

Biological Priority and Psychological Supremacy: A New Integrative Paradigm Derived From Process Theory

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Process theory is a comprehensive theory of physical and psychological processes that can serve to integrate biological, social, and psychodynamic psychiatry. Process theory uses concepts derived from mathematical dynamics and Heraclitus's process philosophy. It provides three novel and clinically applicable concepts: 1) biological priority and psychological supremacy (as contrasted to theories of biological or psychological primacy), 2) union of opposites (as contrasted to psychoanalytic and dialectic conflicts and to systems homeostasis), and 3) creative bifurcations (as contrasted to determinism and developmental theories).

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Although most clinicians now recognize the need to integrate biological, social, and personal factors in psychiatric care, efforts have been hampered by the lack of a comprehensive theory. Eclecticism is not sufficient, as it neglects to indicate when one framework might be more important than another in the cause or treatment of a particular disorder (1). The enormous economic and human cost of experimentation in the clinical and social sciences indicates the need to use theoretical approaches. Systems theory, adopted by many American psychiatrists (2, 3) as a possible integrative framework, falls short of the task because it does not provide guidelines regarding the sequence in which problems are to be treated (1). On the basis of systems theory, Engel (4) proposed a sequential biopsychosocial approach, while Pribram (5) advocated that treatment can start at any point, since to change any part is to change the whole. Both of these concepts are at variance with sociological and sociobiological formulations, all of which recognize that social processes precede the development of personal individu-

ality in the history of the species as well as of each person. This is the biosociopsychological method implied by process theory (figure 1).

Most process theories have been modeled in physics (mechanism) and have used mathematical models (e.g., Newton's dynamics). Others have taken the model of social discourse (dialectics, Socratic, Hegelian, Marxist) or the biological and psychobiological models that first inspired Heraclitus. Freud drew from all three traditions, assuming that psychological processes follow the same laws as mechanical and biological processes and basing his psychodynamics on the dynamics of his time. Adopting this assumption leads us to reformulate psychodynamics in terms of the nonlinear dynamics of our time (6). Process theory is here presented as a comprehensive model for patient care, with particular emphasis in the integration of biological, social, and psychological interventions.

Classic dynamics adopted a mechanical model in which the past determines the present; classic thermodynamics focused on closed systems. Both traits carried over to psychological theory. Humans, however, are open systems, that is, processes, in constant interaction and change. Closed systems tend to equilibrium ("point attractor"), a concept implicit in Freud's drive theory as well as in system formulations of family homeostasis. Open processes have two additional patterns, cyclicity as in seasonal and biological rhythms, and creative bifurcations ("chaotic attractors") such as in the formation and partition of physical systems, biological mutations, and psychological creativity. Dynamics was revolutionized by the discovery that, in open systems, disordered flux can spontaneously create novel structures. These "bifurcations" explain the possibility of evolution and of human creativity and free will. Currently, bifurcation theory is one of the most active fields of applied mathematics, including diverse applications from physics to physiology.

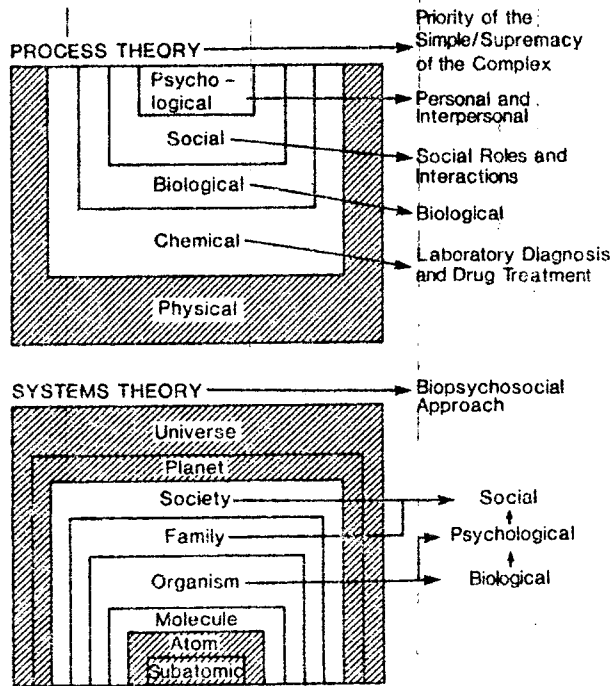
Basic concepts from modern dynamics have drastically altered the classic concept of homeostasis (7) and have already entered biological psychiatry (8, 9). There is, however, no conceptual interpretation of dynamics suitable for its application to psychological issues. A search for such interpretations leads us to the philosophical theories of processes originating with the fifth century B.C. Ionian philosopher Heraclitus. Marmor (3) has suggested that Heraclitus's process theory can

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FIGURE 1. Two Integrative Models in Psychiatry and the Corresponding Clinical Approaches^a



^aProcess theory recognizes two oppositely directed hierarchies: Complex processes predominate by their complexity, while simple processes predominate by their priority and greater extension. According to process theory, social processes precede personal ones. Sociobiological and sociological theories (Marx) as well as non-Marxist indicate that social and familial processes are simpler and precede the personal (psychological) level; there are many more individual personalities and life histories than the relatively small number of social roles.

Systems theory postulates a hierarchy of systems, arranged according to their size, each containing the others as Chinese boxes or Russian dolls. It suggests a biopsychosocial model, although the biological and psychological levels cannot be differentiated by this criterion. Although systems theory separates subatomic and astronomical physical entities, the same physical laws govern the motion of particles and stars (Newton). Systems theory, as well as traditional psychoanalysis, considers psychological processes more fundamental and social processes as the result of the interaction between individuals.

serve as the integrative framework required in modern psychiatry. Jung explicitly referred to Heraclitus's theories, while Freud incorporated them through Hegel's dialectic model (10).

