

# THE CHALLENGE OF COMPLEXITY IN SOCIETY: MEANING MAKING AT THE EDGE OF CHAOS

**Marty Jacobs**  
Saybrook University  
475 14<sup>th</sup> Street, 9<sup>th</sup> Floor  
Oakland, CA 94612

## ABSTRACT

The pressing social problems we have are demanding that we build our capacity for meaning making to address them effectively. Meaning making at the edge of chaos is the type of meaning making we engage in when our current worldview is profoundly challenged by new information and experiences and, when the world is complex and chaotic, we are continually challenged and disoriented. This paper introduces the concept of meaning making at the edge of chaos and its theoretical basis in transformative learning theory, logotherapy, constructive developmental theory, complexity theory, chaos theory, and complex adaptive systems. In particular, it focuses on the concepts of disorienting dilemma, critical reflection, and the components of a meaning system derived from transformative learning theory. From logotherapy, it draws on the notions of will-to-meaning, meaning of life, and freedom of will. This paper includes the theory of the socialized, self-authoring, and self-transforming minds from constructive developmental theory. Finally, the concepts of nonlinearity, self-organization, emergence, learning, adaption, the butterfly effect, dissipative structures, and far-from-equilibrium are some key aspects from the world of complexity. These theories are integrated and form the basis for a model of meaning making at the edge of chaos.

Keywords: meaning making; chaos; complexity; transformative learning; dialogue; complex adaptive systems; far-from-equilibrium

## INTRODUCTION

In this increasingly complex world in which we live, meaning making has taken on heightened significance as we muddle through a myriad of confounding experiences ranging from global to personal. Because meaning making enables us to make sense of the world around us, it is therefore imperative that we continue to develop our capacity for meaning making on an ongoing basis. Meaning making<sup>1</sup> is defined simply as “making sense of or giving coherence to our experiences. *Meaning is an interpretation*” [emphasis

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<sup>1</sup> The terms “meaning making” and “sensemaking” are often used interchangeably by several authors (Rutledge; Schwandt; Weick, Sutcliffe, and Obstfeld; Ziegler, Paulus, and Woodside). I will, for the most part, use the term “meaning making” in this paper with the intention that it includes “sensemaking,” however I will retain the original text in direct quotations.

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in original] (Mezirow, 1991, p. 11). Developing our meaning making capacity is a process of turning the subjective into the objective (Kegan & Lahey, 2009; Nicolaidis & Yorks, 2008), that is, being able to recognize and challenge our assumptions. This process “results in the emergence of a more developed framework for making meaning, allowing for an enhanced capacity for experiencing the complexity of life” (Nicolaidis & Yorks, 2008, p. 54). Increased ability to make meaning of life’s complexity allows us to hold the tension between the familiar and the strange, what we expect and what we experience, and what is current and what is desired. Meaning making is a social and collaborative process (Rutledge, 2009; Ziegler, Paulus, & Woodside, 2006) that enables us to see possibilities. Organizations attempting to stay competitive or yearning to make a difference assemble teams that engage in dialogue with the intent of discovering new ideas and new thinking. Communities gather stakeholders, experts, and organizations together to begin to understand a vexing social problem such as the opiate crisis, homelessness, or economic growth. It is this type of meaning making that will bring forth the wisdom within the community or organization that can address and respond to the complexity around us.

According to Martin Heidegger, we are already always in relationship in the world (Porter & Robinson, 2011). We are always interconnected, interdependent, and interacting with the world around us. As such we are always interpreting our life experience through the lens of our past experience (Calleja, 2014; Henderson, 2002). Weick, Sutcliffe, and Obstfeld (2005) argued that meaning making is the process of talking something into existence. From a constructivist perspective, meaning exists within individuals rather than external to them precisely because we construct meaning using our past experiences (Erickson, 2007; Henderson, 2002). In other words, we construct our own reality, a reality that is based on our assumptions of the way the world is, and it can be radically different from those of others. The challenge of being able to see what we take for granted or what we do habitually and suspend our assumptions for examination can often feel quite overwhelming and threatening to our identity.

The focus of this paper is on the type of meaning making that accommodates challenges to our worldview and leads to perspective transformation. I am calling it “meaning making at the edge of chaos,” in part because it is how we attempt to make sense of profoundly incongruous encounters that disorient us and move us toward disequilibrium. To make meaning at the edge of chaos, we go beyond seeing what fits and ignoring the rest, but rather engage in a process of identifying and examining our assumptions. We participate in dialogue and critical reflection to collectively arrive at a transformed worldview. For example, we may form a group that is exploring the issue of racism and white privilege. Many participants may find themselves shifting their beliefs about race and privilege, and collectively they may alter the overall community attitude toward a more constructive one. At the edge of chaos, beliefs and assumptions are continually challenged, causing confusion, uncertainty, ambiguity, and unpredictability. To move to a transformed perspective often requires a complete deconstruction of our existing system and rebuilding of a new one, which takes place within certain boundaries. Somehow out of this chaos we find order, even if only for a short time until the next disruption when the process repeats itself.

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Complexity theory, chaos theory, and complex adaptive systems provide a framework from which to view meaning making at the edge of chaos. Although borrowed from the sciences, I am applying these concepts from a humanistic perspective. The systems I explore all consist of people, who in the course of their interactions, discover that the status quo (equilibrium in complexity theory) no longer achieves what is necessary and thus must contend with uncertainty, ambiguity, and unpredictability, otherwise known as instability in the system. It is in this state, described as chaos in chaos theory, where meaning making at the edge of chaos is triggered:

One quality particular to human beings is the need to know “Why?” We need to understand and ascribe meaning to things. When we are able to reflect on our experience and develop our interpretation, we can endure even the most horrendous events. (Wheatley, 2006, p. 133)

Bussolari and Goodell (2009) applied chaos theory in their counseling work, rather than the prevailing medical model, to normalize the disorder, uncertainty, and unpredictability that is part of any human transition. They considered chaos theory as a meaning-making model:

As a result of human beings’ fundamental need for meaning, chaos theory is potentially very valuable as a framework for understanding how people in transition self-organize during the process of change. Although linear dynamics and cause–effect reasoning may work well to explain individual, short-term experiences, their explanatory powers fall short when relied on for a comprehensive assessment of human experiences across the life span. Reliance on reductionistic theories alone sets people up to experience confusion and fear and to doubt their potential, especially when their “best laid plans” result in entirely unexpected and sometimes unwanted outcomes. (Bussolari & Goodell, 2009, p. 102)

Furthermore, meaning making at the edge of chaos relies on relationships:

The process and the building of relationships are pivotal and the development and maintenance of these relationships are of more importance than the outcomes or the players or objects themselves. Meaning is derived from relationships and not from the parties in isolation. Because of the interdependence of systems with the environment, relationships actually give meaning to the entities, and meaning is not situated within the entities themselves (McDaniel 1997:24). (Rensburg & Ströh, 1998, p. 54)

The relationships we have with one another are an essential aspect to meaning making at the edge of chaos and provide a uniquely humanistic facet to it. We are always connected with others, even if we are unaware of those links, resulting in myriad human systems. Reflecting the behavior of chaotic systems, a small change we make will impact others in the network, possibly causing significant changes elsewhere in the system. I recently experienced this phenomenon in my work as part of student governance in researching challenges with the Institutional Review Board process. My committee’s work has

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reverberated throughout the university and resulted in both unexpected and less than ideal outcomes, and I have struggled to make meaning of it while simultaneously observing a new order emerging from chaos. A systems perspective, at least for some, can aid in this process of meaning making at the edge of chaos.

Over the next several sections, I discuss the following theories – transformative learning theory, logotherapy, constructive developmental theory, and complexity theory, complex adaptive systems, and chaos theory – with respect to meaning making at the edge of chaos. I will then integrate these theories into a comprehensive model of meaning making at the edge of chaos.

### MEZIROW'S TRANSFORMATIVE LEARNING THEORY

There are ten phases in the transformative learning process that are often referred to as phases of meaning making (Courtenay, Merriam, & Reeves, 1998; Erickson, 2007; Mezirow, 2000b). Transformative learning theory helps us understand meaning making at the edge of chaos. Below are the ten phases of meaning making as delineated in transformative learning theory:

1. A disorienting dilemma
2. Self-examination with feelings of fear, anger, guilt, or shame
3. A critical assessment of assumptions
4. Recognition that one's discontent and the process of transformation are shared
5. Exploration of options for new roles, relationships, and actions
6. Planning a course of action
7. Acquiring knowledge and skills for implementing one's plans
8. Provisional trying of new roles
9. Building competence and self-confidence in new roles and relationships
10. A reintegration into one's life on the basis of conditions dictated by one's new perspective (Mezirow, 2000b, p. 22)

Originally these phases were conceived as a linear process but more recently they are not; rather they are considered recursive and cumulative, and the steps do not necessarily follow the given order (Calleja, 2014). Furthermore, while the description of the phases implies a single event in time, the meaning making necessary for transformative learning to occur takes place over a period of time (Calleja, 2014), sometimes years.

