

The Self as a System of Processes

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Reframing the self or subjective experience as a system of processes provides a model for integrating concepts and findings from various disciplines, for defining and potentially measuring what is otherwise abstract and illusive, and for generating new hypotheses and models. This paper adapts Banathy's three lenses for developing a systems view of any system and applies it to the self. The system-environment lens outlines hierarchical processes of the self and human systems, boundaries and boundary conditions, and the capacity to adapt and coevolve. The function-structure lens describes components, functions, and regulatory processes of the self within human systems. The development lens compares hierarchical levels of development and reframes them as processes and systems types. This model results in simple, functional, and measurable descriptions for the self as an developing and coevolving system emergent from neurophysiological systems and embedded in human systems

1 Introduction

Findings from neuroscience, cognitive science, social biology, and behavioral genetics are changing the face of psychology. Neurophilosophy, neuropsychology, evolutionary psychology, and social neuroscience are efforts toward integration of fragmented approaches to the self. A systems model of the self situated within physiological and social contexts has the potential to facilitate the communication and synthesis of the concepts, findings, and theories from the various disciplines.

A problem for research is that often concepts like emotion, consciousness and cognition are viewed as things that we have rather than as physiological processes that form our experience. As Kagan [2000] says, "Trouble arises. . . when psychologists, sociologists, economists and others in the social and behavioral sciences use abstract words for hidden psychological processes. Often, these words fail to specify critical information such as the type of agent, the situation in which the agent is acting, and the source of evidence for the ascription."

When the self is modeled as a system of systems processes, otherwise abstract concepts can be redefined in terms of process. The following is a skeletal outline of the self as a system of processes using Banathy's [1992] three "lenses" for developing a system's view: the systems relationship to its environment, its structure and functions, and its development through time.

2 Systems Environment Lens

This section looks first at hierarchy theory and then describes the hierarchy of the subsystems of the self, the self, and the social groups of which the self is a part. Next, boundaries and boundary conditions are linked to emotion and interaction with the environment. Finally, adaptation and coevolution of the self is briefly described within the context of brain development and social interaction.

2.1 The Self as a System within Systems

According to hierarchy theory the observer chooses and specifies the level of observation and the systems observed. Each hierarchical level exists at a different scale in time and space and requires different measures and tools for investigation. [Au & Allen 1996]. Miller [1976] outlines the hierarchy of living systems as cells, tissues, organs, organisms, groups, communities, organizations, societies, and supranational systems.

The self (N) exists within groups (N+1) and subjective experience (N) emerges from whole brain activity (N-1). Using elaborate electroencephalograms, Freeman [2000] maps whole brain attractor basins that break down into chaos and reform at an order of tenths of seconds. This whole brain activity emerges from the activity of the various areas of the brain (N-2), which emerge from neural activity (N-3). Just as one cannot expect to describe the characteristics of water by looking at hydrogen and oxygen atoms, one can't expect to fully describe consciousness or subjective experience by observing the parts. N-1, N-2, and N-3 may explain N, but lower levels are not descriptive of N. The following attempts to describe subjective experience (N) as series of processes.

2.2 Boundary Conditions

The self is bounded by skin and by degrees of interaction with its environment. The body has receptors and "channels" for input and output.

At any given time, the individual or the self is relatively open or closed to flows of information and matter/energy. When threatened, living systems respond with inhibition, by partially closing and restricting certain flows. When safe, living systems open to flows of information and energy/matter [Miller 1976].

Inhibitory reactions begin in the lower brain regions and are based on a rapid, partial assessment of information from the environment and the body. The amygdala fires off and neurohormones are released throughout the brain and body. These changes alert the higher cortical regions of the brain (consciousness and thinking) and the accompanying facial expressions and gestures alert others in the environment.

Conscious awareness is slower and requires more complex information processing [Freeman 2000]. Consciousness serves the function of opening the self in the face of perceived threat to increase flows of information into and out of the system and to increase feedback among the body's systems and its environment.

2.3 Adaptation and Coevolution

Open, adaptive systems coevolve with their systemic environments. Neural nets at the level of neurons, attractor basins at the level of the whole brain [Freeman, 2000], cognitive, interpersonal, intrapersonal, and other constructs at the level of awareness and the self [Alexander & Langer 2000], and bonds of friendship, marriage, and family at the level of social groups, all self-organize into increasing complexity and integration, albeit within the limitations of life cycles. At each level feedback from the environment and among the different subsystems results in self-organization and development.

Pathology results when a living system remains protectively closed to its environment and fails to receive the necessary feedback and flows of information and matter/energy that will assure its capacity to self-organize [Troncale 2004]. Whether North Korea, the boys at Columbine High, or a depressed individual, increasing closure, the reinforcing feedback system of negative feedback processes, spirals the system into increasing dysfunction and, unless stabilized by negative feedback or reversed to a reinforcing feedback cycle toward increasing openness, eventual failure or death.