CASE REPORT

We shall introduce process theory by means of a clinical example, illustrating a series of concepts to be defined in the next section.

Ms. A sought therapy after her internist diagnosed depression and prescribed an antidepressant; she was upset with his "attempt to treat the symptoms" and turn her into a "drug addict." Following the concept of psychological

supremacy, the psychiatrist accepted her view of the problem as psychological but also instructed her in the need to take care of biological priorities. Depression was explained to her as encompassing the entire person (oneness or monism), decreasing both biological and psychological energy (dynamic monism), and thereby interfering with learning and performance required for effective psychotherapy. This served to justify the use of antidepressants as part of, rather than as an alternative to, psychological treatment. (Conversely, a patient who suffers only from a "chemical imbalance" may be made to see that the unity of the person makes all biological processes have psychological consequences combining biological, social, and psychological therapy.) Following the concept of the union of opposites, depression was viewed as a component of a conflictual relationship, and both her occupational and familial interactions were explored. Alone, and with her family, she was invited to discuss systematically the entire range of functions, beginning with the simpler material needs (health and economic problems), then progressing to interpersonal and existential issues (the biosociopsychological approach).

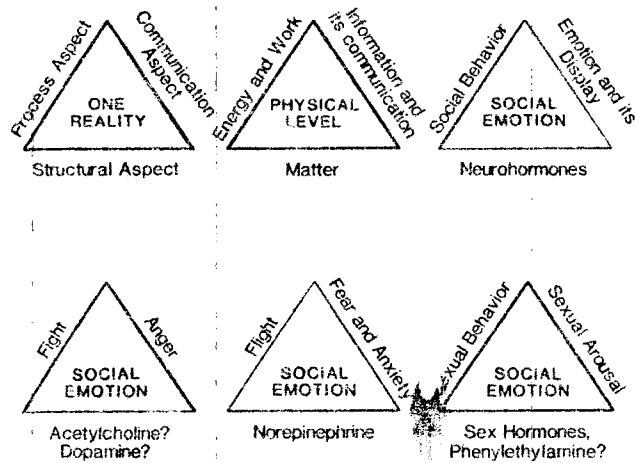
Significantly, both she and her husband were experiencing difficulties with employment because of the unfavorable situation in their field. He was also found to be depressed, illustrating the similarity of opposites. Marital conflicts included her resentment at his overt dominance (male supremacy) and his dependency on her and his mother (female priority). Marital therapy was instituted. Ms. A was also placed in a therapy group to develop more creative behaviors to deal with conflict. Her present problems were examined in a historical context, including her developmental history as well as family history and a discussion of current social transformations as they influenced her life. Family history revealed recurrent patterns of oversubmissive behavior in the female members of the family that dated back three generations. It also indicated decisive turning points (bifurcations) that created novel and unpredictable new patterns of interaction, such as the early death of her mother, which reinforced identification, and her creative resolution of a speech defect through singing, which gave her confidence in psychological therapy. This illustrates the process approach, which attends to both deterministic causation and creativity, as well as to both present processes and past history, including but not limited to personal development. Therapy was also based on the concepts of dynamic monism (energy, power), opposition (harmonic and conflictual), and process (deterministic and creative): It thus focused on empowering the patient pharmacologically, socially, and psychologically; providing insight into inherited and learned behaviors as well as external social processes; and developing confidence and creativity.

While many psychiatrists use similar approaches on an empirical basis, process theory provides a framework with which to integrate these different therapeutic modalities.

PROCESS THEORY

Process theory proposes that everything is a process containing and exchanging energy. Energy flow differentiates opposites, and creative evolution results from

FIGURE 2. Models of the Energetic, Informational, and Material Aspects of Entities^a



Every entity has three aspects: a changing process, a form, and a relatively stable structure. For instance, everything that exists is a physical entity, and every physical entity has energy, contains information, and is made up of matter. Similarly psychological processes consist of the exchange of information. This information is carried by synaptic and action potentials (energy), which in turn are a movement of sodium, potassium, and other ions (matter). The energetic, informational, and material aspects can also be illustrated for more complex entities such as social emotions.

the universal intercourse of opposites. The word "process" derives from the Latin "to proceed or move forward." This differs from other views of change as isolated events, fluctuations around equilibrium states, homeostatic maintenance of a steady state, cyclic repetitions, or random variations.

Everything is a process of unidirectional flow of energy, bidimensional cycles of information, and tridimensional structuration of matter. As a consequence, there is an overall evolution from the simple, which has priority, to the complex, which acquires supremacy. Energy, information, and matter are three inseparable aspects of all natural and human processes (figure 2). Energy, matter, and information are not three separate things, as postulated by some systems theories (11). Heraclitus said that everything is fire and logos; today we say energy and information. Oneness, opposition, and creativity are three universal qualities of all that exists. Unidirectional flow, bidimensional cycling, and tridimensional structurations are three inseparable patterns of change. Process theory thus postulates three fundamental tenets as universal laws of all processes (12), which we have reformulated in modern terms (13).

Dynamic Monism, the Unifying Flow of Energy

Through psychobiological studies and psychopharmacological treatments, twentieth-century psychiatry has achieved some success in bridging the mind/body gap. Most psychiatrists accept that brain and mind are

inseparable and that biological and psychological treatments must often be combined; the concept of dynamic monism provides a scientific formulation of this view, and the notion of biological priority and psychological supremacy serves as a guideline to apply it in clinical practice.

