

How Can Developmental Systems Theories Cope With Free Will? The Importance of Stress-Related Growth and Mindfulness

Carolyn M. Aldwin
Oregon State University

Science is in the midst of a Kuhnian paradigm shift, from causal, deterministic models to more probabilistic ones that emphasize systems approaches. In the developmental sciences, this shift has been manifesting in relational developmental systems theories (RSDTs) which that highlight multi-level analyses, interindividual differences in intraindividual change, and coaction with the context. However, systems theory is still primarily deterministic and does not readily integrate the construct of free will. Although agency is an important component in RSDTs, it is unclear how it develops. However, free will can best be seen as a developmental construct. The process of the development of free will can arise in two ways. First, life-changing encounters with major stressors can result in the development of greater self-awareness and thus greater freedom from the constraints of social conditioning. The second path is through purposive development to increase self-regulation and mindfulness. Through purposive, mindful coaction, the individual and the network can coevolve in positive ways.

As several have noted in a recent issue of *Research in Human Development*, science in general is in the midst of a radical paradigm shift, from reductionism to transactionalism, from Cartesian dualism to a systems approach, from causal determination to probability (Aldwin, 2014; Antonucci & Webster, 2014). In human development, that new paradigm is often referred to as relational development systems theories (RDSTs; Lerner, Agans, DeSouza, & Hershberg, 2014; Overton, 2014). Drawing upon life-span theory, Lerner et al. (2012) noted a number of theoretical tenets of this approach, including integration of levels of organization; mutually influential individual $\longleftrightarrow$ context relations, which are the basic units of analysis; relative (e.g., limited) plasticity; the importance of intraindividual change and diversity; and an emphasis on positive human development (PHD). This shift can be seen in all branches of science, from subatomic physics to sociology and political science.

However, systems theories per se are still largely deterministic (Bergner & Ramon, 2013; Witherington, 2014) and so run counter to another trend that is becoming important in the developmental sciences, namely, self-development (Brandtstädter, 2006). Although current versions of RDSTs do acknowledge the importance of agency, simply acknowledging agency and even coaction does not address in the midst of all of these multiple and deterministic factors

within developmental systems, how does free will and self-determination develop? To address this dialectic, we draw upon theories concerning the positive aspects of stress, or stress-related growth (SRG), self-regulation, and mindfulness.

PRINCIPLES OF SYSTEMS THEORIES

Classical and current theories of systems theories have been developing in the past few decades, and earlier theories have emphasized the more mechanistic and deterministic aspects of systems, whereas more current versions are more open to self-regulation and self-determination.

Early Systems Theories

Understanding person—context transactions has been limited by our inability to produce a generalized theory of the environment and to identify systematically the important contextual features that could affect humans (Aldwin & Stokols, 1988; Oishi, 2014). As Lerner et al. (2012) pointed out, understanding integration across systems is a difficult task when for all intents and purposes these are open systems with potentially thousands of variables. Thus, we often end up focusing on a relatively narrow set of contextual variables (e.g., socioeconomic status, social networks) on which there is general agreement about their importance to human well-being.

According to Barabasi and Frangos (2002), systems theory is an approach to understanding the interconnections among different elements within ecological contexts or other settings. There are some fairly simple principles that underlie the complexity of systems theory that can also aid in simplifying our understanding of environmental contexts.

First, complex environments can be understood in terms of nodes and connectors, whether these nodes are atoms or people, and whether the connectors are subatomic forces or social ties. Second, connections between nodes are not random but rather reflect meaningful patterns. In other words, mathematical models that assume random connections are not tenable, and connections between elements in any system must be meaningful.

Third, there are “hubs,” nodes with multiple connections, which can efficiently shorten the distance between any given set of nodes, and thus the density of the network. In other words, some individuals or places have multiple connections, whereas others have only a few. Fourth, the number of connectors generally can be characterized by power distributions, for example, a Poisson curve or a negative binomial. That is, the majority of nodes have only a few links, but a few have a very large number, the so-called 80–20 rule. For example, roughly 80% of money is earned by 20% of the people, or 80% of publications are generated by 20% of scientists, and so on.

