

ESSAY

Toward a Philosophy of Science in Women's Health Research

ARNOLD L. LETTIERI, JR.

315 East 86 Street, Apt. I-P East, New York, NY 10028

Abstract— Biomedical research on women's health cuts across disciplines, while raising the key philosophical issues of consciousness, mind and brain, and time. The purposes of this paper are to: 1) identify relevant theoretical models of these issues; 2) outline possible connections of the models to significant research in two cross-cutting disciplines; 3) suggest that an interdisciplinary approach does not preclude progress toward a coherent philosophy of science.

Introduction

The venerable kinship of philosophy and medicine survives in a contemporary context which tacitly endorses the traditional wisdom that "Science deals with objective facts, not with subjective values" (Armstrong, 1968). The validity of this science-values dichotomy is questionable from various points of view (Jahn and Dunne, 1994; Sperry, 1966). Professional rivalry is a related problem, together with the deliberate omission from the official history of science of the socially-constructed dimensions of scientific discovery, and their influence on methodological and interpretative disputes (Beloff, 1994; Jammer, 1974).

In the areas of basic, clinical, and public-policy research on women's health, the science-values conflict surfaces as problematic 'gender issues' (Cotton, 1992; Hamilton, 1992). Biological rhythms and life-cycle factors are recognized as critical variables in patient care (Travis and Moore, 1988). In response to the prevailing paradigm of biological determinism in psychiatry, there is growing interest in 'gender-sensitive psychopharmacology', which advocates research and treatment protocols based on women's physiology and responses to medications (Hamilton and Halbreich, 1993; Yonkers et al., 1992). From a wider perspective, the concept of time-sensitive health care finds empirical support in chronobiology (Hayes, Pauly, and Reiter, 1990). The cross-cutting discipline, chronopharmacology, is challenging the medical tradition of prescribing medications for fixed time intervals with little regard for the rhythms which occur at various frequencies (Lemmer, 1989, 1990; Reinberg, 1990).

Sociocultural trends are running in parallel with these shifting paradigms,

ranging from the demands of patient-advocacy groups for changes in the research agenda (Ferraro, 1993), to consumer-driven interest in alternative medicine (Campion, 1993), to public awareness about so-called cosmetic psychopharmacology (Kramer, 1993). In academe, the cross-cutting discipline, women's developmental psychology, is providing a foundation for the conceptual and practical integration of the tacit philosophic issues, therapeutic changes, and social dynamics outlined above (Gilligan *et al.*, 1988; Miller, 1984; Miller *et al.*, 1991; Surrey, 1985).

Women's health research rests upon key philosophical issues: consciousness, time, mind and brain. Three innovative theoretical models are useful in articulating and justifying these issues on logical grounds: (1) consciousness and (2) timekeeping (Jahn, 1993; Jahn and Dunne, 1987); (3) mind-brain interaction (Sperry, 1966, 1986). These models are relevant because the philosophy of science in each, plus their explications of cognitive information-processing, offer suitable frameworks for the values-oriented methodological and therapeutic changes outlined above. The models are summarized below as they relate to the key philosophic issues, and some possible connections of these models to the cross-cutting disciplines of chronopharmacology and women's developmental psychology are discussed briefly.

Theoretical Models

Consciousness

During the reign of behaviorism in American psychology, the study of consciousness, initiated by James (1890), was a taboo research topic; but as the fields of cognitive science and neuroscience have emerged, the study of consciousness has been revived. The prevailing approach to the problem rests upon the premise that a materialistic or reductionistic explanation will be found (Crick and Koch, 1992). A minority view holds that consciousness is related metaphorically to quantum phenomena, effects, and theory (Bohr, 1961; Jahn and Dunne, 1987). Empirical studies of human-machine interactions confirm the hypothesis that human consciousness, directed by intention, plays an active (albeit, small) role in the establishment of physical reality (Jahn, Dobyns, and Dunne, 1991) and displays some gender-related effects (Dunne, 1991). The conventional model of consciousness in Western science and medicine is 'particulate', that is, the cognitive and affective aspects of human consciousness are defined as distinctly separate and isolated in time and space from all other sentient entities. In contrast, the Copenhagen Interpretation of quantum mechanics inspires the 'complementarity model of consciousness', which postulates the addition of a 'wave' or 'penetration' model (Jahn, 1993; Jahn and Dunne, 1994). This complimentary model posits that consciousness can represent itself effectively and accurately by alternating these two fundamental constructs: particle and wave.