As noted earlier, we often encounter information that does not align with our current worldview. These challenges to our assumptions are referred to in transformative learning theory as *disorienting dilemmas* (Mezirow, 1991, 1994, 1997, 2000a), which are defined as “experiences [that] illuminate and challenge heretofore invisible and unquestioned assumptions that determine how we know ourselves and the world around us” (Taylor & Elias, 2012, p. 150), or as Cranton (2016) described, disorienting dilemmas “challenge individuals to reconsider their values, expectations, moral positions, or self-concepts” (p. 50). Kerdeman (as cited in Schwandt, 1999) characterized such events as holding the tension between the familiar and the strange, where the former includes a sense of affirmation and comfort and the latter comprises disorientation, exile, and loss. When we are seeking to understand these events we are standing in between the familiar and the

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strange, trying to discover typical behavior that fits our current perspective (Schwandt, 1999). When that fails, we begin to challenge our assumptions through a process known as *critical reflection*, which Mezirow (1990) defined as “reflection on presuppositions” (p. 6). Critical reflection typically results in transformation of our meaning system.

Our *meaning systems* “[include our] values, beliefs, and assumptions as the lens through which personal experience is made sense of and mediated” (Ziegler et al., 2006, p. 303), and it is these underlying systems and our capacity for meaning making that determine how we interpret disorienting dilemmas (Erickson, 2007; Ziegler et al., 2006). Meaning systems profoundly affect what we do or do not perceive and understand, and

we trade off perception and cognition for relief from the anxiety generated when the experience does not comfortably fit these meaning structures (Goleman, 1985). When experience is too strange or threatening to the way we think or learn, we tend to block it out or resort to psychological defense mechanisms to provide a compatible interpretation. (Mezirow, 1990, p. 4)

Figure 1 illustrates the components that make up a meaning system. A meaning system encompasses *meaning perspectives*, also called *frames of reference* or *paradigms*, and “refer to the structure of assumptions within which new experience is assimilated and

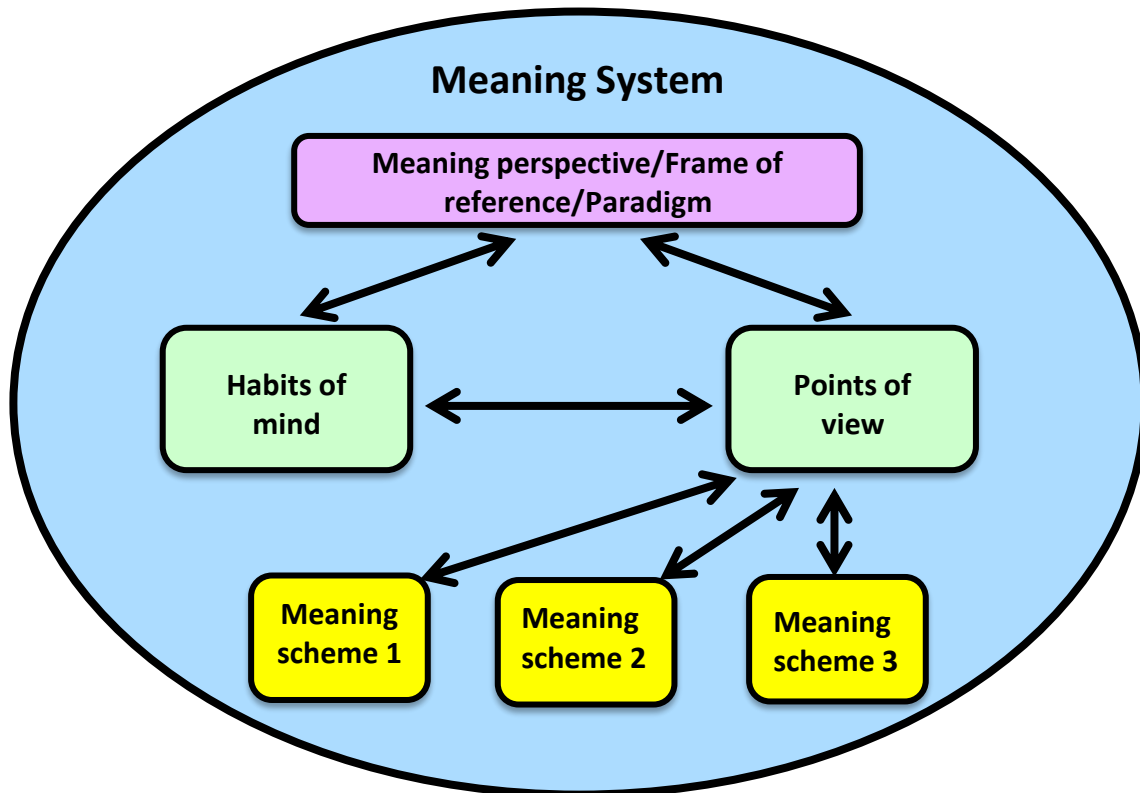


Figure 1. Components of a meaning system based on Mezirow’s transformative learning theory.

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transformed by one's past experience during the process of interpretation" (Mezirow, 1990, p. 2). We acquire our meaning perspectives, often uncritically, through cultural assimilation, intentional learning, and stereotypes, usually in the context of close emotional relationships (Mezirow, 1990). Meaning perspectives are made up of *habits of mind*, "broad, habitual ways of thinking" (Erickson, 2007, p. 66), and *points of view*, "a cluster of habitual, implicit assumptions we use to interpret experience" (Cranton, 2016, p. 29). Habits of mind are more firmly ingrained in our psyche and less responsive to awareness and feedback and are therefore less changeable than points of view, although habits of mind can become points of view (Mezirow, 1997). A *meaning scheme* is a "constellation of concept, belief, judgment, and feeling which shape a particular interpretation" (Mezirow, 1994, p. 223). Meaning schemes are essentially the lowest level of the meaning system since it is at this level where we create new meaning schemes when our experience does not integrate with our existing meaning schemes (Mezirow, 1990). An accumulation of these transformations ripples up through the system to create perspective transformation (Mezirow, 1990).

With respect to meaning making at the edge of chaos, the disorienting dilemma often causes an intense emotional reaction followed by a period of personal alienation, confusion, and uncertainty (Courtenay et al., 1998). In other words, we experience a sense of chaos in our lives because we cannot make sense of the disorienting dilemma. Our natural reaction is to re-establish our equilibrium by returning to the status quo, but when our attempts to make meaning of the disorienting dilemma fail to coincide with our current worldview, we are left with the task of creating new meaning schemes that incorporate the contradictory information from the disorienting dilemma, resulting in a new point of view and ultimately a transformed perspective (Courtenay et al., 1998). We are thus finding the space between the chaos and our previous orderly perspective.

### FRANKL'S LOGOTHERAPY

Viktor Frankl is most well known for his book, *Man's Search for Meaning*, in which he recounts his harrowing time in several Nazi concentration camps, and where he began developing his theory of logotherapy. During his time in the camps, he noticed a pattern between those who survived and those who did not. The critical difference was those who survived managed to find some scrap of meaning in what can only be described as an existence filled with deprivation, humiliation, and unspeakable physical and emotional pain. It is this search for meaning that became the basis for logotherapy. *Logotherapy* is defined as "meaning-centered (psycho-) therapy" (Frankl, 1978, p. 19). In this section I will discuss logotherapy with respect to its three key concepts: will to meaning, meaning of life, and freedom of will (Frankl, 1959/2006, 1969/2014).

#### **Will to Meaning**

Frankl expressed the concept of search for meaning as *will to meaning*:

The will to meaning refers to the primary motivation of seeking meaning and living a meaningful life. Human beings are not pushed by drives,

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instincts, and past histories of reinforcement but drawn forward by the need to fulfill future meanings. The ultimate purpose in life is not to gain pleasure or power but to find meaning and value in life. Will to meaning is essential for survival and health. The will to live is best understood as the will to meaning. A strong will to meaning enables people to endure unimaginable sufferings and to persist in pursuing their ideals. (Frankl, as cited in Wong, 2012, pp., p. 621)

It has been demonstrated repeatedly that the will to meaning is what pushes us to survive even the harshest of conditions (Frankl, 1958), and Frankl has been witness to such events. Frankl (1966) believed that rather than being driven toward meaning, we are drawn to it: “if the will to meaning is to be elicited, meaning itself has to be elucidated” (p. 100). The will to meaning becomes “an intense desire to discover the unique meaning and purpose to one’s life” (Joshi, Marszalek, Berkel, & Hinshaw, 2013, pp. 228-229) and is a life force that never ends until we cease to exist.

According to Frankl (1958, 1959/2006), there are three pathways that we can follow to fulfill our will to meaning. The first is the *creative path* where we give of ourselves through our work and our personal lives; the second is the *experiential path* where we accept the love and gifts of others; and the final path is the *attitudinal path* where we shift our thinking to find meaning in life even in the most difficult of times:

We have not only the possibility of making life meaningful by creating and loving, but also by suffering, so that when we can no longer change our fate by action, what matters is the right attitude toward fate. Where we can no longer control our fate and reshape it, we must be able to accept it. Even a man who finds himself in the most dire distress, in which neither activity nor creativity can bring values to life nor experience give meaning to it, can still give his life meaning by the way and manner in which he faces his fate, in which he takes his suffering upon himself. (Frankl, 1958, p. 32)

The first path requires a sense of responsibility and the ability to rise above oneself and focus on the greater good. The second path involves a letting go of control and opening oneself to receive. The final path requires a great deal of courage and inner strength and the capacity to take a stand. Taking any one of these paths will likely lead to a meaningful life.