Fifth, systems theories often characterize change in terms of phase transitions, which is similar to the notion of qualitative change in developmental science. Phase transitions often follow a power law. For example, the change from relative random water molecules to highly organized ice crystals is a function of the lessened distance between the atoms, reflecting dense connections between a few nodes. In other words, change occurs when connections become centralized and closer, as when the uncertainty driving Piagetian developmental stages coalesces into a new understanding (Acredolo & O'Connor, 1991).

Sixth, any theory must account for changes in the number of nodes, which are often nonlinear and reflect preferential attachment, that is, the tendency for nodes to connect to other nodes that have more attachments (so-called attractors). As hubs age, they can gradually lose connectors.

Seventh, nodes have different “fitness” or energy levels, which affect their ability to compete for the new connections. In other words, systems are fluid, with hubs waxing and waning in their number of interconnections, which in turn may well change the shape and even meaning of patterns within systems. For example, social movements may arise because a powerful and charismatic leader develops solutions to economic or political crises, which attracts enough followers so that meaning patterns coalesce and can change the sociopolitical systems. See Wallace’s (1966) classic but still highly relevant thesis on how cultural change comes about through shifts in stress and coping patterns, often spear-headed by a small group of individuals, who may be more or less successful in their attempts to help their cultures adapt to change in environmental and social milieus.

Finally, networks vary in their level of robustness, or resilience. Distributed networks in which connections between nodes are more evenly distributed, are more resilient than ones in which there are only a few powerful hubs. Overcentralization of hubs can make a network more vulnerable to cascading or catastrophic failures. Finally, systems are self-organizing, changing in dynamic, nonlinear ways.

Thus, classic systems theories follow a series of mathematical principles and are clearly superior to simple reductionistic models in that they account for more complex interactions between elements in a system, and make clear predictions as to how change occurs. Note however, that they are still largely deterministic, self-organization notwithstanding (Witherington, 2014).

Modern Systems Theories

Mobus and Kalton (2015) have developed a somewhat different approach to the basic principles of systems theory. From their point of view, systems consist of holistic units of networks of relationships. They are processes that are organized into hierarchies, structural and functional, and interact with other systems. They are dynamic, complex, and evolve over time, but nonetheless have subsystems which promote stability.

The influence of systems theory in sciences such physics and biology is rapidly growing (Greenberg, 2014). Genomics now recognizes that genes are complex, dynamically changing systems that are responsive to environmental influences through epigenetic processes such as methylation. There is growing research on regulatory networks within cells that control metabolism, replication, and cell death, and regulatory networks between cells and organs. Clearly, there is a neural net—more and more research is focused on complex transactions within the brain rather than reducing behavior to one particular brain structure. And biological development follows systems theory tenets (Greenberg, 2014). Thus, systems theories are very useful heuristics within which to organize dynamic, evolving systems of networks.

SYSTEMS APPROACHES AND FREE WILL

A potential difficulty with applying systems approaches to human development is the problem of free will. As Le Mouél (2014) pointed out, there has been a resurgence of interest in the construct of free will in recent years. But if individuals are strongly influenced by neural networks that seemingly act independently of conscious action, or by the behavioral scripts of the nodes to which they are connected, then how can individuals consciously choose courses of action?

The work of Christakis and Fowler (2011) is a good example, in which they show that smoking, weight loss, and gain, and so on, are influenced not only by our family and friends, but also by the broader social networks to which we belong. Indeed, one can conceive of the massive change in the acceptability of smoking in the past three decades in terms of how change in systems is thought to occur—the smoking nodes become fewer and more isolated, the antismoking nodes increase dramatically and become tightly connected, until there is a phase shift in the culture concerning the general nonacceptability of smoking. However, it would be incorrect to assume that the influence of these social networks are causal in the sense of simple conditioning paradigms—as anyone knows who has attempted to quit smoking, a great deal of conscious self-regulation is required in this process, though it may certainly be encouraged by attitudes and policies within the network.

To their credit, the current versions of developmental systems theories are careful to incorporate notions of agency and coaction into their theories (e.g., Lerner et al., 2014; Overton, 2014). Individuals actively construct not only the meaning of their contexts, but also their transactions with it, resulting in the coconstruction of themselves and thus their own development. However, the theories do not address how agency or free will develops, though theories of stress-related growth, self-regulation and mindfulness provide clues.

HOW DOES FREE WILL DEVELOP?

