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The Philosopher as Prophet and Visionary: Susanne Langer's *Essay on Human Feeling* in the Light of Subsequent Developments in the Sciences

DONALD DRYDEN
Duke University

There are at least five major areas in which Susanne Langer's work—taken as a whole, with the three-volume *Mind: An Essay on Human Feeling* as its defining achievement—anticipated significant developments in the biological and psychological sciences that have taken place since the publication of the first volume of *Mind* in 1967. The first is her belief that consciousness, or subjectivity, is the defining subject matter of psychology. The second is her attempt to develop a conceptual framework for grounding a theory of mind and consciousness in the biological sciences. The third is her proposal that a phenomenology of conscious experience (which she believed could be found in the arts) can serve as a unique source of insights into the phenomena of life and mind that we are seeking to understand in terms of the sciences. The fourth is her thesis that a perfectly continuous evolutionary history has given rise to a difference between human and animal mentality that is "almost as great as the division between animals and plants" (1962, 113). And the fifth is her theory of imagination, which provides a bridge from the biological sciences to the study of human culture and the symbolic resources that support it.

1. Symbolic Transformation, Imagination, and the Theory of Art

A central theme of Langer's work, which received its most extended treatment in *Philosophy in a New Key*, is that human beings are distinguished by a capacity for "symbolic expression and symbolic understanding" (129) which is not shared by other animals and which underlies the range of practices that make culture a uniquely human mode of existence. Langer argued that the process she called the

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"symbolic transformation of experiences" (1942, 44) is a spontaneous activity of the human brain by which *conceptual structures* are derived by abstraction from the stream of perceptual experience. The symbolic or conceptual rendering of experience—a process that is central to Langer's definition of *imagination*—produces "an enormous store of symbolic material," an accessible "fund of conceptions" (41) that find expression in the formation and elaboration of images, are used to ground "the great systematic symbolism known as language" (1962, 147), and furnish the material for dreaming, myth, ritual, narrative, and the arts. The primary function of imagination, through all of its various symbolic expressions, is to "make things conceivable" (1942, 244)—to shape the human world as a "fabric of meanings" (280) by constructing and elaborating the networks of conceptual representations that formulate and organize our experiences, connecting them together into larger, coherent patterns.

Underlying all the varieties of symbolic expression and symbolic understanding, Langer believed, is a fundamental capacity to apprehend forms, *gestalten*, or patterns in experience. "By the recognition of forms we find *analogies*," she wrote, "and come to understand one thing in terms of another" (1930, 88). When we see that two things exhibit a common form or pattern, we may use one of them to formulate a *conception* of the other—to serve as a vehicle for *symbolization*; and any medium in which we can construct and manipulate complex configurations of distinguishable elements can help us to formulate a conception of something else that exhibits a similar pattern. Langer argued that different kinds of apprehended patterns or *symbolic forms* are appropriate to different objects of knowledge. Some domains of experience and understanding fall readily into the discursive forms of language; but we are also able to apprehend and manipulate patterns that have "too many minute yet closely related parts, too many relations within relations" (1942, 93) to be adequately expressed in the medium of discourse. In a painting, for example, "the balance of values, line and color and light, . . . is so highly adjusted that no verbal proposition could hope to embody its pattern" (1930, 160). In *Philosophy in a New Key*, Langer proposed that the dynamic tonal forms found in music might serve as a symbolic formulation of "the ever-moving patterns, the ambivalences and intricacies of inner experience" (1942, 100–101) that language cannot express.

In Langer's mature philosophy of art, a work of art is "an expressive form created for our perception through sense or imagination" (1957, 15)—a deliberately "constructed image" (1967, 94) that formulates for our conception some aspect or dimension of *conscious experience*, which Langer called "feeling" and defined quite broadly to include *the entire gamut of subjective reality*, "woven of thought and emotion, imagination and sense perception" (1953, 127), and extending from "the sensibility of very low animals [to] the whole realm of human awareness and thought" (1967, 55).[1] All these subjective aspects of mental life—"the way feelings, emotions, and all other subjective experiences come and go" (1957, 7)—form an intricate dynamic pattern of tremendous complexity,

much of which "defies discursive formulation, and therefore verbal expression" (22). Through works of art, however, we can have access to genuine knowledge of aspects of the life of feeling that are "verbally ineffable" (26) but nonetheless expressible by means of "form and color, tone and tension and rhythm, contrast and softness and rest and motion" (95) in some artistic medium.