Time

James (1890) speculated that the shortest interval which can be perceived as a discrete unit (*i.e.*, 'now' or 'the conscious present') might last for as long as five seconds. Experimental work on human time perception confirms that the duration range of the conscious present is about four to seven seconds — a unit termed the 'quantum-period' (Pöppel, 1972). The complementarity model holds that the concept of time is a construct of consciousness, and that, like the other metric properties of the physical world (such as mass and energy), represents fundamental properties of conscious functioning, in addition to those oscillatory processes which are measurable in physical reality. This model of timekeeping adapts the quantum-period, and proposes the concept of 'consciousness time', which presumes that any wave-like representation of consciousness oscillates like a radar or sonar scan and "acquires experience of its environment by querying it, receiving response from it, and processing that response, all on some base frequency of operation" (Jahn and Dunne, 1987, p. 232). Even though each consciousness has a 'signature' or base frequency of operation, intra-individual shifts in frequency are possible. Consciousness time is variable and non-linear, as distinct from linear and invariable 'physical time'.¹

Mind and Brain

The present consensus among neuroscientists maintains that achieving an understanding of mind-brain relations is a fundamental problem facing their field (Crick and Koch, 1992), and that answers will be found by means of pragmatic materialism, *i.e.*, searching for the neural correlates of mental activities and human behavior (Fischbach, 1992). In a comprehensive analysis, Beloff (1994) surveys the philosophical backdrop of this issue, connects it to the problem of consciousness, deconstructs the materialistic, reductionistic, and phenomenalist positions, and argues cogently for the validity of solutions based on a strong dualism of — or interaction between — mind and brain.

Sperry (1966, 1986) proposes a mind-brain model which, as a modified dualism, challenges the assumptions of much contemporary research by averring

¹Studies in neurophysiology describe the phenomenon of electromagnetic oscillations in the 40Hz range scanning the cerebral cortex every 12-15ms (Joliot, Ribary, and Llinas, 1994). Even if one grants that in the studies of human/machine and remote-perception anomalies there are "no traditional field-driven $1/r^2$ phenomena... involved" (Jahn and Dunne, 1994, p. 160), consciousness time could, however, be hypothesized as the concatenation of three oscillatory processes: the quantum-period of the conscious present; the cycles-per-second (Hz) of the thalamus-generated scanning wave; and the frequency of these scans. The running subtotal of the differences among these variable temporal units may seem insignificant, but their grand total could be enormous when extrapolated, and also represent a unique feature of standing consciousness-wave patterns or 'eigenfunctions of experience' (Jahn and Dunne, 1987). This hypothesis might also yield insights about the subjective perceptions of time and temporal paradoxes associated with quantum cosmology (Deutsch and Lockwood, 1994).

that "the qualities of subjective experience need not correlate with the diverse particulate components of the neuronal infrastructure, only with the function of the active process as a whole" (Sperry, 1986, p. 16). This holistic model pivots on the postulation of "ideas as causal forces," with potency on a par with cells, molecules, and neurons (Sperry, 1966, p. 4). The hierarchical structure of the model includes eight levels in ascending order: subnuclear, subatomic, atomic, electrochemical, physiological, subjective sensation (joy, pain, sadness, etc.), mental forces (belief, reason, cognition, emotion, intuition, insight, judgment, perception), and abstract ideas. The laws of neuroanatomy, biochemistry, and genetics are the necessary conditions for the operation of the levels, but they are not the sufficient conditions for defining mental phenomena. This model posits that ideas, ideals, and mental forces can exert "downward control" on the margins of the physicochemical levels.

