

PHYSICS, BUDDHISM, AND POSTMODERN INTERPRETATION

by Dawne C. McCance

Abstract. Arguing that the revolution in postmodern physics is concerned essentially not with a change in paradigm but with a change in interpretive standpoint, this paper explores a parallel between the aetiology of disease in Buddhism and the interpretive standpoint introduced by twentieth-century quantum physics. The paper suggests a need to revise central interpretive assumptions of the natural and human sciences, including the traditional projection of an atomistic self.

The reorganization of Western society in the sixteenth and seventeenth centuries had, as its necessary corollary, a decisive ontological shift. Replacing the Aristotelian view of nature as an organic and purposeful whole, the scientific revolution reunified cosmos, society, and self in terms of the modern mechanistic model. An enthusiastic proponent of the mechanical paradigm and first to formalize it as a philosophical system, René Descartes (1596-1650) conceived the universe as consisting throughout of inert material particles in motion. Mind he set apart as nonphysical and nonspatial—pure reason confronting the outside world as separate object. Descartes' dualism thus claimed an essentially "realist" account of how subjects know their world. In this account, representation consists of *re-production* by detached subjectivity of the external object-world.

Perhaps the most radical change introduced by twentieth-century theory of interpretation concerns the movement away from this Cartesian dualism, which has dominated Western intellectual discourse since the Enlightenment.¹ On one level, this change pertains to the specular ideal of "objective knowledge": the shift in interpretive standpoint has been away from the detached Cartesian observer to an interactive point of view which recognizes the participation of the knower in the known. At the same time, abandonment of the Cartesian posture has involved a

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movement away from the reality concept of classical physics, which lasted from the mid-seventeenth-century to about 1920. Thus, insofar as postmodern interpretation rejects the modern ideal of detached objectivity, it no longer claims the perfect realism of the old mechanistic-atomistic models. We have learned that observation itself is interaction and, therefore, that we can no longer talk about a *Ding an sich*.

The interpretive revolution has been most fully developed in twentieth-century quantum physics, which tells us that the Cartesian subject-object dichotomy no longer provides a possible starting point for understanding in physics. As John Wheeler puts it, "the old word *observer* simply has to be crossed off the books, and we must put in the new word *participator*" (Buckley & Peat 1979, 55). Werner Heisenberg writes that "The familiar classification of the world into subject and object, inner and outer world, body and soul, somehow no longer quite applies, and indeed leads to difficulties" (Heisenberg [1958] 1972, 131).

This transition constitutes what Nicola Dallaporta calls the "de-absolutizing" of contemporary physics: a loosening and, to a certain extent, a break with the narrow correspondence between the conceptual model and nature "in itself" (Dallaporta 1975). As a consequence, quantum physics represents a recovery of the meaning of *theory*. As the Greek root indicates, theory is an insight, a way of looking at the world, and not a factual description of the way things *really* are (Bohm 1980, 3-4). Postmodern physics has therefore abandoned the mimetic-mirror theory of knowledge.

In other words, the twentieth-century crisis in interpretation refers essentially to the collapse of naive realism—that epistemology which claims an exact correspondence between thought, language, and the world. Thus, "When we speak of a picture of nature provided by contemporary exact science, we do not actually mean any longer a picture of nature, but rather a picture of our relation to nature" (Heisenberg [1958] 1972, 134). It is important to emphasize that the difference between the old and new physics concerns this breakup of the naive realist code and not just the replacement of an old "picture" with a new one.

The latter view characterizes much of the popular physics-mysticism literature which has emerged in recent years. For example, the writing of Fritjof Capra (1975, 1982) emphasizes the formulation in quantum physics of a new paradigm. In Capra's view, the concepts of classical physics have proven to be "not fully adequate to describe atomic phenomena." Thus, quantum physics forces us to abandon "the metaphor of the world as machine," promising in place of this metaphor a "consistent world view" characterized by words like *holism*, *system* and *ecology* (Capra 1982, 75-97). It is this world view which Capra finds

remarkably similar to “the views in mystical traditions, especially those of Eastern mysticism” (Capra 1982, 78). In *The Tao of Physics*, for example, Capra likens “the bootstrap and the Mahayana views of matter,” both of which, he says, imply “the unity of all things” (Capra 1975, 301-17).