Langer argued, furthermore, that each of the great orders of art formulates a different aspect or dimension of subjective experience for our conception and therefore mirrors its logic. Drawing and painting, for example, explore the dimensions of visual imagination; music reflects and organizes our sense of experiential time; and the literary arts express the imaginative processes that govern the retrospective formulation of lived experience in remembering and retelling through the use of language and narrative, shaping our conceptions of human action and elaborating the basic forms of historical understanding.[2]

2. Conscious Experience and Its Biological Foundations

In general, works of art embody the "conceptual" (1962, 88) or "symbolic expression of an artist's knowledge of [some aspect of] feeling" (1967, xv), "subjective reality," or "consciousness" (1957, 112). But as Langer noted in *Feeling and Form*, all works of art present "the appearance of life, growth, and functional unity" that are "essentially organic" (1953, 373). All good works of art, that is, exhibit qualities of "life," "vitality," or "livingness" (1957, 44); and "'living form' is the most indubitable product of all good art" (1953, 82). By Langer's own account, the project of *Mind* grew out of an effort to answer the fundamental question of why artistic form, to be expressive of the logic of consciousness (1967, xv), must always be "organic or 'living form'" (xix). She had already given an answer, at least in outline, in *Feeling and Form*: "Our whole subjective reality," she had written, "is entirely a vital phenomenon" (1953, 127); and the conscious experiences that make up the inward life of human beings must therefore have their foundations in biological processes.

In an effort to explore the intimate connections between mind and living process that she had adumbrated in *Feeling and Form*, Langer began to read extensively in the specialized literature of the biological sciences; and she spent the next three decades engaged in a project she later described as an attempt to "break through current forms of thought in biology"[3] in order "to construct a conceptual framework for biological thinking that will connect its several departments, from biochemistry to neuropsychology, in one *scientific* system"[4] that "will naturally result in a theory of the human mind."[5] The results of that project were the three volumes of *Mind: An Essay on Human Feeling*, a work that she stated "is not on art at all, except in so far as my biological concepts stem from art."[6]

Langer believed that consciousness, or subjectivity, is the defining subject matter of psychology, and that "a conceptual framework for the empirical study of mind" (1967, 257) must be grounded in the biological sciences. The difficulties of dealing with mental phenomena, however, had forced psychology to divert its attention to other things, such as overt behavior, which at the time were thought to be more amenable to scientific investigation. Langer believed that the problems facing psychology—and, by implication, the social and cultural sciences on the one hand, and the biological sciences on the other—were "deep seated and conceptual" (1971, 316). "Our basic philosophical concepts," she wrote, "are inadequate to the problems of life and mind in nature" (1967, xvii), and therefore "our advanced biological theory does not lead systematically into an equally advanced psychology" (1971, 315). To "bring mental phenomena into the compass of natural fact" (1962, 25)—and to provide an evolutionary account of "the veritable gulf" that Langer believed "divides human from animal mentality, in a perfectly continuous course of development of life on earth that has no breaks" (1967, xvi)—would therefore require "a new conceptual vocabulary" (1971, 316). Given the right working concepts, Langer believed, the study of mind should lead "down into biological structure and process . . . and upward to the purely human sphere known as 'culture'" (1967, 32). An adequate conceptual framework should provide the basis for an evolutionary account of the nature and origin of human mentality that would in turn support advances in psychology, the cultural and social sciences, and the humanistic disciplines, including ethical, social, and political theory.

A biological theory of feeling, or consciousness, requires detailed knowledge of the phenomena we are trying to understand. But as Langer repeatedly emphasized, the phenomena of conscious experience are "the most protean subject matter in the world" (67), and language is "almost useless for conveying knowledge about [their] precise character" (1957, 91). She believed, however, that detailed and intimate knowledge of the characteristics of subjective experience is available in the arts. Every work of art, she had argued, sets some "piece of inward life objectively before us" (24), in a publicly accessible object that is "composed by the laws of the inner world to express its nature" (11); and it does so "with a degree of precision and detail beyond anything that direct introspection is apt to reveal" (1967, 69). Langer believed, therefore, that the arts can provide us with extensive knowledge of many of the phenomena of conscious experience that we are trying to analyze and understand "in the systematic concepts and direct language of science" (xx).

But Langer believed that the knowledge available from a study of the arts goes even deeper. Because consciousness is entirely a biological phenomenon, the dynamic structure of "the unfelt activity underlying every event that enters into the state of feeling" (1964, 391) is invariably reflected in the forms of subjective experience. Every work of art, because it exhibits the "felt tensions, rhythms, and activities" (1967, xix) that characterize some aspect of the dynamics of conscious

experience, must also express "their unfelt substructure of vital processes" (xix). Langer believed, therefore, that a serious study of the phenomenological data available in the arts should guide our investigations in the biological sciences and shape the conceptual framework of an adequate theory of mind.

