

# 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 functional, and potentially measurable descriptions for (1) the experience of self as consisting of an innate "wisdom" (subconscious capacity to process masses of information), cognition, shifting awareness or consciousness; (2) ethics and emotions as regulatory "guidance systems;" (3) a process definition of mental health; (4) 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 integrating otherwise 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 concepts, findings, and theories from the various disciplines.

A problem for research is that 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**

### **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, organs, organisms, groups, 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. This paper attempts to very briefly introduce 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 "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, or more accurately, presented with the unfamiliar, living systems respond with inhibition, by partially closing and restricting certain flows [Miller 1976]. In humans, 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 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, leads to 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 sustain 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, and excitement signal needs for air, food, water, and sex. We respond to get needs met and we carry out 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 consists of 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 increased integrity and efficiency, maintenance and growth of the system. Economics measures the flows through and among human systems. Governance regulates and assures input, transformation, and output. Technology is the extension of self that increases functional capacity.

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 as 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 as the clear flow within and among persons, etc. 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. Emotions are part of a regulatory feedback mechanism involving an early warning system from the lower brain that is tempered by the slower conscious brain. Emotions can be measured “by the magnitudes of the tendencies to chaotic fluctuations in brain modules” [Freeman 2000]. These reactions involve the entire body in response to the surrounding environment.

**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, found in the lower brain regions, 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, emotional development involves the regulation of affect that is learned in mother/infant interactions and later in social interaction [Schore

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].

The causes of basic emotions of fear, anger, disgust, surprise, sadness, and happiness are fairly consistent among humans and nonhuman species. The social emotions, including sympathy, embarrassment, shame, guilt, pride, jealousy, envy, gratitude, admiration, indignation, and contempt, involve their own brain pathways, are mixed with thought and the basic emotions, and are felt as well as projected as complex social signals [Damasio 2003]. While each emotion is associated with a limited number of behavioral alternatives, various emotions and their accompanying thought patterns modify each other to form patterns unique to persons and situations [Izard, Adderman, Scoff, and Fine 2000].

Emotions are linked to ethics. Ethics are “embodied.” [Varela 1999]. We tend to feel good when we are increasing the flows of information and energy/matter toward the increasing integration and well-being of ourselves and our social groups. To greatly oversimplify, when we do good, we tend to feel good [Pinker, 2003].

## **4 The Development Lens**

While consciousness and emotion can be modeled as momentary states, they can also be modeled as developing over scales of 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 as systems processes.

### **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 [Schore 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 [Kohlberg and Rincarz 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 can be resolved with an understanding of processes. Functioning is the result of actual neural networks and brain structures, but humans are capable of operating at higher states for short periods of time. 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 a more efficient developmental level.

Modern society now demands a level of cognitive, interpersonal, and intrapersonal complexity that most of us have not developed [Kegan 1998]. Historically, humans have been guided by tradition, where social roles and rules maintain order and prevent change [Banathy 1996]. More highly evolved societies are open societies, guided by ethics and concerned with the flow of information and

matter/energy toward continuous development of an integrated global network. Hopefully, this new social order is exhibiting the process of equifinality by offering a variety of pathways for people to develop a greater capacity to thrive in this social complexity.

## **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. 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 flows of information/matter energy into, through, and out of the system that results in the the capacity to coevolve with one’s environment. Wisdom can be described as the state of openness and clarity, the innate and learned capacity for simplicity and positive action within the mess of life. This leads, in a few more steps, to a view of “self” as “non-self,” to what Varela [1999] described as “nothing less than a moment-to-moment awareness of the virtual nature of our selves. In its full unfolding it opens up openness as authentic caring.”

Reframing psychological concepts like personality, appraisal, intention, and attachment 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, development occurs in hierarchical stages and the “space” between stages 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 interacting 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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