Stephen Jay Gould sees an ultimate reductionism at work in Capra’s attempt to extrapolate from the subatomic “lowest level” to the oneness of the universe or the “essence of reality” (Gould 1983). More fairly perhaps, the Capra texts attenuate the interpretive implications of contemporary physics: postmodern physics does *not* replace one model, the Cartesian paradigm, with another one, “some new ill-defined or still unexplained conception of reality” (Heisenberg [1958] 1972, 15). Rather, the crisis of physics today involves the recognition and acceptance of the limitation of *all paradigms*. “The point is,” as Heisenberg writes, “we are bound up with a language, we are hanging in the language. . . . We can sometimes by axioms give a precise meaning to words, but still we never know how these precise words correspond to reality, whether they really fit or not . . . we can never know how well these words or concepts fit reality” (Buckley & Peat 1979, 7). In summary, all language is tropological: *all* concepts are “fuzzy,” if not ambiguous.

At stake here, of course, is not simply the collapse of naive realist epistemology and its independent or transcendent observer, but the collapse of the concomitant sense of transcendent individualism, the “I” itself, that has held center stage since the decline of feudal society. As Raymond Williams notes in *Keywords* (1976), *individual* originally meant *indivisible*—comprehensible only as a whole and indivisible from the whole. Only with seventeenth- and eighteenth-century developments in scientific thought, and in Enlightenment social and political thought, did the modern model of the individual emerge. The same Cartesian concepts which rendered nature an “object” independent of humans, thus creating the transcendent “subject,” provided a social physics of the abstract individual, one polarized from society, independent of all others, a disconnected, encapsulated, self-justifying “self.” This view presently threatens not only our physical survival but the survival of *human* community.

In the decentering of the Cartesian subject, then, we confront the de-realizing not only of the reified objects of mechanistic science but also of their counterparts, the abstract entities of atomistic individualism. The “I,” who created the illusion of objectivity “out there” simultaneously with the creation of itself, is now in crisis. It can thus be no coincidence that today’s physicists have included within the scope of their professional writing the ethical crisis of modern individualism. Nor is it a surprise that many Westerners have tried to escape the

pathologies of individualist society by turning to the “holistic” views of Eastern religions.

The interpretive insights of contemporary physics are not entirely new, of course, and we can find parallels to postmodernism in ancient Eastern thought. This paper proposes, however, that such parallels must be focused on theory of interpretation. With this in mind the paper explores a hermeneutic link between the aetiology of disease in Buddhist thought and a theory of interpretation arising out of quantum physics. The conclusion suggests important implications of the Buddhist-postmodern insight for contemporary philosophy and ethics.

BUDDHIST “PHYSICK”

The terms *mysticism*, *Eastern religion*, and even *Buddhism* are reifications. While the historicity of the Buddha has been established at about 600 or 400 B.C., the exact date of his life is uncertain, and of his actual words nothing remains. For the first five hundred years of Buddhist history, the scriptures were transmitted only orally. Moreover, early in the history of Buddhism sects and schisms appeared: approximately eighteen schools, for example, in the first five hundred years. These schools differed markedly, even if sometimes subtly, one from the other; and most claimed their own canon. In light of such historical diversity and complexity, then, it is obvious that the term *Buddhism* cannot denote with precision any specific teaching or practice. Such being the case, we must be careful to indicate precisely what we mean when we use the term *Buddhism*. We must indicate our sources.

This paper will remain as close as possible to the sources of “original” Buddhism, chiefly the Pāli canon. Although as early as one hundred and forty years after Buddha’s enlightenment the schism had occurred which was to produce the Theravāda and Mahāyāna schools, agreement exists between these two schools that the *suttas* of the Pāli canon contain the essence of the Buddha’s own teaching. In addition, these schools allow the high authority of certain extracanonical sources, considered invaluable for the light they shed on the original teachings: *Milindapañha* (*The Questions of King Milinda*); the *Visuddhimagga* (*Path of Purification*) by Buddhaghosa; and the *Bodhicaryāvatāra* by Śāntideva.

Within the canonical texts, Buddha’s teaching emerges in the form of a “medical model.” As Buddhaghosa puts it in his *Visuddhimagga* (see Nyanamoli 1976, 16, 87, 586):

The truth of suffering is like a disease, the
truth of origin is like the cause of the disease,
and the truth of cessation is like the cure of the disease,
and the truth of the path is like the medicine.