3 The Structure/Function Lens

In Troncale's system of systems processes model (SSP), structure is slow process, and process is fast structure. Structure can be seen as a series of processes forming the self-organizing whole. Processes carry out essential functions that support the self-organizing system within its environment. [Troncale, 2006]

The self consists of the whole body in response to its environment. Organ systems, interacting with other organ systems, continually feed information back to the brain via the nervous system. Pain, hunger, thirst, longing, excitement, and more signal needs for air, food, water, sex, and more. We respond to get needs met and to carry out our social functions to assure that needs will be met in the future.

3.1 Functions of the System

The primary function of the self is survival. We have genetically evolved to form social groups to assure our survival. Banathy [1996] describes the functions of human systems, whether individuals, families, organizations or whole societies, in terms of "purposes" that are required for maintenance and growth. They are regulated by feedbacks and result in the development of both the self and the human systems in which the self is embedded. These functions can be described in terms of flows of information and matter/energy: Social action is outputs that assure increased integrity/organization of encompassing systems. Learning and education involves the capacity to process increasingly complex flows of information and matter/energy.

Esthetics involve the sensory appreciation of order, beauty, etc. that opens flow within and among people. Health involves the integrity and efficiency, maintenance and growth of the system. Economics measures the flows through and among human system. Governance regulates and assures input, transformation, and output. Technology provides the extensions of self that increase the capacity to carry out functions.

Ethics can be framed as representing flows of energy/matter and information that result in the further self-organization of social groups. Honesty is the clear flow from one person to another. Generosity is the flow from one person or group to another. Freedom is the flow of energy/matter/information among persons and the flow of persons within social groups. Peace is the clear flow within and among persons. Regulatory functions govern these flows.

3.2 Regulation

The self, the human system at the level of the organism, is regulated by feedback internally by the brain and neural system and externally by social and other environmental constraints.

3.3.1 The Brain's Regulatory Processes Jacobs [2003] divides the brain into two parts, the subconscious "ancestral" mind and the conscious "thinking" mind, each representing different functions. The subconscious ancestral mind is found in the lower brain regions. It processes complex sensory information and is grounded in the physical present. It alerts the body to patterns of danger and the unfamiliar. It is the source of intuition and insight. Emerging from the cerebral cortex and unique to humans, the conscious thinking mind is concerned with thinking, communicating, planning, and anticipating. It creates its own reality of past and future by anticipating possible scenarios. It modifies reactions of the subconscious mind with attention and learned responses.

Schore [2003] describes the orbital frontal system as the "thinking part of the emotional brain." It regulates affect (emotion) by mediating internal functioning with external reality. It modulates distress and reestablishes positive states. It consists of two separate processors: The left hemisphere of the orbital frontal system forms the "implicit self." It is nonverbal and concerns the unconscious processes. It stores faces and memories and induces chaotic states associated with traumatic experiences. It is more connected with limbic and subcortical regions (the "ancestral mind") than the right. The right hemisphere, which produces the "explicit self," is verbal and concerned with the conscious expression of nonverbal states. Verbal interactions repattern both the unconscious limbic structures and the right hemisphere.

3.3.2. Regulation at the Level of the Self We are regulated both by interior processes in the brain and also by social constraints. At any given time, we are either relatively open or closed to our environments. In our "ancestral minds," inhibitory reactions to real or imagined threat result in relatively closed states. Perspective narrows and attention focuses on the immediate danger and on locating escape routes [Derryberry and Tucker 1994]. Thinking becomes negative and repetitive while the body is on alert [Davidson, 1993].

Human brains with cortical regions have additional regulatory functions. While the basic emotions indicate shifts of awareness in any given moment in response to

ever-changing environments, the more complex social emotions each involve their own complex pathways and are felt as well as communicated as complex social signals [Damasio 2003].

Emotional development involves the regulation of affect that is learned in mother/infant interactions and later in social interaction [Schoore 2003]. While the thinking mind can create its own separate reality of negativity, “higher” consciousness, the ability to think about thinking, can reduce fear, constrain chaotic thinking, and open perspective. The ability to stop and think rather than simply react greatly improves the likelihood of survival [Freeman 2000].

Emotions are linked to ethics. Ethics are “embodied.” [Varela 1999]. We feel good when we are increasing the well-being of ourselves and our social groups [Pinker 2002].

4 The Development Lens

While consciousness and emotion can be modeled as momentary states, they can also be modeled as developing over time. Consciousness develops hierarchically but we also have the capacity to operate at higher levels, in short bursts. This section attempts to frame these phenomena in systems terms.

4.1 Hierarchy as Process

Development occurs hierarchically. Hierarchy is a “structure process” that consists of particular features and functions. Hierarchy consists of the emergence of ordered, scalar levels of self-organizing systems. Clustering creates the bonds that result in increasing efficiency of flows of energy, and emerge to new levels as new forms. In this way networks are constructs of hierarchies. In hierarchies, the gaps between levels are unstable and disordered. Constraint fields exist from higher levels onto lower levels and lower levels onto higher levels [Troncale, 1993].