3. A Conceptual Framework for the Empirical Study of Mind

As Langer pursued her readings in biology under the guidance of insights provided by her study of the arts, she was struck by several characteristics of biological phenomena that she believed were theoretically significant. First, living form is always *dynamic* form, "whose permanence is really a pattern of changes," and whose "elements are not independent parts" (1957, 52), but a myriad of interrelated, interdependent activities (52) held together by multiply coordinated interactions. Second, what holds all these activities together in a single system is a principle Langer called *rhythmic continuity* (1953, 127), which she defined as the functional involvement of successive events. And finally, the only way events external to a living system can exert their effect is indirectly, by adding their influences to the prevailing condition of the system, which is the ongoing matrix of activities from which all subsequent changes emerge.[7]

In constructing the concepts that she hoped would provide the framework for a more adequate biological theory, Langer took these characteristic features into account; and following Whitehead's lead, she began with an *event*, rather than a material entity, as "the ultimate unit of natural occurrence" (Whitehead 1925, 103) for the analysis of biological phenomena. Langer built her framework around a concept she called the *act*, which she defined as "an event, a spatiotemporal occurrence" (Langer 1967, 304) that is "the unit of vital process" (1971, 316). Every act "arises from a matrix of other, concomitant acts, and spends itself in the same stream of act-engendered acts as part of the self-propagating process" (317). Acts are therefore not material parts of a living thing but "elements in the continuum of a life" (1967, 261); they are always found within "a matrix of activities [that] is a physiological continuum, a living system, presented as a whole by reason of the involvement of its acts with each other" (1971, 317).

Every act exhibits a characteristic sequence of phases that Langer called the "impulse, rise, consummation, and cadence" (318). Acts begin with "a formative phase, the impulse" (316), after which "they normally show a phase of acceleration, or intensification of a distinguishable dynamic pattern, then reach a point at which the pattern changes, whereupon the movement subsides. That point of general change is the consummation of the act" (1967, 261). Acts therefore exhibit a characteristic dynamic form, and that form can be empirically found in the continuum of biological processes at every level of biological organization.

Every act arises from what Langer termed a *situation,* which is always a matrix or "stream of advancing acts which have already arisen from previous situations" (281). The process whereby distinguishable acts arise from the "constellation of other acts in progress" is a basic causal relation obtaining among acts, which Langer defined as *induction* (281). Outside events that impinge on a living system exert their influence indirectly, by altering "the organic situation that induces acts" (283). The new situation then "induces new distinguishable acts"; and the "indirect causation of acts via the prevailing dynamic situation" is what Langer called *motivation* (283).

A change in the situation in the matrix that induces an act is at the same time an integral part of the act itself; and it is this initial phase of the act that Langer termed its *impulse.* An impulse is a store of energy built up within the matrix, a complex pattern of tensions that determines the presumptive shape and scope of the act, giving an indivisible wholeness to the course of its actualization. An impulse is at once a *potential* act and a real, physical event, although not every impulse is carried out, or *actualized*. Although the overall shape and scope of an act is prefigured in its impulse, the course of its further development is subject to a variety of further influences for which Langer introduced the general term *pressions* (370).

Finally, every act develops as part of "a self-continuing system of actions proliferating and differentiating in more and more centralized and interdependent ways" (314), a matrix of interdependent and self-propagating activities that constitutes what Langer called an *agent*—"a product and producer of acts; a living being" (317). From this perspective, the advancing course of life emerges from "the pressure of billions of impulses, ever pushing to actualization in every single organism, entering or failing to enter the moving stream of acts that constitutes the life of the agent, and beyond the agent, the stock, and enfolding the stock, the whole teeming life process on earth" (377). At every level, a living system is seen as "a fabric of burgeoning acts, in literally billions of pressive relations which automatically adjust the elements of that incredibly complex dynamism to each other" (370).[8]

4. Recent Developments in the Sciences of Life and Mind

In the years following the publication of the *Essay on Human Feeling,* advances in the biological and mind sciences have confirmed the essential rightness of Langer's insights in each of the five areas discussed in the first half of this essay.

4a. The Return of Consciousness to the Study of Mind

The recent rise of consciousness studies provides what is perhaps the most dramatic vindication of Langer's prophetic vision. Although John Searle argued in 1984 that "consciousness is the central fact of specifically human existence" (Searle 1984, 16), he noted that there was still widespread "resistance to treating the conscious mind as a biological phenomenon like any other," with the result that "consciousness and subjectivity are often regarded as unsuitable topics for science" (10). In fact, he reported, on occasions when he had lectured "to audiences of biologists and neurophysiologists," he had found "many of them very reluctant to treat the mind in general and consciousness in particular as a proper domain of scientific investigation" (10). Less than a decade later, however, two books appeared that attracted widespread interest among researchers in the psychological sciences and the philosophy of mind. In *The Embodied Mind*, Francisco Varela and his collaborators urged the sciences of mind "to enlarge their horizons to encompass … the lived world of human experience" (Varela, Thompson, and Rosch 1991, xv–xvi); and Owen Flanagan, in *Consciousness Reconsidered*, argued that descriptions of the way things seem from the viewpoint of the experiencing subject are as important to the study of mind as the cognitive and neurosciences (Flanagan 1992). Before long consciousness studies had become a thriving academic industry, supporting journals, conferences, and a flood of publications with contributions from researchers in a number of disciplines.