Everything is part of a process of uni-versal, uni-directional, and uni-fying flow of energy. Everything is energy and hence changes spontaneously and constantly interacts; nothing is static, nor does change require an external cause. Biological and psychological energy are complex manifestations of simpler physical energy. Body and mind, matter and spirit, and physical, social, and psychological processes, no matter how apparently varied and heterogeneous, all are forms of energy. The flow of energy increases entropy (second law of thermodynamics), corresponding to the unidirectional flow of time. Hence, everything is one and moves unidirectionally. The term "universe," meaning all as well as unidirectional flow, captures the meaning of dynamic monism. As everything is constantly changing energy, everything is one and is many. This dynamic monism is well-founded in modern physics. The first law of thermodynamics postulates the conservation of energy and mutual transformation of its various forms. Einstein demonstrated the interconvertibility of matter and energy; matter is bound energy. Even empty space, which we call void because it contains neither matter nor information, is full of energy according to modern physics and displays flux and chance. The mathematical theory of communication (14) shows how information is a physical property; information is a form such as a pattern of change or a material structure (e.g., genetic information is contained in the structure of DNA). Conversely, there also is a material basis for thoughts and feelings in brain metabolism. Psychological and cultural processes are complex, that is, they contain a high density of information. In turn, even the simplest physical stuff is heterogeneous and complex (i.e., contains information).

Monism is implicit in the biological roots of many psychiatric disorders and in the growing evidence for psychosocial factors in medical illnesses such as coronary artery disease and hypertension. Monism is the core of the modern approach to psychiatry, which combines pharmacological treatment and psychological intervention. In contrast, many physicians and psychologists still adopt the traditional dualistic view in their diagnosis and treatment: either biological or psychological, but not both. Even psychiatrists who recognize in theory the interrelation between biological and psychological processes may still adopt the traditional dualistic view in their practices for lack of time or lack of integrative theory. The traditional division between matter and mind is manifested in psychiatry in the differential diagnosis between emotional dysfunctions of biological origin versus those of developmental or interpersonal origin. Psychopharmacological treatment without psychotherapy implies a materialistic theory of biological psychiatry in which

mental dysfunctions are simply biological illnesses. In treating patients exclusively with psychotherapy, psychologists and psychoanalysts imply an idealistic view according to which emotional dysfunctions are purely a matter of cognition or interpersonal conflict.

According to monism, brain and mind are inseparable but different; in clinical terms, one must combine pharmacological and psychological therapies because neither replaces the other. A practical implication is that one may need to treat separately the intrapsychic, the behavioral, and the biochemical aspects of a given dysfunction. In fact, clinical studies suggest that pharmacotherapy and psychotherapy influence different aspects of depressive illness. This exemplifies a basic tenet of process theory: The energetic process, the material substrate, and the informational content coexist in all phenomena but are not identical. For instance, each pattern of social behavior (energy) is associated with specific nervous structures and transmitter molecules (matter) and with a specific subjective emotion and a pattern of emotional display (information), but these three components can be separated: We may be angry but inhibit our aggressive behavior, escape without feeling fear, submit while enraged. This partial separation of complementary aspects, however, does not imply the total separation of dualism. Dualism is implicit in the distinction between the form and the content of illness advanced by phenomenologists who attribute the first to biological factors, the latter to life experiences (15). According to process theory, there is fundamental union between all aspects of a process. Anxiety, rage, and depression, for instance, are always the concomitants of interpersonal conflict and of specific biochemical changes, and vice versa. Whereas phenomenology suggests the separate consideration of the form and the content of the illness in diagnosis and treatment, process theory proposes that the two are specifically connected. Conflict and defeat are the specific interpersonal concomitants of anxiety and depression. More generally, the energy, information, and matter are inseparable but distinct aspects of processes. This difference in unity illustrates the more general concept of the union of opposites.

Union of Opposites, the Exchange of Information

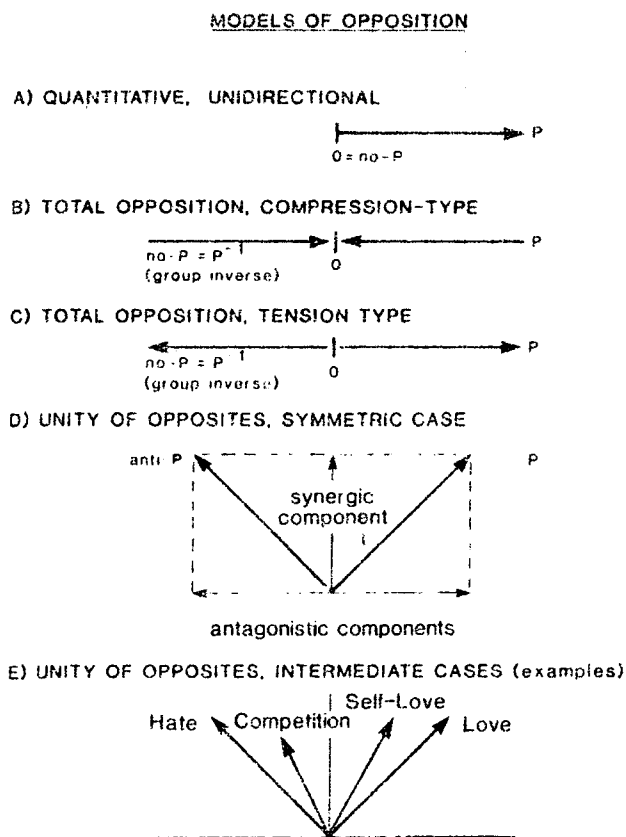
Oppositions organize processes. Every process includes two or more mutually opposing subprocesses that interact with each other in a recurrent fashion and whose alternative predominance creates cyclic change. Opposites coexist in every process; there is no harmony without conflict, no separation without union, no difference without similarity, no love without self-love, no conscious without unconscious. There is a unity in opposites and there are opposites in each unity. Opposites are not only different but also essentially similar (16). This concept of the union of opposites contrasts with conflict theories such as those of Darwin, Marx, and Freud, which make conflict—not harmony—the major motor of becoming, as well as

with traditional rationality that separates opposites as mutually exclusive. It also contrasts with Newtonian mechanism, which postulates the mutual neutralization of opposites, dampening all oscillations to converge to equilibrium. Many processes show spontaneous fluctuations and periodic cycles, as illustrated by seasonal and biological rhythms. These cyclic processes are called periodic attractors by dynamics. Interactions mold each pole after its opposite with the form of its opposite. In the more abstract language of communication theory, processes inform opposites. Information is a process rather than simply a form.