### **Meaning of Life**

For as long as humans have been sentient beings, we have continually pondered the question of the meaning of life. This differs from Mezirow’s concept of the meaning system in that the focus is on finding meaning in one’s life rather than making sense of particular events. Frankl’s concept is more comprehensive and includes making meaning of events as the means toward the end of living a meaningful life. Frankl (1972) responded to the question of the meaning of life, “the answer to the question of what is the meaning of life can be posited only out of one’s whole being — one’s own life is the answer to the question of the meaning of life” (p. 88). In other words, because we are all

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unique individuals, we all discover unique meanings in our lives that constantly change but never cease to be available to us to discern:

The meaning of life differs from man to man, from day to day and from hour to hour. What matters, therefore, is not the meaning of life in general but rather the specific meaning of a person's life at a given moment. (Frankl, 1959/2006, p. 108)

Our meanings exist within the concrete activities of everyday life, and “therefore, what is meaningful in a given situation for a given person is not a ‘thing’ with a fixed denotation (meaning) but has to be negotiated and discovered between people. Meaning is what is meant – in its particular context” (Indinger, 2010, p. 38). Meaning can only be discovered through interaction with others and involves choices:

The more choices you see in your situation, the more meaning will become available as you feel like a human being making a decision, taking action or a stand towards the situation.

The first step is to become aware that you do have choices. The second step is to determine what is most meaningful for you at this time in your life (Indinger, 2010, p. 42).

Having choices does not guarantee that the choices we make will lead to a meaningful life (Joshi et al., 2013). Nevertheless, the number of choices increases the likelihood of finding meaning in life. Joshi et al. (2013) cited multiple research projects that confirm having a meaningful life is a major factor in psychological well-being, influencing affect, happiness, hope, optimism, and life satisfaction in a positive way, and helping create more positive personality and self-empowering traits. They conclude, “thus, the presence of meaning in life may be described as the experience of life's facets being integrated, allowing for a sense of direction and purpose” (Joshi et al., 2013, p. 229). That sense of direction and purpose will come regardless of the circumstances.

As noted earlier, Frankl (1959/2006, 1969/2014, 1978) believed that meaning in life can exist even in the most dire circumstances and that suffering and how we cope with it can bring deeper meaning into our lives: “one cannot understand the meaning of life apart from the meaning of suffering because suffering is an inevitable aspect of human existence. To discover meaning in suffering is essential to meaningful living” (Wong, 2012, p. 622). Suffering can be likened to an extreme version of Mezirow's (1991, 1994, 1997, 2000a) disorienting dilemma in which life has been upended in the harshest of ways:

Individual life cannot be destroyed if it is devoted to something bigger, higher, and more long-lasting than itself. Having the right attitude toward suffering and life indicates that one has reflected on one's life experiences and learned to make sense of the difficulties, predicaments, and paradoxes of life. Logotherapy recognizes that every crisis is an opportunity for personal transformation and developing a mature worldview. (Wong, 2012, p. 624)



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Disorienting dilemmas are never easy to face, particularly those that are inevitable and out of our control, but they offer us tremendous opportunities for profound personal growth. Frankl (1959/2006) offered a hopeful observation: “suffering ceases to be suffering at the moment it finds a meaning, such as the meaning of sacrifice” (p. 113). There are reasons why we suffer – it is not in vain – and there are silver linings to these clouds.

### Freedom of Will

Included in humanity’s desire to find meaning in life is the concept of *freedom of will*: “freedom of will contends that the human being has the capacity of free choice” (Indinger, 2010, p. 28). As noted earlier, the more choices, the more freedom, however Frankl (1958, 1969/2014, 1978) insisted that there are limits on our freedom. In particular, responsibility and conscience must be invoked when making choices:

Freedom of will enables people to be responsible, moral agents. There is no escape from making choices, and people are accountable for the consequences of their decisions and actions. Frankl (1946/1985a) emphasized that freedom without responsibility would lead to chaos and nihilism. Therefore, freedom is always limited by responsibility. (Wong, 2012, p. 621)

Indinger (2010) suggested there are three possibilities for finding meaning through responsibility: “by responding to the meaning(s) of the moment (*responsibility*); by making responsible choices where choice exists (*freedom*); and by not feeling responsible when there is no choice (*acceptance*: change/choice of attitude)” [emphasis in original] (pp. 42-43). Regardless of which type of responsibility we apply to finding meaning, our conscience must accompany us on the journey. Frankl (1969/2014) defined *conscience* “as the intuitive capacity of man to find out the meaning of a situation” (p. 43). Conscience is what guides our choices:

Conscience may be defined as a means to discover meanings, to “sniff them out,” as it were. Conscience lets man arrive at the unique meanings dormant in all the unique situations that go to make up a man's life. But it can also lead him astray. Conscience may err, so that man may not know for certain whether his conscience is right and another man's conscience that tells him something else, is wrong or whether the reverse is true. Not that there is no truth, there is. But no one can be absolutely sure that he has arrived at the truth. (Frankl, 1972, p. 88)

In other words, our conscience is a social construction unique to each of us and as such, reveals that there is no universal truth. Frankl (1969/2014, 1972) claimed that in the journey to finding meaning, our conscience will guide us. Furthermore, he believed that “a lively and vivid conscience is also the only thing that enables man to resist the effects of the existential vacuum, namely conformism and totalitarianism” (Frankl, 1969/2014, p. 45). Our conscience helps us avoid a meaningless life.

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Concepts in Frankl's logotherapy are abundantly present in meaning making at the edge of chaos and in transformative learning theory. As mentioned previously, a disorienting dilemma can produce moments of suffering on which we reflect critically and with which we try to make meaning of the disruption. As outlined in logotherapy, this reflection and meaning making can only take place in discourse with others and offer opportunities for growth and learning. This process is generally guided by responsibility and conscience. Of the three pathways to meaning, it is the attitudinal path that best matches the process of meaning making at the edge of chaos that leads to transformative learning. Transformative learning requires a shift in attitude, that is, worldview, in order to open oneself to the journey of meaning making at the edge of chaos. Furthermore, it is less likely, though not impossible, that the creative and experiential pathways will lead to the edge of chaos. The attitudinal path is the most challenging because it involves suffering, however as Frankl (1959/2006) noted, "suffering ceases to be suffering at the moment it finds a meaning" (p. 113). Indeed, we cannot avoid suffering – it is a natural part of life – but we can choose how we approach it.

### KEGAN'S CONSTRUCTIVE DEVELOPMENTAL THEORY

Constructive developmental theory, sometimes referred to as constructive developmental psychology, is based on the work of Kegan, Piaget, Kohlberg, and Belenky (Kegan, 2000) but is most often associated with Kegan. *Constructive developmental theory* is based on "the ideas of constructivism (that persons or systems constitute or construct reality) and developmentalism (that organic systems evolve through eras according to regular principles of stability and change)" (Kegan, 1982, p. 8), and our perception is the lens through which we make these constructions (Kegan, 1982):

The idea of construction...liberates us from a static view of phenomena. As the idea of construction directs us to the activity that underlies and generates the form or thingness of a phenomenon, so the idea of development directs us to the origins and processes by which the form came to be and by which it will pass into a new form. (Kegan, 1982, p. 13)

In other words, development is an evolutionary process. The constructive developmental framework, therefore, focuses on the evolution of our meaning making processes (Kegan, 1982, 2000). In this section I will explore Kegan's concepts of meaning making systems and the three levels of adult development, the subject-object relationship, and the evolution of meaning making systems.

#### Meaning Making Systems

Previously, I discussed how our meaning system consists of our meaning schemes or our individual interpretations of events that come together to create our point of view and our habits of mind or habitual thinking. These two converge into our meaning perspective or frame of reference (see Figure 1). How we interpret and respond to disorienting dilemmas is highly dependent on our meaning making systems (Erickson, 2007). Kegan claimed that being human "is the activity of meaning-making. There is thus no feeling, no experience, no thought, no perception, independent of a meaning-making context in which it *becomes* a feeling, an experience, a thought, a perception, because we *are* the

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meaning-making context” [emphasis in original] (Kegan, 1982, p. 11). We experience transformation when our meaning making systems change (Berger, 2004), marking the beginning of transformative learning. Kegan (Kegan, 2000; Kegan & Lahey, 2009) described three levels of adult meaning systems through which we can evolve, each one signifying a higher level of mental complexity and which “make sense of the world, and operate within it, in profoundly different ways” (Kegan & Lahey, 2009, p. 16). They are considered to be the lenses or filters through which an individual at that level views the world (Kegan & Lahey, 2009). These three levels are designated the socialized mind, the self-authoring mind, and the self-transforming mind.

### *The socialized mind*

Individuals with a *socialized mind* are characterized by the emphasis they place on responding to the opinions and expectations that others have of them (Kegan & Lahey, 2009). They find coherence in aligning themselves with those with whom they identify and to whom they are loyal (Kegan & Lahey, 2009). Furthermore, they will often say what they believe others want to hear from them and are thus, susceptible to groupthink (Kegan & Lahey, 2009). Moreover, they may withhold information from others in order to help them “save face” (Kegan & Lahey, 2009). They are also very sensitive to how they receive and respond to information and may read more into the information than exists: “because the receiver’s signal-to-noise detector may be highly distorted, the actual information that comes through may have only a distant relationship to the sender’s intention” (Kegan & Lahey, 2009, p. 18). In other words, those who operate from a socialized mind are often important cogs in the wheels of the rumor mill.