4b. Metaphor and Conceptual Processes in Human Cognition

The 1980s also saw the appearance of influential work by George Lakoff, Mark Johnson, and others who began to call attention to the fundamentally *metaphorical* character of the human conceptual system. Johnson, for example, argued that *metaphor,* which he defined as "a process by which we understand and structure one domain of experience in terms of another domain of a different kind" (Johnson 1987, 15), plays a "central role . . . in all meaning, understanding, and reasoning" (ix). On this account, the structures of every domain of human understanding—whether formulated in language or in other symbolic resources—are ultimately derived from our embodied experience, broadly defined to include the biological capacities and the physical, psychological, and social experiences of human beings functioning in a human environment. Recurring patterns in these experiences provide the basis for "nonpropositional, figuratively elaborated schematic structures" (xxi), which Johnson called "image schemata" (xix), "around which meaning is organized at more abstract levels of cognition" (xx).

Since the early 1990s, the concept of *image schemas* has figured prominently in the work of psychologist Jean Mandler. Mandler's work on the emergence of cognitive capacities in human development rests on a fundamental distinc-

tion—also present in Langer's writings—between perceptual and conceptual processes, each of which constitutes a distinct level of cognitive operations. In Mandler's account, elementary perceptual processes initially organize incoming perceptual information into a stable world of objects and patterns and operate on segmented perceptual displays to generate *perceptual schemas or prototypes* that are based on physical appearance or overall physical similarity. These perceptual schemas figure in representations of sensorimotor procedures—they are part of a system of procedural knowledge, itself inaccessible to consciousness, that underlies adaptive sensorimotor performance in humans and nonhumans alike. In human cognition, a further level of processes operates on these elementary formulations to produce what Mandler calls *image-schematic conceptual representations*, or image schemas. Mandler proposes that image schemas are formed by an active, attention-based process she calls *perceptual meaning analysis* (Mandler 2004), which operates selectively to analyze perceptual arrays, abstracting some essential aspects and using them to produce simplified, more abstract representations. Although the image schemas or conceptual representations themselves are inaccessible to consciousness, they provide a network of underlying meanings from which accessible concepts can be formed and brought to conscious awareness as images, language, or other vehicles of thought. The formation of image schemas occurs simultaneously and in parallel with the activity of the sensorimotor system; and image schemas form a network of conceptual representations that can be acquired and elaborated prior to and independently of language, while also providing the meanings that are later used to ground the acquisition of language, as cognitive linguists have argued (Mandler 1998, 294, 299).

In Mandler's theory, image-schematic conceptual representations are seen as "transformations of perceptual information" (264) into analogical, nonpropositional forms of representation that provide an enormous store of potentially accessible conceptual material, only some of which is mapped onto the propositional structures of language. Here the term "conceptual" is extended—as it is by Johnson—to include "*any meaning structure whatever*" (Johnson 1987, 17); and we can define *imagination*, following Johnson, as the set of capacities involved in constructing and elaborating the network of meaning structures that underlies the production of images, language, and other vehicles of conception that figure centrally in human experience. Conceptual representations can also be seen as the product of what Langer called "the symbolic transformation of experiences" (Langer 1942, 44); and as Langer argued, they are used in a multitude of ways to formulate and organize our experiences, connecting them together to make the larger fabric of meaning that frames the human world.[9]

4c. The Evolution of Human Singularity

In the *Essay on Human Feeling*, Langer had argued that a central problem for any naturalistic theory of mind was "the nature and origin of the veritable gulf that divides human from animal mentality" (Langer 1967, xvi). She believed that "a perfectly continuous course of development of life on earth that has no breaks" (xvi) has somehow given rise to a profound *qualitative* transformation, "which sets human nature apart from the rest of the animal kingdom as a mode of being that is typified by language, culture, morality, and the consciousness of life and death" (xvi). Langer's position was not widely shared. As she wrote in 1962:

> The concept of continuous animal evolution has made most psychologists belittle the differences between man and his nonhuman relatives, and led some of them, indeed, to think of *Homo sapiens* as just one kind of primate among others, like the others in all essential respects—differing from apes and monkeys not much more than they differ from species to species among themselves. (1962, 111)