Sexuality is a paradigmatic example of the fundamental role of opposition in natural and human processes. The two sexes are more similar than different, yet the differences are also essential. The sexes cooperate, yet also conflict with one another. In almost every mammalian species and every human population there is some component of male supremacy, yet the term "mammal" reveals a fundamental "priority" of the female as first authority figure and identification model for every child. This suggests a psychosexual development scheme quite different from the traditional Freudian, and with obvious clinical implications. The concept of female priority and male supremacy also has application in the social sciences.

A car engine illustrates how cycles serve as the motor for change, and an electrical battery illustrates how opposing flows create a circuit: Electrons flow from the negative to the positive pole in the external circuit and from positive to negative inside the battery. Most people think of opposition as absence or as antagonism (figure 3). The complementarity of particles and waves (17) is a fundamental law of quantum physics that validates the concept of the complementarity of opposites in nature. The phases of respiration and cardiac contraction illustrate how biological processes always include an alternation of opposites. The union of opposites is also a universal pattern of thinking, not only in the unconscious (18) but also in conscious reasoning, where every process has an opposite (19). In contrast, two-valued logic has been found characteristic of individuals with immature personalities and character disorders and to predispose to neuroses (20) and depression (21). Whereas Freudian psychodynamics focuses on the dialectic struggle of opposite psychological forces, the concept of the union of opposites includes the competitive oppositions of similar forces as well as the enhancement of the predominant emotion by its opposite. That opposing emotions and sensations do not cancel each other but the weaker enhances the stronger may very well explain why pain and sexual arousal combine in masochism. As sexuality, pain produces excitement. Pain can thus enhance rather than antagonize sexual arousal, provided that the latter predominates in intensity and as the terminal consummatory act. Similarly, contradictory, stormy relationships tend to be more exciting and bonding than more serene and less contradictory ones.

The popular concept of stress, often attributed to

FIGURE 3. Linear Versus Dynamic Concepts of Opposition^a

^aThe simplest concept of opposition is quantitative (A), as exemplified by theories of deficit of amines or of development. Other traditional concepts (B, C) formulate opposites as totally opposing forces, such as opposing vectors. According to process theory, everything contains both opposites; instead of a lineal model, we must represent persons or ideas in a two-dimensional plane (D, E). Opposite processes are partially synergic (vertical axis) and partially antagonistic (horizontal axis).

overload, illustrates conflict. The term "stress" comes from mechanics: A body is stressed when subjected to two antagonistic forces that threaten its fragmentation and partition. In a similar manner, stress can lead to the fragmentation of the psychological self and the breaking up of interpersonal or social relations; apparently, it can also induce transient or permanent biological damage. The mechanical metaphor evidences that stress is not simply a quantitatively increased demand from the individual but the effect of contradictory, opposing forces. This is in line with Freud's traditional view of emotional dysfunctions as conflicts and at variance with later formulations solely in terms of deficits or wear and tear. Whereas many psychodynamic approaches would stress deficits in self-esteem or development, process theory indicates that these apparent deficits signify the existence of contradictory self-esteem and unequal, contradictory development.

The union of opposites provides the following

guidelines for psychodynamic interpretations as well as summarizes well-known strategies.

1. When an emotion or belief is strongly stated, seek how it is enhanced by its opposite.

2. When a patient attributes an emotion to another, seek how it applies to his or her own self, and vice versa.

3. Pay attention to what is not said, seek what is missing.

4. Internal and external processes are inseparable opposites: Given a neurotic conflict, seek the interpersonal conflict, and vice versa.

Process theory guides us to an interactional psychodynamics focusing on these polarities and requiring the incorporation of social perspectives. Every person is part of a multiplicity of bipolar or multipolar fields that largely determine behavior: the unidirectional process of growing up and growing old, determining generational classes, the ever present dichotomy of sex, and the every growing differentiations of class, ethnicity, and culture. (Note that they illustrate the three basic patterns of processes: unidirectional change, bipolar interaction, and creative multiplication.)

Every interaction includes three complementary modes of opposition, which predominate at different times, but all three are always present: complementarity, conflict, and partial separation. Different theories of opposition tend to stress one or another of these aspects: Aristotelian logic focuses on the separation of opposites; Darwinian evolutionism and Marxian dialectics focus on the struggle of opposites; while Taoism, quantum mechanics, and systems theory stress the harmony and complementarity of opposites. Similarly, different psychotherapeutic approaches tend to stress one or another of these aspects. Cognitive therapies stress distinctions; this corresponds to traditional views of rationality, such as Aristotelian logic, that separate opposites. Freud's Oedipus conflict and modern radical psychiatry adopt a dialectic model that stresses the struggle between opposites. In contrast, systems theory views the complementarity of opposites as the motor of change (22), minimizing their antagonism. Process theory formulates all interactions as including both synergism and conflict. It is the coexistence of harmony and conflict that moves processes; for instance, marital conflicts occur because a person is both helped and hindered by the spouse; a purely conflictual relationship would simply be terminated.