Meaning making from the socialized mind is influenced, as might be expected, by the values and expectations of those to whom they are loyal: “meaning construction for the socialized self is embedded in relationships and characterized by co-construction of feelings, lack of clear personal boundaries, black-and-white value judgments, and a lack of personal agency” (Erickson, 2007, p. 72). As a result of being embedded in relationships, their “limits of meaning making in transformational learning may be objective reframing of a frame of reference” (Erickson, 2007, p. 76). They do not possess the mental complexity to actually change their meaning system. Disorienting dilemmas are perceived to be generated externally, and their response to a disorienting dilemma is to look to others for confirmation of their self-perceptions (Erickson, 2007). Consequently, meaning making at the edge of chaos is likely to be out of reach for those who reflect from the socialized mind.

### *The self-authoring mind*

Those with a *self-authoring mind* are able to evaluate and make choices about expectations from others and will operate based on their own needs (Kegan & Lahey, 2009). The information they communicate is laser-focused on their own agenda, and they are typically blind to their own shortcomings (Kegan & Lahey, 2009). They receive information in a similarly selfish vein: “the self-authoring mind creates a filter for what it will allow to come through. It places a priority on receiving the information it has sought” (Kegan & Lahey, 2009, p. 19). The advantages of this level of mental complexity is that those who think this way are focused, able to discern the important from the urgent, and

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adept at prioritizing where to put their time (Kegan & Lahey, 2009). On the other hand, their blind spot with their own flaws or mistakes can lead to unresponsiveness to a changing environment (Kegan & Lahey, 2009). While their perspective on their relationships with others is insightful, their relationship with themselves is not.

Meaning making for self-authorizing minds is shaped by their ability to construct their own values and beliefs and “is characterized by autonomy and self-regulation” (Erickson, 2007, p. 65). The disorienting dilemma is framed from their own perspective and is either viewed as an opportunity for new possibilities or for revisiting and resolving a previous dilemma from the present, rather than future, perspective (Erickson, 2007). Unlike the socialized self, self-authorizing individuals define the situation for themselves and explore self-defined options (Erickson, 2007). Although the capacity for reaching transformative learning is considerably more than the socialized mind, it is questionable if they could engage in the critical self-reflection that is required of meaning making at the edge of chaos.

### *The self-transforming mind*

Those who operate from the *self-transforming mind* are capable of ascertaining the larger system and understanding their own limitations within that system as well as the imperfections of the system itself (Kegan & Lahey, 2009). They embrace contradiction, uncertainty, and ambiguity and can hold the tension between different viewpoints (Kegan & Lahey, 2009). The self-transforming mind is the only level that can actually examine its own filter:

The self-transforming mind both values and is wary about any one stance, analysis, or agenda. It is mindful that, powerful though a given design might be, this design almost inevitably leaves something out. It is aware that it lives in time and that the world is in motion, and what might have made sense today may not make as much sense tomorrow. (Kegan & Lahey, 2009, pp. 19-20)

When communicating, people with a self-transforming mind are both promoting their own ideas as well as requesting feedback on those ideas: “information sending is not just on behalf of driving; it is also to remake the map or reset the direction” (Kegan & Lahey, 2009, p. 20). Similarly, when receiving information they are looking for disconfirming evidence regarding their own frame of reference (Kegan & Lahey, 2009). As a result, they are typically more open to learning and growth.

Meaning making from the self-transforming mind is at its most complex and is characterized by the ability to examine one’s existing meaning system, observe its limitations, and reconstruct the meaning system into something that is more comprehensive (Kegan & Lahey, 2009): “Individuals with the self-transforming mind are capable of evaluating their own assumptions and reframing their perspectives as needed when data indicates [*sic*] that their existing mindset is inadequate for the changing circumstances” (Bochman & Kroth, 2010, p. 332). The meaning making that transpires at the level of the self-transforming mind is necessary to respond to the complexities of today’s world” (Gunnlaugson, 2006). Unfortunately, “less than 1% of the adult

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population achieve the ability to possess their own meaning-making processes and realize that there are faults in even having such a system (Kegan, 1994)” (Bugenhagen & Barbuto, 2011, p. 38). This dearth of self-transforming minds sets up a crisis in thinking where the majority of the adult population is not equipped to address today’s complex issues, and it is likely that complexity will only continue to increase, placing an even higher demand that we continue to evolve toward higher levels of mental complexity. In spite of this bleak statistic, people have been shown to rise to the occasion, particularly in crisis situations. As someone who has worked with many communities on thorny issues, I have witnessed individuals putting aside their disagreements to focus on the greater good by tapping the wisdom that already exists. Despite the challenges involved in guiding individuals toward new ways of thinking, it is possible.

### **Subject-Object Relationship and the Evolution of Meaning Making Systems**

The *subject-object relationship* is at the heart of how we evolve toward more complex approaches to meaning making:

The subject–object relationship forms the cognate or core of an epistemology. That which is “object” we can look at, take responsibility for, reflect upon, exercise control over, integrate with some other way of knowing. That which is “subject” we are run by, identified with, fused with, at the effect of. We cannot be responsible for that to which we are subject. What is “object” in our knowing describes the thoughts and feelings we say we have; what is “subject” describes the thinking and feeling that has us. We “have” object; we “are” subject. (Kegan, 2000, p. 53)

Evolution occurs when what was once “subject” is now “object,” that is, the meaning making system we previously had can now be examined from a distance (Kegan, 2000; Kegan & Lahey, 2009). In other words, the lens we once *looked through* is now something we can *look at* (Kegan & Lahey, 2009). This manner of change completely alters the form of our meaning making systems to one that is capable of handling greater levels of complexity and produces a more complex worldview (Bugenhagen & Barbuto, 2011). Furthermore, “this developmental evolution is a highly individual process that advances, or not, dependent on contexts that either promote or hinder development (Kegan, 1998)” (Erickson, 2007, p. 64). Therefore it behooves us to determine under what contexts are we more likely to evolve if we are ever to transform our failing systems of today to ones that enhance and enrich life and promote wellbeing.

Indeed, Kegan (2000) stated that constructive developmental theory’s “somewhat formal, explicitly epistemological rendering of development comes closest, in my view, to the real meaning of transformation in transformational learning theory” (p. 54). It is imperative that we create the settings in which we can continue to evolve to higher levels of mental complexity. It is clear that in order to make meaning at the edge of chaos, we have to be at the transforming mind level, and well-meaning groups of individuals have repeatedly exhibited the courage to embrace the chaos by thinking and growing together.

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### MEANING MAKING'S CONNECTION TO COMPLEXITY AND CHAOS THEORIES AND COMPLEX ADAPTIVE SYSTEMS

As noted earlier, if we are to address today's complex challenges effectively, we have to be able to meet those challenges with the requisite mental complexity. It is unlikely that a day passes without hearing the word "complexity," and yet we as a society struggle to understand the depth and breadth of the word, the concepts behind it, and how to adapt to this ongoing growth in complexity. Complexity and chaos theories and complex adaptive systems (CAS) cover an enormous range of concepts and disciplines, and it is beyond the scope of this paper to explain each one in detail. Rather, this section will link concepts from these theories to meaning making at the edge of chaos. Meaning making is a uniquely human endeavor and as such, adds some humanity to what are fairly intellectual theories adopted from science into the social sciences. Furthermore, the complex and chaotic systems I am considering are groups of individuals in relationship with each other, thus amplifying the need to take human factors into consideration and encouraging a move away from a mechanistic model. Instead of attempting to make a direct translation from the sciences to the social sciences, it is more productive to view the concepts of complexity, chaos, and CAS as metaphors that open us to new ways of thinking. Although I will cover each one in a separate section, it is important to note that there is tremendous overlap amongst all three bodies of knowledge and like the concepts they represent, they are interwoven and interdependent.

#### **Complexity Theory**

*Complexity theory* is defined as "the science [which] is concerned with the fundamental logical properties of the behavior of nonlinear and network feedback systems, no matter where they are found" (Stacey, 1995, p. 480) and encompasses complex adaptive systems and chaos theory, that is, complex adaptive systems and chaos theory can be viewed as overlapping subsets of complexity theory. Complexity theory is "often termed nonlinear dynamics because [it seeks] to understand systems that change in ways that are not amenable to the linear cause and effect models familiar to social scientists" (Warren, Franklin, & Streeter, 1998, p. 358). In other words, the outputs from the various parts of a system are not necessarily proportionate to their inputs (Richardson, 2008), and small initial changes can result in later rapid change or growth (Prigogine & Stengers, 1984; Warren et al., 1998). These changes result in instability in the system (Stacey, 1995) and uncertain and unpredictable outcomes: "nonlinearity is the primary source of uncertainties; it makes the trajectory of a system's future behavior unpredictable" (Morçöl & Wachhaus, 2009, p. 52). Uncertainty cannot be alleviated with more information or knowledge; there are fundamental properties of complex systems that simply cannot be known until they are experienced (Morçöl & Wachhaus, 2009), thus making outcomes unpredictable. Meaning making is what is required at this point and is what human systems generally engage in during times of uncertainty. While this uncertainty and unpredictability is typically disconcerting to those experiencing it, similar to a disorienting dilemma, it also opens up the world of possibilities (Bussolari & Goodell, 2009). In complex systems, the challenge is to find that balance between ambiguity and potential, something that feedback systems facilitate.