Although this view is still widely held, detailed support for Langer's argument was first provided ten years ago by the biological anthropologist Terrence Deacon. In his book, *The Symbolic Species* (1997), Deacon argued that the evolution of the human brain and its capacity for language and culture could not have resulted from a simple quantitative increase in animal intelligence but instead required the emergence and functional dominance of a novel semiotic function, qualitatively different from the cognitive capacities that form the basis of animal intelligence. Deacon termed this emergent cognitive capacity *symbolic reference* and argued that it forms the basis of a uniquely human mode of existence. Human beings, Deacon argued, live in a world "full of abstractions, impossibilities," and the knowledge of their own death (Deacon 1997, 22) that "no other species has access to" (21). Although Deacon accepted an "unbroken continuity" (13) in the evolutionary descent of human from nonhuman brains, he proposed that a series of *quantitative* changes in early brain growth patterns—such as changes in the timing of a few key regulatory events—ultimately led to a radical, *qualitative* shift in the functional organization of the human brain and therefore to "a singular discontinuity between human and nonhuman minds" (13): Although "biologically, we are just another ape," he concluded, "mentally, we are a new phylum of organisms" (23).[10]

4d. Causal Networks and Dynamical Modules in the Biological Sciences

The recent history of cellular and developmental biology provides further examples of significant themes prefigured in the *Essay on Human Feeling*. For nearly a century, researchers in developmental biology have operated with what

biologist George von Dassow calls a "perturbation-to-consequence mode" of causation (von Dassow and Munro 1999, 310)—an essentially linear conception in which research on developmental mechanisms proceeds on the assumption that a mutant gene and an altered phenotype, for example, lie at the opposite ends of a causal chain, and that the goal of research is to fill in the links of a "perturbation-to-consequence chain" between the mutant gene and the abnormal phenotype. Common metaphors like "genetic program" and "developmental pathway" owe their prevalence in part to this widespread habit of thought, which was derived from the biochemical metaphor of metabolic pathways. In the face of growing evidence of the staggering complexity of biological processes at every level of organization, however, cell biologists have been forced to expand their conceptions of mechanistic architecture to include *causal networks*. Similarly, developmental biologists have been faced with a growing number of individual perturbation-to-consequence chains that "overlap and interweave" (310); and the chains themselves begin to appear as identifiable strands within a densely ramifying network of highly orchestrated, interlocking biochemical processes.

In the late 1990s, von Dassow and his colleagues developed a network model of the cross-regulatory interactions among segment polarity genes and their products, which play a central role in the segmentation of developing insect embryos like the fruit fly *Drosophila* (von Dassow, Meir, Munro, and Odell 2000). In general, a *genetic regulatory network* can be defined as any set of interacting molecular species, including genes, gene products, and metabolites, whose boundaries can be determined by connectivity criteria; and models of nonlinear dynamical systems offer powerful resources for exploring the behavior of such networks, whose complexity could not have been captured without the increases in computational power that recent advances in computer engineering have made possible.

The significance of these achievements, however, reaches beyond their use in modeling gene networks and developmental mechanisms. The "parts," or *units of decomposition,* that have been singled out for the purposes of mechanistic explanation in biology have traditionally been things like molecules, macromolecular structures, cells, anatomically defined structures, or individual organisms—material units that biologist Jay Mittenthal calls *structural modules* (Mittenthal 1998) and von Dassow describes as "obvious entities, defined in more or less concrete terms," and constituting "an equally evident hierarchy of biological organization" (von Dassow and Munro 1999, 312). The development of network models, however, has forced researchers to consider what von Dassow calls "more elusive entities that inhabit intermediate levels within the framework defined by the obvious ones" (312). Mittenthal calls these *dynamical modules* of biological organization—networks of processes that can defined by the strength of connectivity or density of interactions among their constituent entities (which may themselves be networks of processes) and can be modeled using the resources of dynamical systems theory. Although dynamical modules are "more difficult to

define in abstract terms and to identify or distinguish from one another in practice than obvious things like proteins and cells," von Dassow argues that they "are no less real as a consequence" (312). Furthermore, Mittenthal has proposed that biological entities can be analyzed as networks of processes that "form a nested hierarchy with bidirectional interactions among levels" (Mittenthal, Baskin, and Reinke 1992, 322), and that "physiological and developmental modules operate at levels of organization from intracellular to organismal, and at time scales from seconds to years" (Mittenthal 1998, 3).