Buddhism begins with the diagnosis of suffering, set forth in its most well-known form in the Truth of Suffering, first of the Four Holy Truths preached initially at Benares in the Deer Park immediately after Buddha's enlightenment. Suffering (*dukkha*) characterizes becoming (*samsāra*), the universal round of existence to which human beings are attached by the law of *kamma* and the cycle of rebirth. Significantly, Buddha addressed this diagnosis to an individualistic urban population during a period of intense technological growth, marked by depersonalization, overspecialization, widespread violence, and the destruction of life (Conze 1980, 11-12).

Throughout the scriptures, Buddha presents himself as "all-knowing Physician," the one who "takes away all cause of pain" (see Matics 1970, 152). He calls himself "Supreme Physician," and his *dhamma* "King of Medicines," meaning that healing can be possible only if humankind recognizes the cause of ill. It is important to note, of course, that ethics is "the essence of Buddhism" (Saddhatissa 1970) and that the word *dukkha* describes a fundamentally moral predicament. This "healing," to which Buddha refers in terms of pursuance of the "path," involves, then, an ethical transformation, a "mode of living . . . an entirely new attitude to life" (Conze 1951, 20). At the same time, the healing requires a prior insight into the origin of human disease.

This insight, said to be Buddha's highest, was attained just prior to his enlightenment with his discovery of the twelve links of the chain of causation or "conditioned coorigination" (*paticca-samuppāda*) (Conze 1962, 156). Often painted in Buddhist monasteries as the Wheel of Becoming or the Wheel of Life, the *paticca-samuppāda* formula sets forth the cause of human suffering as well as the condition for its cessation (see Rhys-Davids 1950, 12, 1, 1-2). In the hub of the wheel the three deadly sins—ignorance, hatred, greed—chase each other and keep the wheel in motion, perpetuating the "circle of birth-and-death." The starting point in this endless round, and thus the root cause of human suffering, is the deadly sin of ignorance or illusion (*moha*).

As Buddhaghosa explains it, ignorance involves not so much blindness as self-deception. Not only are we blind in that we cannot fully "see" or "know" Reality, for the Real is transcendent to thought, but we also are self-deceived in that we grant ontic status to a multiplicity of ultimately "un-Real" dichotomic concepts. Thus, ". . . we react to fictitious units, such as 'men,' 'women,' 'things,' . . . It is amongst them that we seek for the permanence, happiness and full control which are found only in Nirvana. But this Nirvana is hidden from our sight by the multiplicity of persons and things. This is the definition of ignorance" (Conze 1956, 153).

Our primordial ignorance derives from the notion of a dichotomized "self." As Betty Heimann observes, Buddhist thought bases itself on a

“biological metaphor,” which considers the universe an organic whole in which all parts interrelate, having functions and purposes relative to the whole (Heimann 1904). For all Buddhists, then, fragmentation is an ontologically “wrong view.” To be sure, the Buddhist does use analytic thinking. Indeed, a favorite subject of meditation is the chariot simile in *Milindapañha*, which illustrates the *anattā* (“no-self”) teaching by analyzing the person in terms of the five factors, elements, or *khandhas* (see Muller 1965, 35:40-45). The very purpose of such exercises, however, is to produce reflective awareness of the limitations of analytic logic.

The *anattā* (“no-self”) teaching illustrates the relation between *moha* (ignorance) and *tanhā* (the life-style of individualism). *Tanhā* is the moral fruit of ignorance, a literal grasping of or clinging to “forms” or “factors,” to the “things” of our own making, including the fictitious “self.” Candrakīrti characterizes *tanhā* as “I-ing” and “mine-ing” (see Sprung 1979, 170); it stems from the ignorance of equating our partial knowledge or experience of the world with Reality itself. For, as the *rūpa* sayings point out, “All created things perish. . . . All created things are grief and pain. . . . All forms are unreal” (see Muller 1965, 10:67-68).