Different theories of opposition underlie different conceptions of libido and self. Freud opposed love and self-love as antagonistic opposites in dialectic struggle; maturation increased love for others at the expense of primitive narcissism. Antonio Sabelli (16) viewed love and self-love as complementary opposites, each evolving with the other in helical or spiral fashion; this view is now widely accepted by many. Kohut (23) viewed love and self-love as having two separate lines of development; this corresponds to Aristotle's separation of opposites. Process theory recognizes the coexistence of these three patterns of change—unidirectional flow,

interaction (both synergic and conflictual), and differentiation—in all processes. Hence love and self-love wax and wane together, mutually reinforcing and mutually antagonistic, inseparable and yet differentiating.

Interpersonal relationships always include both cooperation and conflict. Characterological opposites tend to exclude each other, but they are also linked through their struggle and mutual repulsion. They struggle and compete with each other but also are complementary and synergic. They are different and opposite but also share basic commonalities and essential similarities. Hysterical traits imply and are implied by obsessive ones: to be obsessive is a hysterical way to be rational and hard-working; to be hysterical is an obsessive way of being emotional. Emotional opposites are inseparable, and so are opposite concepts, such as real and imaginary or objective and subjective. By necessity, "objective" evaluations include a subjective component, and even the most subjective opinion carries within it a grain of objective truth.

Freud discovered that the association between opposites is a main feature of primary process thinking. Dreams often express one thing by its opposite; for example, fire may represent water (urine). Freud noted that dreams of fire occurred in enuretic individuals; fire setting and bed-wetting are associated in the childhoods of some sociopathic individuals.

On the basis of the contradictory pattern of dreams, Freud viewed the unconscious as a cauldron of energy fueled by the contradiction between mutually exclusive feelings and wishes. In contrast, he accepted the commonly held belief that most conscious, rational thinking is logical: Nothing can be one thing and its opposite at the same time and in the same respect (Aristotle's principle of no-contradiction). Freud thus made consciousness an Aristotelian logician, and he made the unconscious a Hegelian dialectician. In our view, psychological processes flow like a Heraclitean river, the conscious surface inseparable from the unconscious undercurrents, and together forming vortices and eddies, convergence and bifurcations. Not only dreams but also consciousness contain contradictory, but never mutually exclusive, ideas; in fact, every idea, wish, and feeling evokes its opposite, albeit in a diminished manner (unity of opposites). The unconscious, in turn, contains ideas and feelings similar to conscious ones but of low intensity, as well as others that are opposite to the predominant consciousness but also connected and reinforcing.

In Freud's dialectic model, conscious and unconscious processes are considered as separate and antagonistic: Conscious, dominant thoughts repress opposite ideas and feelings, relegating them to the unconscious. Conversely, the emergence of the unconscious distorts the conscious. The theory of the union of opposites suggests that for the most part conscious and unconscious processes are also similar and synergistic, each evoking the other. The reason one is conscious and the other unconscious is because the former are high-intensity attractors, while the latter are low-intensity attractors.

Both darkness and blinding light can hinder vision. The unconscious includes both synergistic and antagonistic contents, in either case of lower power than the conscious contents. The denial of death is a paradigmatic example of the similarity of the conscious and the unconscious, as it coexists with consciousness of death beyond immediate danger, which is unique to humans.

In the Freudian model, consciousness and unconsciousness represent a mechanism of separation through which the mind manages to contain opposite and antagonistic ideas, wishes, and feelings. The intellectual and affective contents of these two separate parts of the mind are intertwined in mutual struggle. In our complementarity model, a major component of the unconscious is those low-intensity ideas, wishes, and feelings that are synergistic and evoked by high-intensity, conscious attractors. Conscious and unconscious processes are largely synergistic. Contradictions and antagonisms exist in the mind, just as conflicts and oppositions exist throughout nature, but opposing mental contents coexist in the conscious realm, not only in the unconscious to which Freud relegated them. A person seldom changes his ideas and biases simply because he renders them conscious; racism, male supremacy, and depressing cognitive structures remain operative, often increased, when made conscious. Further, the dynamic unconscious originates not only in conflict but also in complementarity. Consciousness is distorted and repressed into the unconscious by self-interest, the id, the profit motive, and the economic factor, not only by the introjected other (superego). The psychoeconomics of repression needs to be expanded to include the economics of the self.

Although Freud was accused of mechanism, the conflict formulation of psychological processes is the cornerstone of Freud's psychoanalytic theory and Freud's reformulation of dialectic thinking within the scientific framework of clinical medicine. The enormous contributions and the significant limitations of Freudian theory result not only from his mechanism but also from his dialectics. With Darwin and Marx, Freud shared the nineteenth-century infatuation with conflict as the mainspring of change. Adopting a dialectic model, traditional psychoanalysts have probably exaggerated the implication of opposites. Thus, when a psychoanalyst offers an interpretation and the patient accepts it, this shows that the interpretation is correct. If the patient rejects it, this is resistance, and this proves again that the interpretation is right. Yet, clinical evidence indicates that there is often validity to the view that excessive rejection is a proof of the adequacy of an interpretation.

For Adler, overemphasis on good or bad, right or wrong, and up and down, the "antithetical mode of apperception," is characteristic of the neurotically disposed individual (20). Adlerians stress the continuity and complementarity, rather than the partition and struggle, between perception and bias, objectivity and subjectivity, and conscious and unconscious. This psy-

chodynamic conception of the union of opposites has become incorporated into modern psychotherapies. For instance, cognitive psychotherapy has identified either-or thinking as a dysfunctional cognitive structure that predisposes to mental illness such as depression (21). As an alternative to dichotomous thinking, cognitive therapy proposes to demonstrate to the patient that events may be evaluated in a continuum. This reflects the quantitative thinking predominant in our society. Focusing on quality, process theory hinges on the insight that everything has both positive and negative aspects. This is essential for interpersonal therapy. Adler, and other social psychologists, focused on the social character of humans and viewed narcissism as a failure in social feeling. Adler and others stressed that antisocial behavior, as well as the "superiority complex," were reactions against suffering and feelings of inferiority. This view of one extreme as a reaction against its opposite represents a dialectic union of opposites that may explain the pathological behavior of the oppressed. It fails to explain the antisocial and narcissistic behavior of the powerful. In our view, connected and successive processes are more similar than different. Narcissism is largely inherited rather than reactive. Patients with low self-esteem transmit it to their children. People who idealize themselves also idealize their children. Children develop selfish, antisocial, exploitative, or narcissistic behavior because this is the environment that surrounds them.