How are these developments prefigured in Langer's work? Consider the conceptual framework of dynamical systems theory. In general, a *dynamical system* is any system whose overall state changes over time; and it is convenient to think of the changes it can undergo as taking place within a "space" defined by all the possible states that the system can assume. The state of the system at any given time can be defined by a point in this *state space*; and as the state changes over time, the point traces a path through the state space that is called a *trajectory*. Under the right conditions, the time evolution of a dynamical system will exhibit distinguishable phases or episodes, each of which begins with the formation of a particular dynamical landscape. Under the influence of a set of initial determining conditions, the system is launched along a trajectory in the direction of an *attractor*.

The landscape of a dynamical system is a function of the parameters of the equations that define the model of the system, and if the parameters vary as the system moves along its trajectory, the dynamical landscape will change—sometimes gradually and continuously, sometimes more abruptly and drastically. Influences from the environment of the system can be represented as parameters of the system equations, and a system whose parameters are changing is said to be coupled to, or perturbed by, the environment.

A coupled dynamical system can be used to model the behavior of an agent interacting with an environment which it is continuously affecting and to which it is continuously making adjustments. In many such cases, the dynamics of a coupled agent-environment system will never settle on an attractor, and the system will always be found on a *transient*—a trajectory directed toward, but never actually on, an attractor—because the dynamical landscape of the system is continually shifting as the system is perturbed by input.

Distinguishable episodes in the time evolution of a coupled agent-environment system will therefore be marked by punctuational changes in the dynamical landscape, defined by nonequilibrium *phase transitions* as the parameter values cross critical "bifurcation" points in parameter space. The formative phase of each successive episode can be defined as the period of time in which a particular dynamical landscape forms under the influence of a set of initial determining conditions, or the point in time at which the control parameters pass through critical points in parameter space, thereby initiating a nonequilibrium phase transition and a consequent shift in the configuration of the dynamical landscape.

In terms of Langer's conceptual framework, the episodes themselves may be identified as *acts*, the formative phase as the *impulse*; and the determining conditions (the initial and boundary conditions that shape the dynamical landscape and influence the parameter values of the system equations) constitute the *situation* from which the act arises. Influences that affect parameter values without bringing about punctuational, nonlinear changes in the landscape (which result in a gradual, linear deformation of the landscape) might be identified with what Langer called *pressions*—"those relations [between acts and situations] that determine the form of an act in the course of its development, i.e., beyond its determination in the generating impulse, and conversely, such as shape a situation for subsequent or sometimes concurrent acts" (Langer 1967, 370).

4e. Phenomenology and the Deep Continuity of Life and Mind

One other area of current research deserves attention, and that concerns the growing interest in developing disciplined, first-person, phenomenological methods as an integral part of the scientific study of consciousness. Langer's approach to the phenomenology of consciousness was through a detailed study of works of art, which she believed offered an access to many of the phenomena of subjective experience that are available in no other way; and the conceptual framework she developed in the *Essay on Human Feeling* was shaped by the aspects of life and mind that she found revealed in the arts. More recently, Evan Thompson has made the phenomenological tradition of Husserl and Merleau-Ponty central to his efforts to "enlarge and enrich the philosophical and scientific resources we have for addressing the [explanatory] gap" (Thompson 2007, x) between consciousness and the rest of nature. "To make real progress on the explanatory gap," Thompson argues,

> we need richer phenomenological accounts of the structure of experience, and we need scientific accounts of mind and life informed by these phenomenological accounts. Phenomenology in turn needs to be informed by psychology, neuroscience, and biology. (x)

Like Langer, Thompson accepts the thesis he calls "the deep continuity of life and mind," according to which "life and mind share a set of basic organizational properties, and the organizational properties distinctive of mind are an enriched version of those fundamental to life" (128). By bringing phenomenological investigations of human experience into "a mutually illuminating relationship" (x) with the scientific study of life and mind, Thompson believes that phenomenology can be renewed and naturalized nonreductively while contributing to a transformation in our understanding of nature itself as the resources of phenomenology are brought to bear on the study of biological phenomena (359).

It was Thompson's mentor and long-time collaborator, Francisco Varela, who first proposed that structural features of present-time consciousness, as described in Husserl's philosophical phenomenology, could be mapped onto corresponding aspects of brain activity using the resources of dynamical systems theory—an approach he called "neurophenomenology" (Varela 1996; 1999). As further developed by Thompson, neurophenomenology employs first-person descriptions of subjective experience obtained by phenomenological methods to guide and shape the analysis and interpretation of neurophysiological processes relevant to consciousness, while at the same time making use of the results of neuroscientific research, obtained from a third-person perspective, to guide and shape phenomenological investigations. Neurophenomenology uses dynamical systems theory to mediate between phenomenological accounts of the structure of lived experience and the results of neuroscientific investigations of brain activity.