For the past three decades, I have interviewed or surveyed thousands of individuals about very difficult times in their lives and have become convinced that stress forms a context for development and growth in adulthood (Aldwin, 2007). Severe stress and trauma can result in life-long harm, especially if they result in posttraumatic stress disorder (PTSD), severe depression, or disrupted family bonds. They are often thought to shatter one's assumption networks (e.g., Janoff-Bulman, 2004), which can and often force the individual to reexamine his or her assumption systems. This provides an unparalleled opportunity for self-knowledge, to learn about one's biases, assumptions, and faults. For example, one person I interviewed selected her divorce as the worst thing that happened to her. Scarred by her parents' divorce, she decided that this would never happen to her, and that she would become the perfect wife and thus avoid her parents' fate. Unfortunately, she never thought to ask her husband what he thought the perfect wife would be—or even to consider whether such a thing was even possible—and they divorced. In the interview, she was still struggling with her self-definition but understood that her ideal self was motivated by fear rather than by a realistic understanding of the give and take in relationships.

Stress can force us to develop new coping skills, resulting in increased mastery. Another woman who I interviewed who also went through a divorce said that at first she believed that she couldn't make it on her own but went back to school and was able to become self-sufficient, and take care of herself and her children.

Stress and trauma can strengthen social ties, as when communities come together after natural disasters. It can result in increased spirituality and meaning in life (Park, 2010; Tedeschi & Calhoun, 2012). By recognizing what influences us—whether it be family dynamics, social network characteristics, or biases and prejudices in the local culture—one can learn to make choices that are relatively independent of these influences and thus begin the process of developing free will. As Levenson and Crumpler (1996) pointed out, development in adulthood reflects Habermas' (1971) dicta of liberation from biological and social determinism.

However, the development of free will can also reflect purposive development. In adulthood, this is generally seen as involving goal setting (Brandtstädter, Rothermund, Kranz, & Kühn, 2010). However, self-regulation—and, more specifically, the development of mindfulness—can also be seen as a form of purposive development (Levenson & Aldwin, 2013).

In the child development literature, self-regulation depends upon three developmental processes (Eisenberg, Hofer, Sulik, & Spinrad, 2014). First, a child must develop self-awareness by learning to monitor his or her thoughts, feelings, and behaviors. Second, self-regulation requires the ability to consciously direct and sustain attention, whether in the service of problem solving or emotion regulation. Third, a child must learn to monitor his or her own behavior, to become aware of the impact of the behavior on others, and modify that behavior to achieve goals.

This process sounds a great deal like the development of mindfulness in adulthood, with one important exception. As Roeser and Eccles (2015) noted, mindfulness does involve the direction of sustained attention, but it is the quality of that attention that distinguishes it from simple self-regulation. Kabat-Zinn (1994) emphasized the nonjudgmental aspects of that attention, whereas Bishop et al. (2004) included not only acceptance but also curiosity and openness.

Thus, the development of choice and free will is compatible with a developmental systems approach, as long as one includes notions of awareness of one's self and of environmental influences. One can choose to affiliate with certain "nodes," or break off contact with ones that are problematic. Further, connections between nodes are not random, but rather reflect meaningful patterns, as mentioned earlier. An important part of adult development is generativity and self-transcendence—one can choose to act in ways that benefits others (Levenson & Aldwin, 2013). Thus, one's behavior, especially moral behavior, can affect the meaning of the patterns within and between the nodes. Although networks have emergent properties and are self-organizing, individuals can affect the organization of networks, their goals, and their efficiency or resilience. Thus, my wishes are that developmental science empirically examine free will as a developmental phenomenon, and that we get beyond examining outcomes at the individual level, and examine how stress, coping, and resilience processes affect others in one's social network, the ecological context, and the larger sociocultural milieu (see Aldwin & Igarashi, 2012).

CONCLUSION

Systems theory approaches are radically changing the developmental sciences and extending beyond calls for multilevel analysis and trajectories of development. It can provide a new way of characterizing the environment and emphasizing the interconnections between individuals in a systemic whole. However, one must keep in mind the dialectic between being embedded in a social system and its influences on thoughts and actions, and the exercise of choice or free will. Thus, the positive human development central to RDSTs (Lerner et al., 2012) must involve the conscious application of choice, thus affording coaction and conscious coevolution.

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