In his psychological theory, Jung extensively used the concept of union of opposites. The self is a unity of opposites such as the male and female, introversive and extroversive aspects in everyone. Others have viewed these opposites as mutually exclusive alternatives rather than as coexisting. Thus, the Myers-Briggs Type Indicator (24), used to distinguish between Jungian personalities, relies on the choice between introversive or extroversive behaviors, sensory or intuitive attitudes, and so forth because it classifies people according to the way they "prefer" to use their minds. In our view, there is a more important aspect in which opposites do not oppose each other. For instance, the more intense and the more complex the personality, the greater the person's ability and intensity in dealing with both the inside and outside worlds.

Bipolar oppositions dominate many other psychoanalytic formulations, such as Kohut's bipolar self (23). Systems theory adopted the concept of polar opposites as the motor of change. Conceptualizing family and society as wholes or systems, maintained by homeostatic mechanisms, systems theory obscures their fundamental conflicts and thereby undermines efforts at human liberation. The systems view is based upon a former concept of homeostasis no longer considered valid (7): External stimuli were held responsible for variations, and physiological mechanisms were understood as homeostatic feedbacks restoring equilibrium. Actually, physical as well as biological processes are naturally oscillatory and rhythmic. Whereas chemical reactions proceed toward equilibrium, the more com-

plex biochemical pathways are cyclic and oscillatory (25). Cyclicity is a fundamental feature of biological processes, from cardiac rhythms to bipolar illness. Physiological processes do not consist of homeostatic mechanisms attempting to compensate for random variations introduced by environmental factors (as in traditional systems views) but of spontaneous rhythms, a dynamic coexistence of opposite but complementary states.

The union of opposites implies its complementary opposite: the bifurcation of opposites. It creates novelty.

Creative Becoming, the Structuration of Matter

Processes create novel complex structures through the differentiation and intercourse of opposites. Processes flow (toward equilibrium), oscillate (between opposites), and spontaneously create structures (bifurcations). Evolution results from the differentiation and intercourse of opposites.

The simplest theories in any one field focus on unidirectional linear processes, as illustrated by inertial mechanics, energy flow to entropy in thermodynamics, homeostasis in biology and in family systems, and Freudian drives as discharges of tensions. More realistic models include the existence of cyclic processes. Biological rhythms and psychological drives are not the consequence of the failure of regulatory processes to maintain homeostasis; rather, normality is an oscillatory process. Similarly, periodic illnesses, such as premenstrual syndromes or manic-depressive illness, probably do not represent the deficit of regulatory processes but an exaggeration of normal cyclicity. Finally, a theory of processes needs to include the creation of complex systems. These three patterns of change coexist in physical as well as in physiological processes. All physical and chemical processes flow toward equilibrium, and this pattern of change predominates near equilibrium. Somewhat farther from equilibrium, processes are dominated by the oscillations between opposites, which also is a pattern of change present in all processes. Far from equilibrium, even simple physical processes and all physiological ones are dominated by strong oscillations that produce chaos, which in turn can produce novel structures (bifurcation). The concept of creativity through bifurcation is readily understandable for the biologist familiar with the concepts of division and differentiation, basic to embryological development and to biological evolution. Novelty is unpredictable, but it occurs over and over in all processes, as illustrated by biological mutations, the formation of physical systems, and artistic creativity. If even simple processes include random-like behavior and the creation of novelty, this must also be true for social and psychological processes; yet many theories are based on linear concepts of development.

Process theory postulates an uninterrupted evolution that creates novelty and complexity, coexisting with and overcoming cyclic changes, random variations, and the maintenance of homeostatic equilibrium

Murphy

in localized systems. This process view of growth and maturation as creative co-organization is not contained in the Aristotelian concepts of development, potential, and actualization that still permeate biology, sociology, and psychology. Personal growth and maturation are co-determined by social and personal interactions, not simply predetermined by biological development. Predetermined developmental stages are constantly modified by chance and by creativity. The existence of creative processes implies that evolution has a tree-like shape (as the zoological classification) that is at variance with sequential and linear schemes of development (Marx, Freud, Piaget, and Erikson).

Traditional quantitative dynamics (e.g., Newton's calculus) was unable to deal with complex processes; its mechanical approach excluded the consideration of creativity and novelty. The recent development of qualitative dynamics provides a mathematical model for creative processes. Qualitative dynamics has already caused a revolution in many fields of science, from physics in the Nobel Prize-winning work of Prigogine (6) to biology and medicine (7, 26). Fortunately, qualitative dynamics can be understood through drawings without the use of mathematical symbolism (27).