For the Buddhist, the goal of all spiritual life is *Nibbāna* (Sanskrit: *Nirvāna*), which brings release from *samsāra*, the end of rebirth, the cure of disease. The term *Nibbāna* represents “Reality,” the “Whole” or “Truth” greater than and beyond all of our conceptual formulations. *Nibbāna* cannot be defined; it is not “nothing,” but “no *thing*.” Similarly, the Mahayana term *śūnyatā* (“emptiness”) refers not to a void but to the Whole which is indescribable by (empty of) our partial knowledge and arbitrary conceptual divisions. One of the *avyākṛta* (the questions considered by the Buddha to be unanswerable) asks whether the soul is identical with the body or different from it. As T. R. V. Murti comments, Buddha’s silence with respect to this crucial question indicates his view that all speculations are dogmatism, because “the Real is transcendent to thought.” The Buddha answers decisively and critically with silence, says Murti, indicating his awareness that all thought is limited. *Nibbāna* rests beyond our descriptions (Murti 1955, 36-50).

In epistemological terms, *Buddhism* does not deny Reality, but frees it from dogmatic use of theory. To recognize theory as theory is to become self-conscious of it as “un-Real.” This critical standpoint allows freedom from attachment: “When do we know *rupa as rupa*, a theory *as* theory? Not when we are using it implicitly, putting all our trust in it, enamoured of its externals, but only when we realise its shortcomings” (Murti 1955, 46-47, 160).

The important point is that freedom comes only with awareness of the limitations of human thought and that this enlightenment is, at the

same time, discovery of our “dependent origination.” Thus, ethically speaking, *Nibbāna* means freedom from the dis-integrating force of individualism, just as *śūnyatā* “is a term for absence of self, or for self-effacement” (Conze 1951, 131). Recognition of the essential inter-relatedness of all life frees the Buddhist ethically and epistemologically from a fragmented self-world view. This emancipation requires the shattering of two illusions: the illusion of the independence of “objects,” and the illusion of the neutrality of the person or perceiving subject as observer of an “objective” nature. Buddhism clearly sees the person as participant. As Buddhaghosa expressed it so long ago, ignorance is based on “discrimination.” The Enlightened One “knows no barriers” (see Nyanamoli 1976, 9, 42, 333).

FRAGMENTATION AND PHYSICS

In *Wholeness and the Implicate Order*, David Bohm faces “the problem of fragmentation” evident all around us (Bohm 1980, xi, 7). Ours is a planet of divided nations, political and religious factionalism, violence and wars. Competition pits person against person, while fear and anxiety spawn a wide variety of stress-related disease. In our personal lives we experience the fragmentation of disrupted relationships, broken homes, isolation, and monotony in the workplace. Fragmentation obviously produces and reproduces suffering (*dukkha*), and, as Bohm’s analysis makes clear, loss of wholeness, health, or integrity is, as in the Buddhist diagnosis, a moral crisis (Bohm 1980, 3; see also 1985, 125-26).

In Bohm’s view, fragmentation, as a way of life, reproduces itself through a general form of thinking which is fundamentally ignorance or “wrong view.” Again paralleling Buddhist aetiology, this ignorance concerns “the almost universal habit of taking the content of our thought for ‘a description of the world as it is’” (Bohm 1980, 3). Since our thought is necessarily “pervaded with differences and distinctions,” to regard our concepts as directly correspondent with reality perpetuates a fragmentary self-world view. So, “. . . if we regard our theories as ‘direct descriptions of reality as it is,’ then we will . . . be led to the illusion that the world is actually constituted of separate fragments and . . . this will cause us to act in such a way that we do in fact produce the very fragmentation implied in our attitude to the theory” (Bohm 1980, 7).

The cure of the disease requires a letting-go of the objectivist illusion. “For this to happen . . . it is crucial that man be aware of the activity of his thought *as such*, i.e., as a form of insight, a way of looking, rather than as a ‘true copy of reality as it is’” (Bohm 1980, 7). Bohm emphasizes the oneness of reality and therefore considers that it cannot be

contained within our limited conceptual formulations. We simply cannot “get outside” the whole to fully “know” or “reproduce” it. Thus Bohm says: “There is a reality which is beyond man, and includes man, but this is unknown” (Buckley & Peat 1979, 131).² Indeed, “wholeness is what is real,” and always has been. In Western scientific culture, however, we have tended to endow the divided forms and shapes of our perception with the absoluteness of Truth, through the mediation of a transcendent “I.” Postmodern physics challenges this theory of the subject and of meaning.