Cross-Cutting Disciplines

Chronopharmacology

Across the spectrum of the material world — ranging from quanta of energy, atoms, cells, and neurons, to microorganisms, plants, animals, and humans, to the celestial mechanics of our planet's orbital geometry — periodic processes and oscillatory cycles mark the flow of physical time (Hayes, Pauly, and Reiter, 1990; Reichenbach, 1958.) Traditional medical practice posits that each patient constitutes a particulate 'anatomy in space'. Chronopharmacology adds that each patient also represents an 'anatomy in time', which is the total of all biological rhythms within the body (Reinberg, 1990).²

Building on this distinction, the theoretical foundations of chronopharmacology include these high-concept, interdisciplinary elements: humans-as-open-systems; temporal dissipative structure (coherent oscillatory behavior); non-linearity; and feedback and cross-coupling (Edmunds, 1989). On the phenomenological level, there is an acknowledgment that humans measure time through 'functional biochronometry': (a) perceptual modes attuned to alterations in daylight; (b) *Zeitgedachtnis* or intuitive time-sense; (c) lunar-linked regularity of menstrual cycles. The unifying notion is that human time-keeping includes environmental (objective) and biological (subjective) correlates, plus variable and invariable elements. These components describe the bases of the biological rhythms responsible for a patient's 'synchronization', which is a very important concept clinically (Reinberg, 1990).

The empirical foundations of chronopharmacology are based upon mounting evidence for three key phenomena (Lemmer, 1989). First, non-randomicity: neither the onset nor the symptomatology of some diseases follow a ran-

²The physical concept of anatomy in time may provide a basis for understanding how the retardation of clocks in Einstein's theory of relativity (commonly illustrated by the "twin paradox") can be applied to living organisms (Reichenbach, 1958).

dom pattern of distribution over a 24-hour period. Second, time-dependency: relationships between drug dosage and response (including side effects) for numerous medications differ according to the time of day of their administration. Third, pharmacokinetics: the parameters of drug action, such as half-life, absorption rate, and time-to-peak concentration, are influenced by biological and environmental rhythms. Biological rhythms (also known as 'bioperiodicities') track on time scales at all hierarchical levels of organization (cellular, systemic, metabolic) within the human body. This makes it theoretically-possible to calculate dosages and clinically-practical to prescribe them on the basis of the periodic and predictable effects which they produce according to the time of day, month, season, or age of the person. Lemmer (1989) points out that while we may have adequate information about the kinetics (the "how") of drug action, the underlying mechanisms (the "why") are far from being completely understood — especially with regard to emotional disorders such as manic depression, and illnesses thought to involve psychogenic aspects such as allergies.

Other useful clinical concepts include: bioperiodicity, entrainment, *Zeitgeber*, and phase-shift. A bioperiodicity (or biological rhythm) is an endogenous, genetically-determined, self-sustaining oscillation which forms an adaptive response to environmental factors (including the daily rotation of the earth, and its annual orbit around the sun). A remarkable feature of a bioperiodicity is that it can be entrained (coupled) to an exogenous time signal, which is called a *Zeitgeber*. This entrainment can cause a phase-shift, that is, the bioperiodicity then runs along the same time scale or period as the *Zeitgeber*, which maintains tempo in a manner analogous to an orchestra conductor. Examples of a *Zeitgeber* are: timing of meals; alterations of darkness and daylight; daily hospital-visits from physicians; encounters with health professionals which trigger increases in a patient's blood pressure, *i.e.*, 'White Coat Syndrome' (Weil, 1995); plus other social cues and interactions.

The complex interaction between the patient's synchronization (largely influenced by *Die Zeitgeber*, as well as social and environmental interactions), and the innumerable bioperiodicities within each patient, are far from being understood. This much, however, is clear: "the subject's synchronization... must be known to correctly interpret changes in kinetics and/or effects related to the dosing times of a given agent" (Reinberg, 1990, p. 17). This requires that a thorough social history be taken and accorded comparable weight alongside objective test results, but this history is often dismissed by physicians as too time-consuming and subjective (Weil, 1995).