Quantitative measurements (such as blood pressure, temperature, food intake, mood, and anxiety) at a given time provide valuable information regarding clinical status, but even more important is a longitudinal monitoring of the clinical process to assess whether the patient is improving, worsening, cycling, or changing in a qualitative fashion. Qualitative dynamics allows the study of complex processes by plotting the time course ("trajectory") of variables in a combined graph. Unidirectional trajectories indicate convergence to an equilibrium point, such as restoration of health or, conversely, death. Cycles represent alternations between opposites, such as alternative phases of the sleep-wakefulness cycle. Qualitative changes can occur when oscillations are so strong as to drive the process far from equilibrium and into chaos (although chaos is not the only avenue to system formation and creativity in complex processes); becoming ill, falling in love, and having an insight exemplify creative (or destructive) processes. Modern mathematical dynamics formulates these types of processes in terms of "attractors." A single point attractor drives a process toward one equilibrium point. A simple example is the mercury column in a thermometer, which will move unidirectionally to the temperature of the patient. Real processes include cyclic attractors that determine oscillatory changes, spirals, and helices resulting from the interaction between two or more partially competing forces. Biological and seasonal rhythms are periodic attractors. Interestingly, the helix is the form of evolution postulated by process theory since 500 B.C. When we consider that the helix is the form of DNA and proteins, we begin to suspect that we have hit upon a basic form of nature. An important type of cyclicity is a dampening (or amplifying) oscillation that

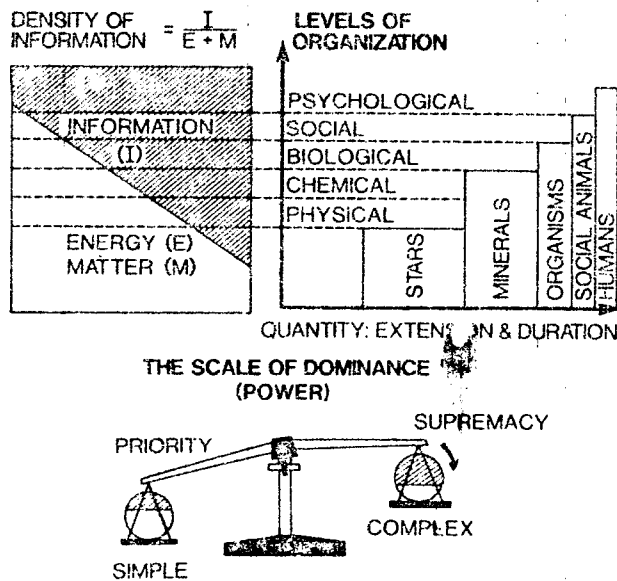
forms a spiral. We are reminded of the spiral shape of galaxies, the spiral arrangement of chemical elements in Mendeleev's table, and the basic role of the spiral Fibonacci series in biology (28, 29). Even more complex forms of cyclicity have been described (27).

Two partially opposing forces such as anger and fear can coexist and alternate when their intensity is relatively low. High intensity opposites are mutually incompatible; one of them must predominate over the other. The animal either fights or flees. This behavioral bifurcation (all or none switch to one or the other defensive behavior) is a catastrophe (9). The mathematical theory of catastrophes offers exact models for processes with thresholds and qualitative changes (26). Far from equilibrium, intense and opposite forces can not only induce a switch into preexisting alternative patterns but may also produce chaos; in turn such chaotic attractors can produce new patterns of organization (bifurcation). Prigogine described creative bifurcations in chemical systems. He said that far from equilibrium there are powerful oscillations; when the oscillations become very powerful, the whole system becomes chaotic. This occurs spontaneously, and new structures are formed. These are called dissipative structures because they consume energy. One may draw a parallel between intense psychological conflict and the production of chaotic behavior in physical systems far from equilibrium. Not only can illness be the consequence of arrest or regression, but it can also be the result of deviation (bifurcation). Bipolar illness is an example of the excessive oscillation of a cyclic attractor; when the two opposites coexist at high intensity, psychological chaos occurs, with the possible creation of psychotic structures. Such a model carries clinical implications different from those of the traditional model, which is based on the failure of homeostatic mechanisms. Chaotic attractors offer a scientific model for fragmentation and dissociation and may explain the genesis of neurotic, psychotic, and dissociative structures such as delusions and multiple personalities (13).

The recognition of the creative nature of personal life provides the following guidelines for psychotherapy.

1. Whenever a deviant structure, such as a dysfunctional pattern of behavior, a delusion, a depressive process, or a character disorder, is found, attempt to identify the chaotic point of origin and the underlying polarization of opposites that created and reproduces it.
2. Explore present choices and future goals in addition to past causalities and current equilibria.
3. Investigate the interaction of chance, causal interactions, and choice in every human process, recognizing that chance has priority and choice and creativity have supremacy over cause.
4. Focus on creating new patterns rather than completing a developmental stage and returning to standard patterns taken as universal and normative.

As they diversify and create complexity, processes create new systems and new levels of organization.

FIGURE 4. Process Theory Model of Levels of Organization^a

^aTop right: Levels of organization differ in extension and duration (horizontal axis) and density of information (vertical axis). Simple levels of organization (e.g., physical, chemical) are abundant but have low density of information; evolution creates new entities (e.g., biological, social) that are scarcer but more complex (greater density of information). Top left: Processes contain different proportions of energy (E), matter (M), and information (I). Density of information is defined as the ratio of information content to energy and matter. Bottom: priority of the simple, supremacy of the complex. Simple levels preexist, coexist with, and outlast complex levels. Complex levels have a supremacy of control within limits. The existence of two oppositely directed forms of dominance is explained by the ability of information to increase the efficacy of energy to produce work and to create novelty.

BIOLOGICAL PRIORITY AND PSYCHOLOGICAL SUPREMACY

Modern formulations of monism center on the notion of the levels of organization. In traditional formulations, either the simpler material processes are considered fundamental (e.g., psychiatric dysfunctions are biological illnesses), or the higher psychosocial processes are recognized as having primacy (e.g., emotional dysfunctions as character defects, disruptions of interpersonal communications, or defective cognitive/affective structures). According to process theory, *in every process there is a bidirectional hierarchy in which processes are hierarchically ordered according to their complexity: physical:chemical:biological:social:psychological* such that entities at each level of organization include all those simpler (figure 4, top); for instance, a social organism is necessarily biological and hence physical.