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*Nonlinear feedback systems* comprise the opposing trends of positive and negative feedback: “nonlinearity can produce either positive (amplifying) or negative (dampening) feedback. It can produce stability or instability” (Goerner, as cited in Morçöl & Wachhaus, 2009, p. 52). Positive feedback pushes a system toward instability whereas negative feedback pulls a system toward stability and equilibrium (Gleick, 2008; Prigogine & Stengers, 1984). In complex systems, the tendency is toward growth, but there are limits to that growth:

The meeting of a nonlinear growth curve and a resource limitation, to form a logistic growth curve, is something like the meeting of the proverbial irresistible force and immovable object. The nonlinear growth does not really stop, it is simply contained. Moreover, it is contained because its own action, increasing growth, uses the resources needed to sustain growth. This amounts to a negative feedback loop, counterbalancing the positive feedback of growth building on itself. But if the growth rate is high enough, the counterbalance will not lead to a steady equilibrium. Rather, the entire system will be unable to settle down. It will wander unpredictably within a region defined by the growth rate and the resource limit. (Warren et al., 1998, p. 360)

The unpredictability of these continuous fluctuations between growth and limits is responsible for our inability to link cause and effect in complex systems (Bussolari & Goodell, 2009). From a meaning making perspective, this means that we experience serial disorienting dilemmas and are unable to connect them with our current meaning schemes, resulting in a need to constantly change our meaning schemes. Furthermore, “it is the existence of nonlinear feedback in complex systems that allows for *emergence, self-organization, adaptation, ...*and many other key concepts that have become synonymous with complexity thinking” [emphasis in original] (Richardson, 2008, p. 14) and complex adaptive systems.

### Complex Adaptive Systems

*Complex adaptive systems* are a specific type of system:

The term complex adaptive system is used to describe all living creatures, including humans, which can both adapt to and change their environment so that it further meets their needs. Complex adaptive systems are also self-regenerating or autopoietic, reflecting life cycle aspects of adaptation such as birth and death, as well as ongoing processes of continual growth. Self-organizing systems are embedded in and interact with their environment in a way that promotes growth. (Bussolari & Goodell, 2009, p. 99)

These embedded self-organizing systems are interdependent, reveal dynamic patterns of relationships (Morçöl & Wachhaus, 2009), exhibit hierarchy, emergence, and learning (Edson, 2012), and “[strive] for adaptation, change, life, and growth” (Bussolari & Goodell, 2009, p. 104). For the purposes of this paper, I will discuss the CAS properties

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of self-organization, emergence, learning, and adaptation as they apply to meaning making at the edge of chaos.

*Self-organization* is an essential function of CAS and is defined as an “emergent growth process through which adaptation and change occurs” (Bussolari & Goodell, 2009, p. 103) and is the result of our meaning making processes. A system is considered to be self-organizing if it creates relationships between its component parts, resulting in an integrated whole (Edson, 2010). Self-organization can be equated to the “forming” stage of group development (Edson, 2010), where individuals interact and self-organize across system boundaries and collectively create and recreate their environment (Stacey, 1995): “people and groups in organizations will materialize already available potentials of the system by the very act of thinking. This may be the essence of self-organization” (van Eijnatten, 2004, p. 443). While thinking stimulates the process of self-organizations, it can do little to alleviate the uncertainty and unpredictability in CAS. Because it is impossible to predict long-term outcomes in CAS, those outcomes must be allowed to emerge from the process of self-organization (Stacey, 1995). Emergence and self-organization are intricately intertwined within CAS and are often used to define each other. *Emergence* is simply “the act of coming through transition” (Bussolari & Goodell, 2009, p. 104), which often happens as a result of self-organizing where the whole is greater than the sum of the parts (Edson, 2010). From the perspective of logotherapy, emergence is the process of following one of the three paths to meaning, and in transformative learning theory, it is the process of allowing a new perspective to reveal itself. In both cases we do not know what the outcome will be until we arrive. Like self-organization, “emergence is a cornerstone of complexity theory” (Schermer, 2012, p. 282), “which depicts how new self-organizations appear when the parameters of a system change” (Schermer, 2012, p. 283). Subsequently, those changes are transmitted through nonlinear feedback systems, which often yield emergent order in CAS (Stacey, 1995), as well as learning and adaptation.

Analogous to self-organization and emergence, learning and adaptation are closely linked to one another. Likewise, the system’s nonlinear feedback system plays an important role in the emergence of learning and adaptation (Edson, 2010, 2012). *Adaptation* is defined as “a dynamic process resulting in alterations within a [living system] that emerge as a result of [a] transition experience” (Bussolari & Goodell, 2009, p. 103). CAS occupy environments that are constantly changing, and consequently they are perpetually responding and adapting to those changes (Bussolari & Goodell, 2009; Warren et al., 1998). Edson (2012), in her study of a project team, claimed, “systemic adaptation requires willingness to listen to environmental feedback (flexibility) and to incorporate change into the system (versatility). Continual flexibility and versatility in using feedback increases adaptive capacity and, when combined with double-loop learning, becomes resilience” (p. 5). She identified four phases to the cycle of adaptation: “(a) rapid growth, (b) conservation, (c) release, and (d) reorganization” (Edson, 2010, p. 11). These phases are described respectively as the moment when (a) “resources are readily available,” (b) “things change slowly [and] resources [are] locked up,” (c) “things change rapidly [and] ‘locked up’ resources are suddenly released,” and (d) “system boundaries are tenuous [and] innovations are possible” (p. 11). It is at this final phase, if conditions are adverse, that adaptation takes place and where system feedback can be summoned to build the



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system's adaptive capacity (Edson, 2010). It is here where the process of learning will determine the depth and extent of the systems ability to adapt.

*Learning* within CAS can be defined as “the application of lessons from an adaptive experience of the flows between structure and function to future situations building adaptive capacity for resilience” (Edson, 2010, p. 8). In other words, learning ensues when we are able to understand and apply to new situations the emergent properties that occur when self-organization and hierarchy interact (Edson, 2010). De Simone and Simoncini (2012) explicated,

The learning process can not only be understood as a process that embodies a causal relationship with the environment; it can also be understood, in our opinion, as a phenomenon that may have its origin in the inter-relationship established between the subject and its environment. In this case, learning can be considered as an emerging phenomenon that occurs when subject and environment come into relationship in a dynamic and recursive process. The learning that emerges from this connection is a generative phenomenon that influences both the subject and its context. (p. 311)

As noted earlier, CAS exist in a constantly changing environment, and the subsystems and individuals within those systems are ceaselessly making adjustments while simultaneously adapting to and learning from those changes and adjustments: “[learning] through reflection upon what emerged through the release of resources ... is a key leverage point for building adaptive capacity and transformative change” (Edson, 2012, p. 24). Meaning making is a process of reflecting on and adapting the new information from a disorienting dilemma into a more inclusive worldview, resulting in learning. Critical reflection is an essential element in the transformative learning process, and it is through language that we make meaning of complex situations. Subsequently, “because language is important in meaning making, [the concepts of complexity theory and CAS] are useful tools for moving toward an adaptive outcome even in the midst of uncomfortable, confusing, or seemingly random experiences” (Bussolari & Goodell, 2009, p. 103). This discomfort, confusion, and randomness are the essence of a disorienting dilemma, of suffering, and of chaos.

### Chaos Theory

*Chaos* can be “understood as the state where a system can no longer sustain a stable pattern of behaviour because of an increasingly changing environment and subsequently leads to the system reorganising itself to adjust to these changes” (Rensburg & Ströh, 1998, p. 53). *Chaos theory* is “the study of complex, dynamic systems that reveal patterns of order out of seemingly chaotic behaviors ... the study of complex, deterministic, non-linear, dynamic systems ... so complex and dynamic, in fact, as to appear chaotic” (Rensburg & Ströh, 1998, p. 53). A *chaotic system* is one where “it becomes impossible to know what it will do next. The system never behaves the same way twice” (Wheatley, 2006, p. 22). The common thread amongst these three definitions is disequilibrium, that sense of confusion and disorientation we experience with a disorienting dilemma, which signals that change is occurring (Bussolari & Goodell,

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2009). It is one of many fundamental concepts within chaos theory. As was the case with complexity theory and CAS, a full discussion of chaos theory is beyond the scope of this paper. In this section I discuss the constructs of the butterfly effect; dissipative structures and creative destruction; and chaos, the edge of chaos, bounded instability, and far-from-equilibrium as related to meaning making at the edge of chaos.