A neurophenomenological analysis of present-time consciousness, for example, leads to the claim that "the formal structure of time-consciousness . . . has an analogue in the dynamic structure of neural processes," and that "this analogue is revealed by a nonlinear dynamical form of description" (Thompson 2007, 356). In Varela's account, the moving continuum of conscious experience is constituted by a succession of events that have an episodic structure like the successive peaks on the undulating surface of a river, each one integral to, but distinguishable within, an unbroken stream of ongoing activity. What Varela calls the emergence of mental-cognitive events (Varela 1999, 117) or *cognitive acts* (Varela and Thompson 2003, 270) is an ongoing process that continually gives rise to an unbroken succession of cognitive moments, each of which "arises, flourishes, and subsides, only to begin another cycle" (Varela 1999, 117). Each successive episode corresponds to the present moment of consciousness, which has an incompressible duration on the order of a few seconds, a "now moment" (112) that is bounded by a horizon or fringe reaching in two directions at once—backward into the immediate past and forward into an indeterminate future. What Husserl called the "living present" thus has an invariant three-fold structure, in which a "now" phase is bounded by both a *retentional* fringe—a "continuous holding onto the present as slipping away and sinking into the past" (Thompson 2007, 319)—and a *protentional* horizon—"the continuous going beyond the present as opening into [a] future" (319) that is "indeterminate" but "about to manifest" (Varela 1999, 131).

Varela explains these phenomenological features of present-time consciousness as manifestations of an underlying neurodynamics having a similar retentional-protentional structure. He argues that the ongoing stream of neural activities relevant to consciousness can be parsed into a succession of events, each of which corresponds to the emergence of a momentarily integrated, self-organizing neural assembly (or neuronal ensemble) from the cooperative interactions among elements of widely distributed neuronal populations with strong interconnections. In the language of dynamical systems theory, each emergent assembly arises as a

phase transition from the immediately previous one and "is attracted along a certain forward trajectory, while containing the trace of its predecessor" (Thompson 2007, 335). As seen from the perspective of dynamical systems theory, therefore, the phenomenological features of present-time consciousness are "structurally mirrored at the biological level by the self-organizing dynamics" of "the large-scale neural processes thought to be associated with consciousness" (329). In other words, as Thompson puts it, "the temporal structure of experience . . . depends on the way the brain dynamically parses its own activity" and "is [therefore] caused by and realized in the dynamic structure of biological processes" (334).

In using the concepts of dynamical systems theory to mediate between phenomenology and neuroscience, dynamical descriptions are mapped onto structural features of experience and also onto corresponding aspects of neurophysiological processes relevant to consciousness. In this way, a phenomenological analysis of the structure of time-consciousness can be naturalized by grounding it in biological features of brain activity. The resulting account is not a reductive one, however, because the phenomenological, biological, and dynamical analyses are all equally needed, and "no attempt is made to reduce one to the other or eliminate one in favor of another" (357).

5. Conclusion: Toward a "Biology Built Out of Verbs"

In closing, I would like to call attention to a recent article by the historian and philosopher of biology, Evelyn Fox Keller. Keller opens her article, "The Century Beyond the Gene," with the observation that

> in exciting times such as ours, . . . history can happen a lot faster than a scholar . . . can write. . . . Five years ago, the number of molecular geneticists willing to give up on their paradigm of genetic reductionism was still relatively small, but biologists seem to be undergoing a paradigm shift right under our noses. (Keller 2005, 4)

As the complete genomes of a growing number of organisms have been sequenced—including, most recently, the human genome itself—an increasing number of biologists have begun to turn their attention toward system-wide approaches to biological complexity. When Langer began the project of *Mind* in the mid-1950s, Watson and Crick had just announced their discovery of the structure of DNA; and biology stood at the beginning of a fifty-year period of research into the detailed structures and functions of the molecular components of life. As we begin a new century, however, as Keller reports, "there is a widespread sense that the reductionist phase of genetic research is now over" (5) and that biology has begun to move in the direction of becoming a systems science (4).

Keller cautions, however, that "the challenges now posed by our most recent encounter with biological complexity may require some new ways of talking" (8). Although most biologists, she notes, "may now agree on the need to shift their focus to the interaction between and among individual parts, and even to the dynamics of these interactions" (9), she argues that, "in this effort, they are handicapped by ingrained habits of thought and speech that give ontological priority to those parts" (9). "Prior to the need to construct an appropriate theoretical framework," she continues, "may well be the need to construct a more appropriate linguistic framework," one that takes account of "the dynamic interactions that not only bind parts into wholes, but equally, that reveal the ways in which those interactions construct the parts themselves" (9). The more we learn about the interactions among what Keller calls "all the players of the cellular orchestra" (9), "the more compelling," she writes, becomes