The CNS is organized in this fashion, as discovered by the nineteenth-century British neurologist H. Jackson: The lower levels regulate simpler and essential functions such as temperature, respiration, and pos-

ture; diencephalic and paleocortical levels coordinate sociobiological functions such as emotions; neocortical levels are the substrate for personal and creative functions. The simpler bulbar and spinal levels have priority in the evolution of species and the development of the individual, as well as in mediating the input and output for the higher levels. The higher levels control the function of the lower levels (cortical supremacy). Correspondingly, behaviors are organized in a dynamic hierarchy such that simpler needs for oxygen, water, and defense have priority but are eventually dominated by more complex wants for personal and interpersonal affection and creativity (30). Because evolution proceeds from the biological to the social to the psychological, it is our view that this organization of the brain corresponds to the actual relation between levels of organization in nature. A bidirectional, flexible order governs the relation between levels of organization: Simpler processes (low density of information relative to the amount of energy and matter) preexist, coexist with, and outlast complex processes. Complex processes are made of, and are surrounded by, simple processes that are essential for their existence; hence, complex processes are more rare and transient. Yet complex phenomena predominate locally, whenever present, because a higher density of information per unit of matter/energy increases their efficacy and creativity; the power of energy is multiplied by the amount of information (figure 4, bottom). Simple processes have the power of prior existence, and complex ones have the power of greater control. Hence, in every mental process, its biological aspects have priority, while social and psychological aspects have supremacy. Biological processes are essential for psychological function (priority), contain less information, and are more determined by causal factors and less by choice than the more complex social and psychological processes. The personal/psychological level, being more complex in informational content, has supremacy for control and is more amenable to change by conscious choice.

Interventions can and often do attend to more than one level at once. We thus propose a method of integrating the various levels of organization by attending to two simultaneous, opposite, and complementary hierarchies, and we derive the following guideline: Give priority to biological needs, supremacy to social and psychological processes, at the same time.

According to this guideline, the biological level needs to be addressed first, as survival precedes all other needs in time and is least influenced by choice. Our model is compatible with Maslow's conception of motivation (30), but its bidirectional aspect takes us beyond Maslow. Basic needs such as survival, respiration, and nutrition have priority in time but are dominated by the more complex levels as the simpler needs are partially met. This leads to a flexible approach, in which one level or another may be the predominant one at a given time. For instance, restoring breathing always has absolute priority, but once life is not threat-

ened, taking care of the patient's emotional well-being may become more important than treating a respiratory difficulty. Conversely, attending to the emotional welfare of a dying patient has absolute supremacy. Note that social processes precede personal ones (figure 1). Social role precedes the individual manner in which one performs it (31). Before knowing each other as individuals, women and men, and employer and employee, patient and doctor face each other as a function of their respective roles. The difference between process and systems approaches has significant consequences regarding clinical and social practice. Process theory implies that social factors should be given great weight in understanding the pathogenesis of illness, away from the traditional individualistic approach. By implication, family therapy should be employed more frequently and earlier than individual therapy.

The dynamic concept of a sliding scale of priority: supremacy contrasts with more rigid schemes that oppose different levels of organization such as needs and wants derived from biological instincts (id) versus social repression introjected as a superego. Actually, false needs and wants introjected by society play a repressive role, a more comfortable, pleasant, and democratic form of social control. Only the simplest needs are mainly biologically determined. All others are socially conditioned in their intensity, quality, and form of satisfaction. Thus, society can create false needs through market-oriented media, entertainment, and advertisement (32). Olds (33) demonstrated that rats which can self-stimulate their brain pleasure centers through implanted electrodes will do so for long periods of time, to the detriment of all other activities. Similarly, humans exchange immediate gratification of pleasurable needs (e.g., smoking) for long-term goals. The need to be successful or useful drives many to work beyond the limits advisable for good health or for successful family life.

Complex processes such as thinking and valuing, relating to others, and creating are dependent on simpler physiological processes. These basic processes precede, coexist, and set limits within which the complex operates; hence, the material and energetic aspects of the problem usually, but not universally, need to be dealt with before the informational, subjective aspects, the ideas, values, and emotions. This means addressing objective life circumstances before subjective feelings and conceptions, biological illness before interpersonal psychological disorders, social and family matrices before personal intrapsychic processes, and the facts as they appear before the meaning ascribed to them by interpretation. However, process theory points out that the more complex processes can override the simple ones. It also alerts us to the fact that one is not confined to operating linearly, but, in fact, one must attend at the same time to the supremacy of the social and psychological aspects. Without trust and compliance there can be no treatment. Unfortunately, treatment may also be limited by insurance, illustrating the supremacy of the social over the biological.

The concept of biological priority: psychological supremacy particularly applies to insight. Insight is considered a basic psychotherapeutic technique, but it is just as important in biological medicine. Whether in medicine or psychiatry, biological insight has priority. When a material reality exists and operates, whether it is perceived or not, it is necessary to facilitate the patient to gain insight—so reality can be dealt with appropriately. The initial step in dealing with a biological problem might be providing awareness that a physiological problem does indeed exist. As the patient who denies the meaning of his or her chest pain will not seek the needed treatment, the patient suffering from a genetically determined affective disorder cannot be adequately treated unless he or she is aware of the diagnosis. Therapists who promote "insight" into hypothetical unconscious factors, childhood traumas, or current family conflicts, while denying the importance of biological factors, provide no insight at all.

Biological insight must be complemented with social and psychological insight. In our practice we increasingly witness patients with obvious problems such as unemployment, job insecurity, marital conflict, and childhood abuse who are treated with antidepressants because they are economically more convenient for the physicians and the drug industry that dominates our medical practice.

The priority:supremacy concept contrasts with the philosophical materialism of biological psychiatry, which postulates the primacy of matter, and with philosophical idealism of nonbiological psychology, which postulates the primacy of ideas. Implying the coexistence of opposites, each predominating in a different respect, the priority:supremacy paradigm provides a method for integrative patient care.

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