As has been already noted, small perturbations in a system can result in subsequent larger changes. Edward Lorenz famously originated the moniker “butterfly effect” for this phenomenon:

Lorenz established that very small changes could greatly alter an end result or an emergent pattern. The butterfly effect, or sensitive dependence on initial conditions, is the term coined from these findings. The explanation of this term suggests that the flapping of a butterfly’s wings in one part of the world can cause a hurricane somewhere else. More specifically, if two similar systems differ by even the smallest initial variation, they can exponentially diverge from each other across time. Thus, even if one knows the current state of a system and even if one might be able to make reasonable predictions in the short term, one will not be able to predict the path of development continuously over time. (Bussolari & Goodell, 2009, p. 100)

The butterfly effect depends on *deterministic chaos* (Warren et al., 1998), which maintains that the overall shape of a system is set by rules and parameters and is therefore predictable, but within those bounds the individual components exercise free will, which is ultimately unpredictable (Stacey, 1995; Wheatley, 2006). Moreover, “deterministic chaotic behavior has several distinctive characteristics: It arises within feedback systems, never precisely repeating itself, but staying within a certain range of possibilities” (Warren et al., 1998, p. 361). In other words, borrowing from Prigogine and Stengers’ (1984) book title, we have order out of chaos. It is similar to the process I described earlier where we continually change our meaning schemes to keep up with the constantly changing environment – each new change brings forth different perspectives. Furthermore, it is the butterfly effect that makes rapid change possible (Warren et al., 1998). Like so much of complexity theory, the butterfly effect confronts the reductionist perspective:

The butterfly effect presents a profound and perhaps insuperable challenge to the traditional scientific belief that, given a perfect knowledge of present conditions, accurate prediction of the future is possible. In effect, sensitive dependence on initial conditions implies that our knowledge can never be good enough (Kellert, 1993). (Warren et al., 1998, p. 363)

It is that inability to predict and have accurate knowledge that feeds the need for self-organization, adaptation, and learning.

As a result of the butterfly effect, a system finds itself in the midst of chaos with unpredictable fluctuations within the system’s bounds, and it is dissipation that enables the system to self-organize and create order within disorder (Prigogine & Stengers, 1984).

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Gleick (2008) stated, “the universe is randomness and dissipation, yes. But randomness with direction can produce surprising complexity. And as Lorenz discovered so long ago, dissipation is an agent of order” (p. 314). *Dissipation* is a term borrowed from thermodynamics that “describes loss, a process of energy gradually ebbing away” (Wheatley, 2006, pp. 20-21). Another phrase that is used to describe dissipation is *creative destruction* (van Eijnatten, 2004), which essentially means that “before creativity there needs to be destruction and endings of the old” (Rensburg & Ströh, 1998, p. 56). In meaning making, creative destruction occurs when we dismantle our existing worldview and construct a more inclusive one. This creativity through self-organization results in what Prigogine (Prigogine & Stengers, 1984) called *dissipative structures*: “new dynamic states of matter [that] originate, states that reflect the interaction of a given system with its surroundings” (p. 12). Morçöl and Wachhaus (2009) explained further:

Prigogine and Stengers’s (1984) dissipative structures theory is based on their fundamental observation that most systems in the universe are open systems that exchange energy, matter, and information with their environments. In their view, dynamism, not equilibrium, is a prevalent characteristic of open systems: Systems tend not to settle in equilibria; to the contrary, they have the tendency to drift toward “far-from-equilibrium conditions,” under which systems are unstable and sensitive to external influences. Under these conditions, their behavioral patterns are nonlinear and partly unpredictable. (p. 49)

In closed systems, dissipation would ultimately lead to the death of the system, but because open systems can exchange energy and information with its environment, dissipative structures are able to rise from the fires of creative destruction (Schermer, 2012; Warren et al., 1998).

Dissipation can only take place at the “edge of chaos,” a term coined by scientists at the Santa Fe Institute (Warren et al., 1998) and also referred to as “bounded instability” (Stacey, 1995) or “far-from-equilibrium.” The *edge of chaos* is defined as “a limited set of conditions where order and disorder are in delicate but optimal balance for growth and change” (Schermer, 2012, p. 280). Wheatley (2006) viewed chaos and order as mirror images that complement each other and claimed, “the greatest generator of information is the freedom of chaos, where every moment is new” (p. 97). Goldstein (1988) concurred, stating, “*equilibrium generates less information than far-from-equilibrium generates*” [emphasis in original] (p. 22). It is in far-from equilibrium where disorienting dilemmas take place. New information, along with diversity and interaction with the environment, is what introduces and increases instability in the system, “but it is precisely at the edge of this chaos that the most growth and creativity will occur” (Rensburg & Ströh, 1998, p. 56) and where the potential for transformative learning and transformational change is greatest (Stacey, 1995; Wheatley, 2006). Stacey (1995) summarized the concepts of complexity and chaos theories succinctly:

The science of complexity demonstrates that for a system to be innovative, creative, and changeable it must be driven far from equilibrium where it can make use of disorder, irregularity, and difference as essential elements

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in the process of change. But far from equilibrium the links between cause and effect disappear because positive feedback enables a system to escalate many tiny changes into globally different behavior patterns. Sensitivity to initial conditions destroys identifiable links between individual actions and global outcomes. The state a system is in now is the result of every detail of its history, and what it will become can only be known if one knows every detail of its future development, and the only way one can do that is to let the development occur. The future of such a system is open and hence unknowable until it occurs. (p. 490)

In a far-from-equilibrium state, a system must allow for self-organization and emergence as a means for survival. Maintaining that delicate balance between order and disorder is a considerable challenge (Stacey, 1995), but a system that exists far-from-equilibrium is more likely to be sustainable than one that is not (van Eijnatten, 2004), and it is in this state of far-from-equilibrium where meaning making at the edge of chaos takes place. This meaning making is triggered by a challenge to the status quo and often takes the shape of an individual collaboratively working with others to reconstruct a more inclusive worldview combined with the group collectively redesigning the systems within which they operate. It can only take place at the edge of chaos, where uncertainty, unpredictability, and ambiguity reign within certain boundaries and make self-organization, emergence, adaptation, and learning possible.

### CAS and Chaotic Systems as Learning Systems

If we consider a system to be defined as “a set of things—people, cells, molecules, or whatever—interconnected in such a way that they produce their own pattern of behavior over time [and which] may be buffeted, constricted, triggered, or driven by outside forces” (Meadows & Wright, 2008, p. 2), and we define learning as “a form of adaptivity...that seems to involve some aspects of evolutionary process” (Mobus & Kalton, 2015, p. 214), then it is possible to consider CAS and chaotic systems as learning systems: “Learning systems identify the gaps between the expected and the actual occurrence, and assist in the development of adaptive responses (Argyris, 1999)” (Edson, 2010, p. 11). Learning and meaning making are closely tied to one another: “To make ‘*meaning*’ means to make sense of an experience, we make an interpretation of it. When we subsequently use this interpretation to guide decision-making or action, then making ‘*meaning*’ becomes ‘*learning*’” [emphasis in original] (Mezirow, 1990, p. 1). From a systems perspective, “learning from within [the] context of continued interaction and integration is a precondition for creating order and self-organization within a system” (Nicolaidis & Yorks, 2008, pp. 56-57), both of which result when complex and chaotic systems are at the edge of chaos. Thus, meaning making at the edge of chaos through interaction and integration with others, which identifies gaps between actual and expected outcomes, and which we use to guide our actions evolves into learning. In other words, systems at far-from-equilibrium are learning systems.

Learning in systems can take a variety of forms. Adaptive and generative learning are forms of loop learning, specifically single- and double-loop learning respectively. *Single-loop learning* is defined as “the level of learning and behavioral adaptation that brings about performance that is more effective” (Nicolaidis & Dzubinski, 2016, p. 124), and

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*double-loop learning* transpires “when error is detected and corrected in ways that involve the modification of an organization’s underlying norms, policies, and objectives” (Argyris, 1978, p. 3). Additionally, “*triple-loop learning* involves unpredictable and uncontrolled learning that integrates how individuals seek and make meaning and then act based on values and beliefs that are permeable, in order to revision action from moment to moment” [emphasis added] (Nicolaidis & Dzubinski, 2016, p. 124). It is important to note that before the concept of triple-loop learning was developed, double-loop learning encompassed much of what is now considered to be triple-loop learning. Of the three, meaning making at the edge of chaos is most concerned with triple-loop learning and what could be considered as the higher end of double-loop learning. This type of learning involves critical self-reflection of assumptions (Mezirow, 1990, 1998; van Woerkom, 2008), with individuals examining their own assumptions in a collective process. In general, loop learning is essentially a feedback system (Nicolaidis & Dzubinski, 2016), with both individuals and groups receiving feedback and re-examining their actions and thinking. Indeed, Vickers (1968) claimed that all human learning is circular.

Double-loop and triple-loop learning are essential to CAS, as illuminated through Edson’s (2010, 2012) work. These loops work as feedback systems, and “it is the existence of nonlinear feedback in complex systems that allows for *emergence, self-organization, adaptation, learning* and many other key concepts that have become synonymous with complexity thinking” [emphasis in original] (Richardson, 2008, p. 14).  
Learning through complexity

requires creating learning environments that involve: 1. keeping the boundaries and freedoms of the learning context fluid; 2. being mindful of the capacities of the participants for making meaning; 3. working with the complexity of real and current challenges facing learners and the assumptions they hold about them; 4. keeping the distinction between expert problem solving and mindful insight ever present; 5. calling attention to both the informal and incidental learning that is taking place; and, 6. providing competencies for addressing ambiguity while seeking to simultaneously foster participants’ capacities for constructing meaning. (Nicolaidis & Yorks, 2008, p. 58)

CAS are fluid systems that challenge the assumptions of its members in an ambiguous and unpredictable environment while constructing meaning of the constantly changing context. As learning systems, CAS engage in continuous meaning making and learning by virtue of their continually changing environment. Through dialogue, systems thinking, and critical reflection, CAS create and maintain a culture of learning. Although a short-term vision is likely to be fleeting in such an environment, CAS must create a shared ideal future for its own survival and tap the existing wisdom within its members to persistently move toward that future. CAS are capable of maintaining the tension between sustainability and change as they learn to make meaning, adapt, and recreate themselves.