> the need for an entire new lexicon, one that has the capacity for representing the dynamic interactivity of living systems, and for describing the kinds of inherently relational entities that can emerge from those dynamics. . . . For too long we have tried to build a biology out of nouns, a science constructed around entities. Perhaps it is time for a biology built out of verbs, a science constructed around processes. (9)

Ten years ago I concluded an article on Langer's contributions to American philosophic naturalism with these words:

> Susanne Langer's genius lay in being able to see beyond the limited alternatives of her own time to a vision of life and mind within a nature that was far richer with possibilities than were dreamed of in the philosophies of most of her contemporaries, as well as by many of those who came after her, even down to the present day. We have barely begun to catch up to her vision. (Dryden 1997a, 177)

Now, however, in 2007, the conditions favoring the realization of that vision are already upon us. And I cannot imagine a more exciting time to be working at the intersection of philosophy and the sciences of life and mind.

Notes

1. It is important to emphasize that Langer uses the term *feeling* in the broadest possible sense, as a generic term for conscious experience. Early in *The Principles of Psychology* James discussed the need for "some general term by which to designate all states of consciousness merely as such, and apart from their particular quality or cognitive function" (James 1890, 185). He considered "thought" to be "by far the best word to use" (186) but acknowledged the difficulty of extending the term to cover sensations, and concluded that, "in this quandary we can make no definitive choice. . . . My own partiality is for either FEELING or THOUGHT," he wrote, and "I shall probably often use both words in a wider sense than usual," to refer to "mental states at large, irrespective of their kind" (186). Langer's choice of the term "feeling" can be seen as an attempt to deal with the same problem; and

she stated unequivocally that she intended the term to refer to "what is sometimes called 'inner life,' 'subjective reality,' [or] 'consciousness'" (Langer 1957, 112). In the first volume of *Mind*, Langer noted that James "used 'thinking' in the sense in which I use 'feeling'" (Langer 1967, 21n.36); and she cites the above passage from *The Principles of Psychology*.

2. I have discussed the role of language, narrative, and literary art in relation to human memory, historical understanding, and conceptions of human action in Dryden (2004).

3. James Lord, "A Lady Seeking Answers," *New York Times Book Review*, May 26, 1968, p. 4.

4. Susanne K. Langer, "Letter to the Book Review Editor," *Saturday Review*, August 26, 1967, p. 26.

5. James Lord, "A Lady Seeking Answers," *New York Times Book Review*, May 26, 1968, p. 4.

6. Unpublished letter to Sir Herbert Read, August 4, 1967, in the Susanne K. Langer Papers, Houghton Library, Harvard University.

7. This characteristic of living things concerns the pattern of causal relationships that obtain between the impingement of events external to the system and subsequent changes that are observed in the system itself, including behaviors, that are often described as "responses." These changes, which may emerge gradually or suddenly from the ongoing activities of the system as it registers the influence of external events, often appear as "the direct mechanical effects of [a] stimulus" (Langer 1972, 10). But as Langer observed, the analysis of biological activities in terms of linear sequences of cause-and-effect relationships, while not impossible, is often irrelevant to understanding their more complex causal architecture (Langer 1967, 275). Treating influences that originate outside the system of biological activities as "stimulus events" and the subsequent changes as "responses" "creates a much simpler pattern of cause and effect" (Langer 1972, 23) than "the indirect and non-linear causation" exhibited by organic processes (5n.3). A more adequate analysis would reflect the fact that external events which impinge on a living system always exert their effects *indirectly*, " through the matrix of activities which is the organism" (5), by adding their influences "to the prevailing condition of [the] system" (5), in which "external and internal elements intersect and interact" (Langer 1967, 427). As Langer noted, an external event that makes peripheral contact with this ongoing system of activities "falls at once under the sway of vital processes, and becomes an element in a new phase of the organism; that is, it engenders a new situation" (283). It is the resulting change in the matrix of activities already in progress that brings about what are identified as the responses of the system. "The only way an external influence can produce [a distinguishable change of activity] is to alter the organic situation that induces [subsequent activities]; and to do this it must strike into a matrix of ongoing activity, in which it is immediately lost, replaced by a change of phase in the activity. The new phase induces new distinguishable [changes]" (283).

8. Further details of Langer's proposed biological framework and the influence of Whitehead's metaphysics on its development are given in Dryden (1997b).

9. I have explored the relationship between Mandler's work and Langer's theory of art and imagination in Dryden (2004).

10. Since the publication of Deacon's book, several other researchers have proposed theories of what is sometimes referred to as the origins of "human singularity," or the evolution of "cognitively modern humans." These theories are summarized and compared in Fauconnier and Turner (2002, 171–87).

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