CONCLUSION

Heisenberg observes that “most biologists today still use the language and the way of thinking of classical mechanics; that is, they describe their molecules as if the parts of the molecules were just stones or something like that. They have not taken notice of the changes which have occurred in quantum theory” (Buckley & Peat 1979, 8).³ Dallaporta agrees, extending Heisenberg’s observation to the social sciences and humanities. Dallaporta writes that physics was the first of the sciences to adopt the ideal of objective knowledge and also the first to leave it behind. Other sciences and disciplines, which acquired the ideal second-hand, still remain firmly attached to it (Dallaporta 1975, 68).⁴

This being so, scholars must obviously pay more attention to the new interpretive situation introduced by postmodern physics. Coming to terms with this situation will, of course, involve the two elements of transition discussed in this paper: movement away from the old idea of “objective” knowledge, and a giving up of the “reality” concept of an atomistic ontology. As suggested, the problem proves to be a profoundly ethical one which includes movement away from the social pathology of abstract individualism. Behind the reification of the term *disease* in the realist ontological theories of contemporary biomedical nosology, we go back to the roots of the term in “dis-ease” or anxiety. Just as in Buddha’s society, so in ours, *dukkha* and *tanhā* are closely related.

The modern idea of scientific objectivity depended on presuppositions which postmodern physics has now undermined. From the Enlightenment to the present, these presuppositions (e.g., the transcendent subject, “objective” meaning, the teleology of reason, etc.) have provided Western culture with what Jean-Francois Lyotard refers to as its “metanarrative” of progress: the master-code behind science and ethics alike (Lyotard 1984). Postmodernism disperses this metanarrative, but the transformation does not generate another metadiscourse or metamodel of “outside reality.” No such metalevel is available to the observer who is also part of the system being observed (see Wilden

1980, 94). Rather, a first premise of post-Cartesian epistemology must be the participation of the knower in the known. For the old ideas of entity, totality, and transcendence we must substitute the more “objectively” valid notions of process, context, and relationship. Our concern is not “a picture of nature” but rather “a picture of our relation to nature” (Heisenberg [1958] 1972, 134).

As an attempt to “see things whole,” postmodernism opens interpretation to a necessary plurality of voices. Yet, as Stephen Toulmin points out, this plurality does not imply idiosyncrasy. It reminds us, rather, that the observer is participator, that is, *in* the system, and that all interpretation begins only at a point where some conceptual framework or theoretical perspective has already been adopted. The task of judging any interpretation therefore includes the task of judging the particular standpoint from which it is offered (Toulmin 1982, 114-17). Indeed, the chief problems of evaluation today lie at this contextual level.⁵

Heisenberg has offered a metaphor illustrative of the new interpretive situation. He suggests that we find ourselves in the position of a captain whose ship has been so securely built of iron and steel that its compass no longer points north but only toward the ship’s mass of iron. With such a ship no destination can be reached. “But let us remember the state of affairs of modern physics: the danger only exists so long as the captain is unaware that his compass does not respond to the earth’s magnetic forces. The moment the situation is recognized, the danger can be considered as half removed” (Heisenberg [1958] 1972, 135).

NOTES

1. See Toulmin (1982). In the present century, theory of interpretation increasingly cuts across traditional disciplinary boundaries; it comprises a new kind of writing which, in the words of Richard Rorty, “is neither the evaluation of the relative merits of literary productions, nor intellectual history, nor moral philosophy, nor epistemology, nor social prophecy, but all of these mingled together in a new genre” (Rorty 1976, 763-64). In addition to the physicists discussed in this paper (e.g., Heisenberg and Bohm), contributors to recent theory of criticism and interpretation include Roland Barthes, Jacques Derrida, Paul De Man, Michael Foucault, Julia Kristeva, Jacques Lacan, Claude Levi-Strauss, Jean-Francois Lyotard, Edward Said, and Anthony Wilden.

2. Here, of course, Bohm challenges naive realism, and not the “real” existence of the whole. Thus, Russell (1985, 148) refers to Bohm as a “critical realist.” The important point is not to debate epistemological labels but to recognize that postmodern interpretation sees the individual as indivisible from, and participating in, the system being analyzed.

3. Although one can qualify Heisenberg’s statement with reference to the development of systemic and ecological perspectives in biology, it still applies to much of contemporary molecular biology and genetics.