Discussion

Chronopharmacology models the patient as a 'space-time structure'. Philosophically, this implies that the human person comprises two primordial aspects: 'substantiality' and 'relationality'.³ The many bioperiodicities (or temporal reality) of the patient are established through cognitive, affective, and

perceptual interactions with the environment. Chronopharmacology does not deny the vital importance of treating those patients who are either in medical-crisis or shock-trauma conditions as closed systems. Rather, it advocates that chronic disorders and longer-term illnesses require complementary or holistic approaches which treat patients as open systems; these 'alternative' treatments enable temporal dissipative structures to serve healing functions. Correspondingly, the complementarity model of consciousness reflects a homologous philosophic view of the human person by positing the representation of consciousness in two distinct modes: 'particulate' (substantiality) and 'wave-like' (relationality). Essentially, each consciousness is an open system whose physical reality is established through cognitive, affective, and perceptual interactions with its environment. The empirical evidence for the capacity of consciousness to shape some randomly-generated processes and events seems to suggest that it might possess the ability to defy the Second Law of Thermodynamics and induce order. In this way, consciousness may be compared to a dissipative structure. Given that human physiological functioning exhibits varying degrees of randomness in a plethora of exchanges involving information and energy, the possibility exists that conscious volition may influence health and healing (Jahn, 1995).

Chronopharmacology asserts that a rigid policy of prescribing medications according to linear time (fixed clock-hours) is ineffective, because bioperiodicities are non-linear, *i.e.*, they follow their own respective clocks, time trajectories, or base frequencies of operation; and also because they are variable, *i.e.*, they can be entrained by a *Zeitgeber*. This position does not deny that the medication regimen itself may sometimes serve as a *Zeitgeber*. Rather, it argues for the clinical evidence which documents the gradually-diminishing effectiveness of certain medications when they are administered without regard to the characteristics of bioperiodicities.

The commonalities shared by the complementarity model of consciousness and the chronopharmacology model are illuminated by the concept of 'consciousness conjugates' (Jahn and Dunne, 1994). These construct-pairs provide complementary descriptions of tangible and intangible properties and processes (Table 1). Within a materialistic-reductionistic philosophy of science, each pair presents a mutually-encumbering contradiction, thus forcing a choice. The two models under discussion suggest that any two conjugates may be combined in a mutually-fulfilling ratio, as the clinical judgment of the physi-

³The notion of relationality has roots in Plato, Plotinus, and the Neoplatonic doctrine of the 'intrinsic self-diffusiveness of the good'; Aquinas incorporated this in his metaphysics of the person, together with Aristotle's idea that a person is inherently a substance (Clarke, 1993). If the primordial aspects of substantiality and relationality are compared to complementary classical pictures in the Copenhagen Interpretation, then Bohr's "relational conception of quantum states" (Jammer, 1974, p. 197) becomes useful in explicating the quantum mechanics of experience in the complementarity model of consciousness. In fact, Jammer even compares Bohr to Aquinas in describing Bohr's response to the so-called Einstein-Podolsky-Rosen argument.

TABLE 1
Consciousness Conjugates

Anatomy in Space/Anatomy in Time	Entropy/Order
Environmental/Biological	Variable/Invariable
Linear/Non-linear	Pharmacokinetics/Pharmacodynamics
Closed System/Open System	Substantiality/Relationality
Objective/Subjective	Time Independent/Time Dependent
Random/Nonrandom	Feminine/Masculine

cian assesses the needs of each patient. Another implication is that the ratio or balance of the conjugate pairs may be different for male and female patients.

Beloff observes that "there is just no comfortable solution to the mind-brain problem" (1994, p. 521). Clearly, this mind-brain model does not solve the mystery, but it does provide a practical framework which is useful for integrating the concepts and phenomena described above, especially conscious volition and anatomy in time. If one grants the presumption that mental forces and ideas are the constructs of consciousness, and also that they can have causal potency within certain limits, then medical anomalies such as the placebo effect, alternative medicine, and the spontaneous remission of serious illnesses begin to make sense. This may occur because randomness is a pervasive feature of all physiological functioning and information processing, and, therefore, human health and disease (Jahn, 1995). If one assumes that consciousness time serves as a 'calibration chronometer' for the myriad of bioperiodicities at each hierarchical level of the mind-brain model, then one has a basis for explicating biofeedback-type healing protocols like hypnosis, meditation, and music therapy. These strategies share at least one common element: a new tempo is established by a *Zeitgeber* (e.g., the hypnotist's voice, focus on breath control, or attention to a specific melody).