As noted previously, learning is more likely to take place at the edge of chaos than in a state of equilibrium, where “learning is seen as being primarily a transformative process”

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(van Eijnatten, 2004, p. 445). At the edge of chaos, the extent of the learning is determined by “the degrees of freedom and constraint that each boundary at the individual, group, and organizational level creates for a capacity for learning through ambiguity” (Nicolaidis & Yorks, 2008, p. 57). Similar to the butterfly effect, these boundaries are determined by fairly simple rules, and within these boundaries, small changes can have profound effects, that is, the potential for transformative learning is significant. The continuous learning of CAS and chaotic systems is essentially a dissipative structure.

The three doctrines of complexity theory, complex adaptive systems, and chaos theory, coupled with the concept of CAS and chaotic systems as learning systems, integrate with meaning making at the edge of chaos in multiple ways. The small perturbations that push a system toward chaos can be equated to disorienting dilemmas. If the disorienting dilemma is substantial enough, it essentially becomes a positive feedback system. As we try to make sense of this disorienting dilemma, we are frantically trying to maintain that delicate balance between order and disorder. We are likely to be buffeted between our old worldview and the new information we encountered in the disorienting dilemma, and as we grapple with what it means, our destination feels uncertain and unpredictable. If we can hold the tension between the stable and unstable and allow ourselves to re-organize our thinking, a more inclusive worldview will likely emerge that enables us to engage in generative learning, ultimately leading to transformative learning. And we do this all by interacting with others and the environment. It is a collective journey through reflective and generative dialogue as we engage with others to seek out meaning and purpose and to eventually take action.

### INTEGRATION OF THEORY: A MODEL FOR MEANING MAKING AT THE EDGE OF CHAOS

The theories of transformative learning, logotherapy, constructive development, and chaos, complexity, and complex adaptive systems, although developed at very different times within very different disciplines, overlap and integrate considerably with respect to meaning making at the edge of chaos. Figure 2 illustrates the integration of these theories. In my explanation, I will refer to the numbers in green diamonds to explain in further detail what aspects of the theory are involved and from which theory I am drawing.

The process begins with the disorienting dilemma, which can also be compared to the small perturbations in chaotic systems that result in enormous change. The pull of equilibrium (or subject, existential vacuum, or boredom) is often strong at this point. The curved arrows (1) indicate that negative feedback is influencing this pathway toward equilibrium. Furthermore, logotherapy considers these paths to be the will to power and the will to pleasure that result in boredom and ultimately an existential vacuum. Because we cannot easily observe our current frame of reference in equilibrium, constructive developmental theory would consider this state to be subject (as opposed to object). The arrows (2) from the disorienting dilemma also lead to the socialized mind via logotherapy’s experiential pathway, to the self-authoring mind via logotherapy’s creative pathway, or to the self-transforming mind via logotherapy’s attitudinal pathway, which is influenced by uncertainty, unpredictability, and suffering. The socialized mind is most likely to choose the experiential path to meaning because it is significantly influenced by

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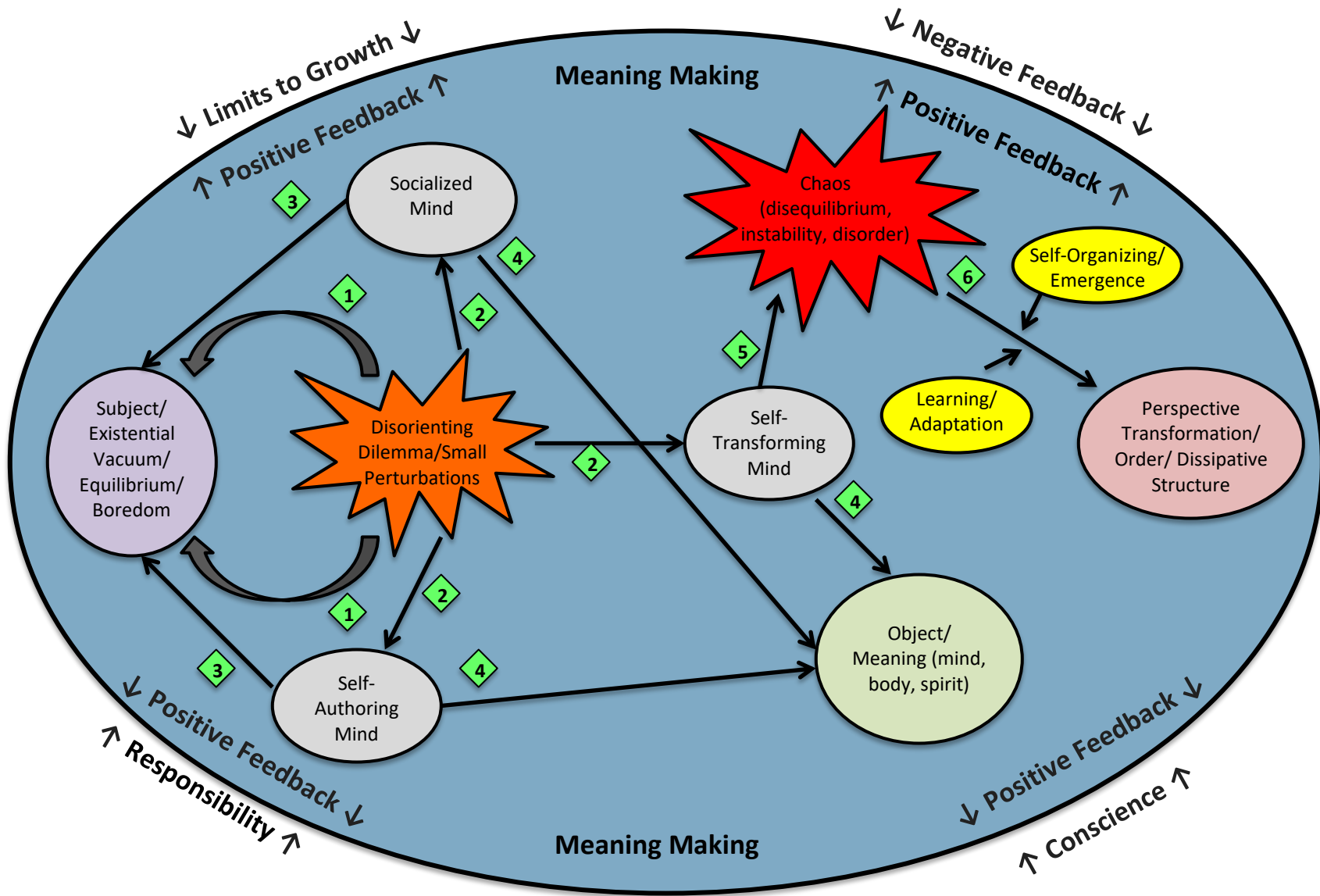


Figure 2. Integration of theories. Integration of transformative learning theory, logotherapy, constructive developmental theory, complexity and chaos theories, and complex adaptive systems with respect to meaning making at the edge of chaos.

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the opinions of others and is less likely to exhibit personal agency. The self-authoring mind tends toward the creative path as a result of its intensive focus on its own needs and goals. Because of its ability to embrace uncertainty and unpredictability and to discern both subject and object, the self-transforming mind typically follows the attitudinal pathway toward transformation. From the socialized and self-authoring minds, the arrows (3) signify that negative feedback is pulling those developmental frames back to the status quo.

On the other hand, all three minds are capable of turning what was once subject into object, as represented by the arrows (4). From logotherapy's perspective, they are finding meaning in their lives and integrating mind, body, and spirit. The self-transforming mind has an additional option (5). Positive feedback and critical reflection propel it toward chaos, also known as disequilibrium, instability, and disorder. Once ensconced in a chaotic system, dissipation or creative destruction takes place, influenced by self-organizing, emergence, learning, and adaptation (6). The result of this process is perspective transformation, order, and the dissipative structure of continuous learning. The entire illustration represents a meaning making system bounded by positive feedback exerting outward pressure and limits to growth, negative feedback, responsibility, and conscience applying inward pressure to maintain the boundary.