4. See, for example, Brown (1983, 550): “Social thought continues to be dominated by a methodological dualism that posits a strict separation between the subject and the object, a standing admonition not to contaminate the data, not to shatter the value-free chrysalis in which the investigator is thought to work. In terms of this dualism, the empirical variables of social theories are taken to represent out-there naturalistic facts.

Stated inversely, this entails a suppression of awareness of the transcendental and practical frameworks that are the preconditions of the meaning and validity of such theories in the first place."

5. The subject of evaluation would be a major paper in itself, but for the moment we might say that epistemologically postmodernism transvalues Cartesian objectivity and neutrality. It requires that we interrogate (and stand morally accountable for) the theoretical presuppositions which lie behind and permit our various scientific discourses. See Brown (1983, 550); Toulmin (1982); Wilden (1980).

REFERENCES

- Bohm, David. 1980. *Wholeness and the Implicate Order*. London: Routledge & Kegan Paul.
- . 1985. "Fragmentation and Wholeness in Religion and Science." *Zygon: Journal of Religion and Science* 20 (June):125-33.
- Brown, Richard Harvey. 1983. "Dialectical Irony: Literary Form and Sociological Theory." *Poetics Today* 4:543-64.
- Buckley, Paul and David Peat, eds. 1979. *A Question of Physics: Conversations in Physics and Biology*. Toronto: Univ. of Toronto Press.
- Capra, Fritjof. 1975. *The Tao of Physics*. London: Fontana.
- . 1982. *The Turning Point*. New York: Bantam.
- Conze, Edward. 1951. *Buddhism: Its Essence and Development*. Oxford: Bruno Cassirer.
- . 1956. *Buddhist Meditation*. New York: Harper & Row.
- . 1962. *Buddhist Thought in India*. Ann Arbor: Univ. of Michigan Press.
- . 1980. *A Short History of Buddhism*. London: George Allen & Unwin.
- Dallaporta, Nicola. 1975. "The Crises of Contemporary Physics." *Diogenes* 89:66-86.
- Gould, Stephen Jay. 1983. "Utopia (Limited)." *The New York Review of Books*, March 3.
- Heimann, Betty. 1904. "India's Biology." In *Facets of Indian Thought*, 37-48. London: George Allen & Unwin.
- Heisenberg, Werner. [1958] 1972. "The Representation of Nature in Contemporary Physics." Reprinted in *The Discontinuous Universe*, ed. S. Sears and G. Lord, 122-35. New York: Basic Books.
- Lyotard, Jean-Francois. 1984. *The Postmodern Condition: A Report on Knowledge*. Minneapolis: Univ. of Minnesota Press.
- Matics, Marion, trans. 1970. *Entering the Path of Enlightenment: The Bodhicaryāvatāra of Śāntideva*. London: Macmillan.
- Muller, Max, ed. 1965. *The Sacred Books of the East*. (SBE) Volume 10: *Dhammapada*. Volume 35: *Milindapañha*. Delhi: Motilal Banarsidass.
- Murti, T. R. V. 1955. *The Central Philosophy of Buddhism*. London: George Allen & Unwin.
- Nyanamoli, Bhikku, trans. 1976. *Visuddhimagga: The Path of Purification of Buddhaghosa*. Berkeley and London: Shambhala.
- Rhys-Davids, Caroline, trans. 1950. *Samyutta-nikāya: The Book of the Kindred Sayings*. London: Luzac.
- Rorty, Richard. 1976. "Professionalized Philosophy and Transcendentalist Culture." *Georgia Review* 30:757-69.
- Russell, Robert John. 1985. "The Physics of David Bohm and its Relevance to Philosophy and Theology." *Zygon: Journal of Religion and Science*: 20 (June):135-58.
- Saddhatissa, H. 1970. *Buddhist Ethics: Essence of Buddhism*. London: George Allen & Unwin.
- Sprung, Mervyn, trans. 1979. *Lucid Exposition of the Middle Way: Essential Chapters from the Prasannapadā of Candrakīrti*. Boulder, Colo.: Prajna Press.
- Toulmin, Stephen. 1982. "The Construal of Reality: Criticism in Modern and Post-modern Science." In *The Politics of Interpretation*, ed. W. J. T. Mitchell, 99-117. Chicago: Univ. of Chicago Press.
- Wilden, Anthony. 1980. *System and Structure: Essays in Communication and Exchange*. London: Tavistock.
- Williams, Raymond. 1976. *Keywords*. London: Fontana.