Perhaps the phenomenological mechanism is: If one can control the clock, then one can control the randomness, and induce order. On a more conceptual level, if one accepts the premise that ideas and ideals consist of information and energy in a coherent form (analogous to a holographic image), then the knotty argument which states that mind and brain cannot interact (because they do not have anything in common) starts to unravel.

Women's Developmental Psychology

Two perspectives in women's developmental psychology supply gender-sensitive contexts for the above. These are the models of relational development (Miller, 1984; Miller *et al.*, 1991; Surrey, 1985), and linguistic-moral development (Gilligan *et al.*, 1988).

Classical theories of personality and human development tend to define the 'self' in ways that "emphasize separation and individuation" as the hallmarks of maturity, while "neglecting the intricacies of human interconnection"

(Miller, 1984, p. 1). The 'self-in-relation' approach objects to this static and particulate paradigm of the self as being biased toward masculine idealizations while neglecting the actual experience of women; and counters with the thesis that "the self develops in the context of relationships, rather than as an isolated or separated autonomous individual" (Surrey, 1985, p. 7). This two-way interactional model of the self postulates four key concepts: oscillatory self-structure, oscillating mother-daughter introject, synchrony, and mutually forming processes. The oscillatory self-structure is the intra-personal dynamic which enables women to "move from one perspective to another as the needs of the relational situation arise" with the expectation that this oscillatory process will lead to shared empathy, "empowerment, and self-knowledge" (Surrey, 1985, p. 7). The oscillating mother-daughter introject is an interpersonal dynamic which allows the relational self to develop within the context of the mother-daughter relationship. It follows from this that timing (or periodicity) is very important, because both personal identity and the relationship develop in synchrony. The notion of mutually forming processes suggests that the "self, other, and the relationship are no longer clearly separated entities" (Miller *et al.*, 1991, p. 4).

The linguistic-moral model specifies a 'two-voice perspective' whereby language exerts widespread influence not only on human development, but also in the fields of psychology, education, and medical education (Gilligan *et al.*, 1988). These voices are the 'justice perspective' and the 'care perspective', and they can be heard when people speak about their approaches or orientations while solving moral problems and dilemmas. "This shift in voice and perspective" creates uncertainty about "the meaning of such key words as 'self', 'relationship', 'morality', and 'development'" (Gilligan *et al.*, 1988, ii). Despite the fact that the care perspective is more frequently identified among women's voices and may be described as 'gender-related', this research does not endorse gender-specific equations of care-equals-female or male-equals-justice. Instead, the two-voice framework (like the relational approach) challenges the conventional models of human development which equate "adulthood with a justice perspective, and maturity with separation, self-sufficiency, and independence" (Gilligan *et al.*, 1988, v).

Discussion

These two approaches to human development and the three models fit like locks and heuristic keys. For example, the relational model fills important gaps in the theoretical models because it defines the 'self' and explicates its role in psychological development. If the self-in-relation is placed at the top of hierarchical mind-brain model, then consciousness — directed by intention or volition — becomes an ethical, emotional, and cognitive 'gyroscope' with causal efficacy in interpersonal relationships. The two voices have the ideals of justice and care as their respective foundations; therefore, each are capable of causal potency in the mind-brain model. Other striking parallels may be

seen in the role which oscillatory processes play in the relational and consciousness-time models with non-linearity as the unifying theme. Perhaps the basic similarity shared by all of these approaches (including chronopharmacology) is their emphasis on **interaction-as-shaper-of-reality**: between consciousness and environment, mind and body, synchronization and drug-response, self and other, or the oft-ambiguous demands of care and justice.