Functionally, hierarchies allow systems to evolve more quickly. They allow for increased complexity by providing an organizing function of parts. Modularity allows for increased possibilities for combinations and provides more than one pathway to get to the same result (equifinality). Hierarchy results in efficient search strategies and file organization in complex systems. It creates minimum paths for speed and access [Troncale, 1993]. Hierarchy provides a transcendence and emergence function that solves problems at a former levels [Au & Allen, 1996].

4.2 Hierarchical Levels of Development

In infants during infant/mother interaction, limbic regions, the ancestral emotional parts of the brain, develop the neocortical regions, the higher thinking parts of the brain, in a process of strengthening and pruning of neurons [Schoore 2000]. Piaget’s basic levels of cognitive development from childhood to young adulthood describe sensorimotor, concrete, and abstract reasoning. Kohlberg’s levels of moral reasoning [Alexander and Langer 2000], Gilligan’s levels of care and responsibility, Kegan’s [1998] orders of consciousness, and Erikson’s [1994] psychosocial levels are just a few of the hundreds of theories of adult development.

Kegan's [1998] cognitive, interpersonal and intrapersonal "orders of consciousness" are examples of adult levels. "Traditionalism" is the cognitive ability to think in abstractions, but in terms of absolute ideals and values. Mutual reciprocity and role consciousness are guiding principles. Awareness of subjective inner states and valuing the importance of maintaining one's role in society is paramount.

Two levels higher, Kegan's [1998] "postmodernism" involves the cognitive ability to not only formulate roles and rules but also to see how roles and rules cross ideologies, to see the paradox of contradicting roles and rules and values among systems, and to see that the differences among persons are personally and socially constructed. Each party is seen as creating the other's reality.

Superimpose Banathy's [1996] systems types onto the descriptions of levels and the process of development appears. Banathy describes human systems, whether individuals, families, businesses, or nations, in terms of their boundary conditions, the complexity of their structures and functions, their "systemness" vs. mechanistic functioning, and the scope of and their relationships to their environments. "Rigidly controlled systems" are relatively closed, with limited freedom, few components, and a singleness of purpose. The fifth level, "purpose-seeking systems" are ideal-seeking and guided by future vision. They are open and coevolve with their environment. They are complex, systemic, and pluralistic. They define their own policies and purposes and constantly seek new purposes and new niches.

From this view, the question "How do we develop our systems?" shifts to "How do we open our systems to increase the likelihood of further self-organization toward greater complexity and integration?"

4.3 Codevelopment

Langer [1990] challenges the hierarchical views of development, showing how in "mindfulness" people transcend the levels and even form levels of their own. The paradox is resolved with an understanding of systems. The levels of functioning are the result of the complexity of actual neural networks and brain structures, but humans are all capable of operating at higher states for short periods of time. As we know from the processes of hierarchy and phase state changes, the use of less developed pathways demands more effort and energy, so a system will revert back to more limited, but comfortable, energy-efficient states [Prigogine and Stengers 1984]

Prayer, meditation, therapy, 12-Step programs and Langer's [1990] mindfulness open boundaries in the face of real or imagined threat. Temporary higher levels of functioning result [Alexander 1990]. With further opening, these new neural connections lead to the emergence of higher, more efficient developmental levels.

5 Reframing the Self as Process

Even this very rough sketch demonstrates a beginning capacity to define otherwise abstract concepts. "Consciousness" is a catchall term for a dynamic state variable, an emotional regulating mechanism, and a developing cognitive, interpersonal, and intrapersonal awareness of complexity that increasingly matches the complexity and requirements of the environment. "Emotion" is an internal guidance system, an indicator of one's current level of consciousness, which makes

“emotional development” better labeled as “development of consciousness” or “development of self-regulation.” Emotion linked to ethics is also a social guidance system, communicating complexity beyond the capacity of words. “Cognition” involves thinking influenced by a shifting consciousness in any given moment. Reason becomes as Pinker [2002] says, “a spin doctor, not the commander-in-chief.”

Mental health can be described as the clear flow of information/matter energy into, through, and out of the system that results in the development of the self and the capacity to coevolve with one’s environment. Missing is a process view of wisdom, the state of openness and clarity, the innate and learned capacity for simplicity and constructive action within the mess of life.

Reframing psychological concepts could be just a beginning. A systems view offers the possibility of parsing and transcending otherwise divisive political and religious language, perceptions, and beliefs. For example, the “space” between hierarchical stages of development exhibits chaos. Whether involving whole countries or adolescents, the healthy chaos of a self-organizing, developing system and the pathology of a closed system are different processes that require different responses.

While Banathy’s “lenses” offer a glimpse of a framework, Troncale’s [2006] system of systems processes offers the beginnings of a comprehensive general systems model that links axiomatic and interdependent isomorphies (or processes) that have been or can be mathematically modeled. Developing metamodels and recursively applying them to systems models of “real” systems involves a new research enterprise, one capable of transcending conventional constructs in order to meet the demands of our emerging highly-networked and increasingly-endangered global world.

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