Areas for Future Research

There have been innumerable and substantial barriers to the advancement of women's health research, but those which are especially relevant to future progress are the persistent "devaluation of women in society" as well as the "low status of women in science" (Hamilton, 1992, p. 321). Another significant factor is the influence of biological determinism, which is a special case of scientific materialism. These assume that human behavior (and by extension, states of health and disease) can be explained solely in physicochemical terms, without recourse to mental, introspective, cognitive, subjective, spiritual, cultural, or psychological terms. Clearly, the three models and two cross-cutting disciplines are red-lining these barriers, constructing gateways through them, and pointing the way toward a more comprehensive synthesis. Possible areas to explore are: (1) integrating the models of consciousness, time, mind-brain, self-in-relation, linguistic-moral development, and the conceptual basis of chronopharmacology into one theoretical framework for application to gender-sensitive psychopharmacology; (2) the explication of a mathematical formalism relating physical time and consciousness time for basic research and clinical applications of patients' 'synchronization' in psychopharmacology.

Conclusion

The personal process of articulating a position, such as a philosophy of science, requires the momentum of thinking about thinking. Conversely, defining one's position on cognition, perception, and the problems of knowledge implies a philosophy of science, while revealing a gender-sensitive gauge of human nature. We cannot escape these mutually forming processes, or the price which we must pay for them — a sort of uncertainty principle of consciousness. The exercise of clinical judgment is a gentle art which tries to balance the traits, values, and behaviors which social convention dichotomizes simplistically as 'feminine' and 'masculine'. Bohr frames these issues aptly: "How can that part of reality which begins with consciousness be combined with those parts that are treated in physics and chemistry?... Here we obviously have a genuine case of complementarity" (1961, p. 115).

Acknowledgments

The author thanks Brenda J. Dunne, Margaret F. Jensvold, M. D., Prof. Robert B. Nordberg, and the two anonymous reviewers for their helpful comments on an earlier version of this article.

References

- Armstrong, D. M. (1968). *A Materialist Theory of Mind*. London, Routledge and Kegan Paul.
- Beloff, J. (1994). The mind-brain problem. *Journal of Scientific Exploration*, 8, 509.
- Bohr, N. (1961). *Atomic Theory and the Description of Nature*. Cambridge: University Press.
- Campion, E. W. (1993). Why unconventional medicine? *New England Journal of Medicine*, 328, 282.
- Clarke, F. N. (1993). *Person and Being*. Milwaukee, WI: Marquette University Press.
- Cotton, P. (1992). Harassment hinders women's care and careers. *Journal of the American Medical Association*, 267, 778.
- Crick, F. and Koch, C. (1993). The problem of consciousness. *Scientific American*, 267, 152.
- Deutsch, D. and Lockwood, W. (1994). The quantum physics of time travel. *Scientific American*, 270, 68.
- Dunne, B. J. (1991). Co-operator experiments with an REG device (Technical Note PEAR 91005). Princeton Engineering Anomalies Research, Princeton University, School of Engineering/Applied Science.
- Edmunds, L. N. (1989). Series introduction. In B. Lemmer (Ed), *Chronopharmacology: Cellular and Biochemical Interactions*. New York: Dekker.
- Ferraro, S. (August 15, 1993). The anguished politics of breast cancer. *New York Times Magazine*.
- Fischbach, G. D. (1992). Mind and brain. *Scientific American*, 267, 48.
- Gilligan, C., Ward, J. V., Taylor, J. M., & Bardige, B. (Eds) (1988). *Mapping the Moral Domain*. Cambridge: Harvard University Press.
- Hamilton, J. A. (1992). Medical research: the forgotten 51%. Special report in *Medical and Health Annual, Encyclopedia Britannica*, 317.
- Hamilton, J. A., and Halbreich, U. (1993). Special aspects of neuropsychiatric illness in women: with a focus on depression. *Annual Review of Medicine*, 44, 355.
- Hayes, D. K., Pauly, J. E., & Reiter, R. J. (Eds) (1990). *Chronobiology: Its Role in Clinical Medicine, General Biology, and Agriculture, Vol. 1 & 2*. New York: Wiley-Liss.
- Jahn, R. G. (1993). The complementarity of consciousness. In K. R. Rao (Ed), *Cultivating Consciousness for Enhancing Human Potential, Wellness, and Healing*. London: Praeger.
- Jahn, R. G. (1995). "Out of this aboriginal sensible muchness...": consciousness, information, and human health. *Journal of the American Society for Psychical Research*, 89, 301.
- Jahn, R. G. and Dunne, B. J. (1987). *Margins of Reality: The Role of Consciousness in the Physical World*. New York: Harcourt Brace Jovanovich.
- Jahn, R. G. and Dunne, B. J. (1994). The spiritual substance of science. In W. Harman (Ed), *New Metaphysical Foundations of Modern Science*. Sausalito, CA: Institute of Noetic Sciences.
- Jahn, R. G., Dobyns, Y. H., & Dunne, B. J. (1991). Count population profiles in engineering anomalies experiments. *Journal of Scientific Exploration*, 5, 205.
- James, W. (1890). *The Principles of Psychology, Vol. 1*. New York: Henry Holt.
- Jammer, M. (1974). *The Philosophy of Quantum Mechanics*. New York: John Wiley and Sons.
- Joliot, M., Ribary, U., & Llinas, R. (1994). Human oscillatory brain activity near 40Hz. coexists with cognitive temporal binding. *Proceedings of the National Academy of Sciences, USA*, 91, 11748.
- Kramer, P. D. (1993). *Listening to Prozac*. New York: Viking.
- Lemmer, B. (Ed) (1989). *Clinical Chronopharmacology: Cellular and Biochemical Interactions*. New York: Dekker.
- Lemmer, B. (1990). Clinical chronopharmacology of neuropsychiatric medications. In A. Reinberg (Ed), *Clinical Chronopharmacology: Concepts, Kinetics, Applications*. New York: Hemisphere.
- Miller, J. B. (1984). The development of women's sense of self. *Work in Progress*. Wellesley, MA, The Stone Center.

- Miller, J. B., Jordan, J. V., Kaplan, A. G., Stiver, I. P., & Surrey, J. L. (1991). Some misconceptions and reconceptions of a relational approach. *Work in Progress*. Wellesley, MA: The Stone Center.
- Pöppel, E. (1972). Oscillations as possible basis for time perception. In J. T. Fraser, F. C. Maker, & G. H. Muller (Eds), *The Study of Time: Proceedings of the First Conference of the International Society for the Study of Time*. (Oberwolfach, West Germany, 1969). New York: Springer-Verlag.
- Reichenbach, H. (1958). *The Philosophy of Space and Time*. New York: Dover.
- Reinberg, A. (1990). Concepts of chronopharmacology. In A. Reinberg (Ed), *Clinical Chronopharmacology: Concepts, Kinetics, Applications*. New York: Hemisphere.
- Sperry, R. W. (1966). Mind, brain, and humanist values. *Bulletin of the Atomic Scientists*, 22, 2.
- Sperry, R. W. (1986). Consciousness, personal identity, and the divided brain. In F. Lepore, M. Ptito, & H. H. Jasper (Eds), *Two Hemispheres, One Brain: Functions of the Corpus Callosum: Proceedings of the Sixth International Symposium of Centre de Recherche en Sciences Neurologiques of the Universite de Montreal* (Quebec, Canada, 1984). New York: Liss.
- Surrey, J. L. (1985). *Self-in-relation: A theory of women's development*. *Work in Progress*. Wellesley, MA.: The Stone Center.
- Travis, C. B. and Moore, P. L. (1988). Psychotropic drugs: treatment issues. In C. B. Travis (Ed), *Women and Health Psychology: Mental Health Issues*. Hillsdale, NJ: Lawrence Erlbaum.
- Yonkers, K. A., Kando, J. C., Cole, J. O., & Blumenthal, S. (1992). Gender differences in pharmacokinetics and pharmacodynamics in psychotropic medication. *American Journal of Psychiatry*, 149,587.
- Weil, A. (1995). *Spontaneous Healing*. New York: Knopf.