From a broad perspective, these four theories are complementary in how they represent the human experience. Transformative learning theory, constructive developmental theory, and complexity and chaos theories mainly emphasize the cognitive domain of human experience. They focus on the process of meaning making and learning, coping with change, and how our behavior influences those processes. Transformative learning theory, as it was originally conceived, has been criticized for an overemphasis on rationality (Courtenay et al., 1998; Gunnlaugson, 2007), and paying too little attention to the affective domain (Courtenay et al., 1998) and to expressive ways of knowing (Gunnlaugson, 2007). In contrast, logotherapy focuses on the integration of the mind, body, and spirit. Indeed, Frankl (1958) considered logotherapy to be spiritually rooted in a nonreligious sense, and he insisted that "spiritual means uniquely and truly human" (1969/2014, p. 108). He also spoke of the meaning of love: "Love is the only way to grasp another human being in the innermost core of his personality. No one can become fully aware of the very essence of another human being unless he loves him" (1959/2006, p. 111). Wheatley (2006) managed to bridge the gap between the cognitive and affective domains of complexity and chaos theories. She considered human relationships to be the "basic building blocks of life" (2006, p. 170), and when people care passionately about a cause, they easily self-organize around shared meaning. She described her own emotional reaction to chaos as follows:

But even though I know the role of chaos, I still don't like it. It's terrifying when the world I so carefully held together dissolves. I don't like feeling lost and emptied of meaning. I would prefer an easier path to transformation. But even as I experience their demands as unreasonable, I know I am in partnership with great creative forces. I know that chaos is a necessary place for me to dwell occasionally. So I have learned to sit with these dark moments—confused, overwhelmed, only faintly trusting that



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new insight will appear. I know that this is my only route to new ways of being. (Wheatley, 2006, pp. 190-191)

Both Wheatley's approach to chaos and logotherapy's spirituality fill the gap left by the strictly cognitive focus of transformative learning theory, constructive developmental theory, and complexity and chaos theories, providing a more comprehensive perspective to meaning making at the edge of chaos.

### **Model for Meaning Making at the Edge of Chaos**

Meaning making at the edge of chaos is the type of meaning making we experience when our worldview is thoroughly challenged. Figure 3 illustrates the process of meaning making at the edge of chaos. It begins with a disorienting dilemma that challenges our current perspective. We have two choices: we can choose stability which will bring us back to the status quo or we can allow ourselves to be pushed to far-from-equilibrium where we have additional choices. Although we are at the edge of chaos, we can still choose to return to stability and the status quo. Another option is to remain at the edge of chaos, finding that delicate balance between order and disorder where meaning making is at its deepest. If we are unable to find or sustain that balance, we will find ourselves in instability that leads to utter chaos and the annihilation of the system. If we do manage to maintain the delicate dance between chaos and order, sometimes referred to as walking the "chaordic path" (McKeever, n.d.), we must engage in the process of creative destruction in which we deconstruct the old and allow the new to emerge. That process results in innovation and creativity that involves adaptation, uncertainty, self-organization, emergence, and unpredictability. Ultimately, we arrive at a transformed perspective.

During this entire process, we engage in dialogue with others that enables us to form a new perspective, and it is the process of transformative learning that guides us there. Our newly transformed perspective now becomes our current perspective, and we eventually experience another disorienting dilemma and the cycle begins anew, down an evolutionary path toward the self-transforming mind.

### **CONCLUSION**

The challenge of complexity in society today brings an urgency to the need to develop our capacities for meaning making – to reach the transforming mind that will facilitate our ability to comprehend and address the complex issues facing us. We can embrace the notion that our "truths" are social constructs founded on our lived experience, values, beliefs, and assumptions, and we can choose to challenge those assumptions when we encounter disconfirming evidence with the intention of understanding and collectively making meaning. We can face our discomfort and discover the meaning that lies therein and transcend our limiting perspectives in order to move toward the greater good, allowing our responsibility and conscience to guide our way. We can welcome complexity and chaos into our lives, holding the tension between chaos and order and acknowledging the uncertainty, ambiguity, and unpredictability of outcomes. Simultaneously, we need to encourage self-organization and adaptation that make it possible for a transformed perspective to emerge. Ultimately, maintaining the status quo is not an option.

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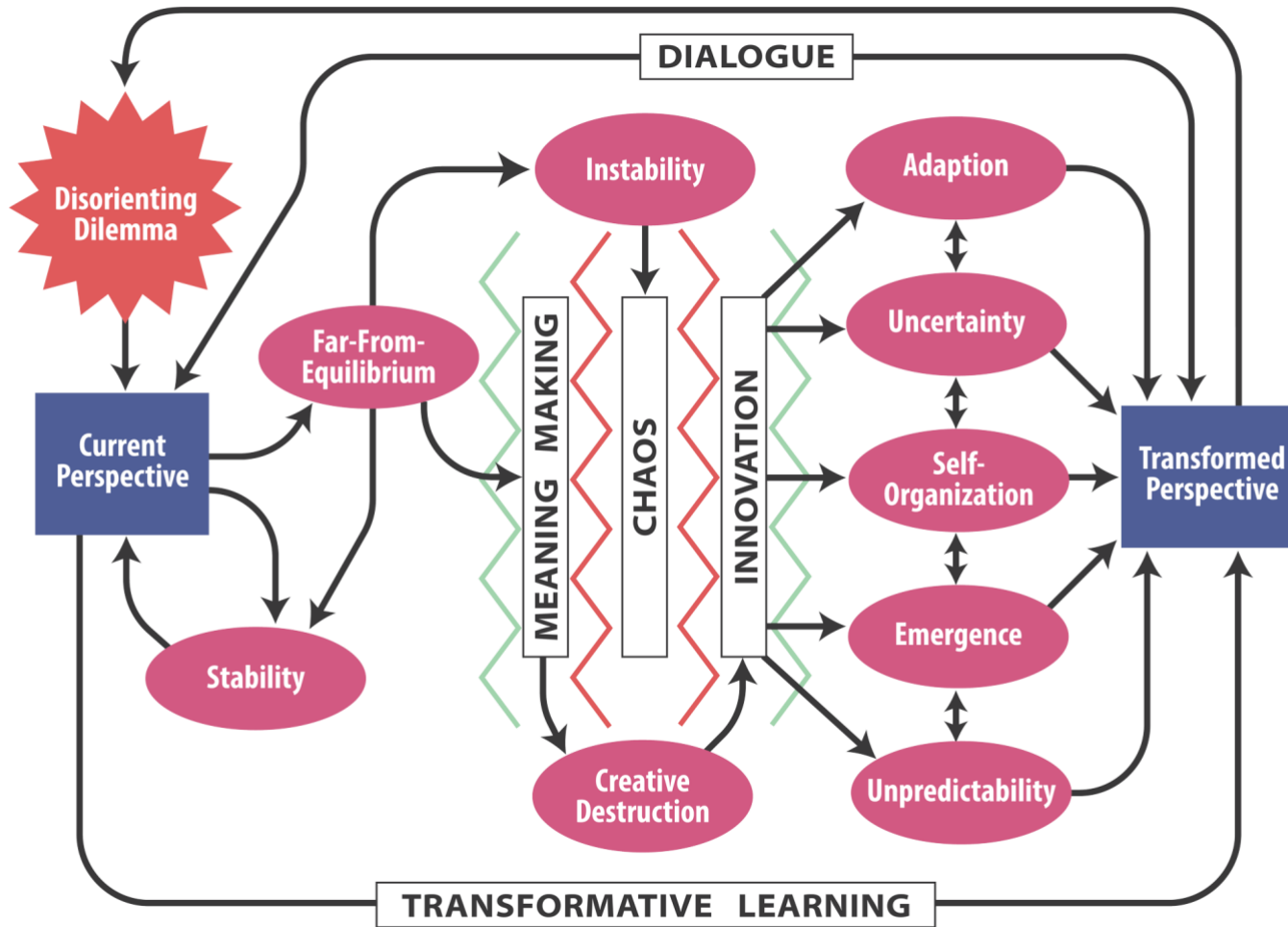


Figure 3. Meaning making at the edge of chaos.

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Meaning making at the edge of chaos is an exceedingly difficult space to occupy, one that challenges our identity as well as our assumptions where “the past seems untenable and the future unidentifiable” (Berger, 2004, p. 344). It is no wonder so many prefer the comfort of certainty at the expense of innovation, creativity, and growth. Nevertheless, the concerns of today’s society demand that we push beyond the limits of our knowing on a regular basis to the creation of new knowledge. Yet we intuitively fear the unknown precisely because it entails substantial risk and uncertainty. This push-and-pull enigma is exactly where we need to start. We should continue to find a way to create the space that provides the support and trust we need to be vulnerable and to encourage us to “dance on the edge of [our] knowing” (Berger, 2004, p. 343). That dance takes place in the company of peers who are on a similar journey toward new thinking. They could be friends, colleagues, or complete strangers who are bound together by a common passion in the search for meaning. If we execute the wrong dance steps or forget them completely, our peers are willing to rethink the dance, and if we are wildly successful, they are there to celebrate and learn the dance with us.

This endeavor to make meaning at the edge of chaos can only be accomplished in community through dialogue: “the only way the world will change is if many more of us step forward, let go of our judgments, become curious about each other, and take the risk to begin a conversation” (Wheatley, 2014, p. 4). Dialogue, as we have seen in transformative learning theory, may lead to transformative learning for an individual. An accumulation of individual learning within a group may result in a shift in perspective for the entire group. For transformational change, all of this happens at the edge of chaos. None of these steps are guaranteed, and so we need to be mindful and intentional about creating the space for extended dialogue. In a world of 24-7 connection, an oft-cited barrier to this effort is a lack of time, but it is not about time—it is about priorities. Unfortunately, the old adage that “the pain of remaining the same must be greater than the pain of going through change” may come to fruition. How we choose to make meaning at the edge of chaos and what priority we assign to it can increase or lessen the risk of experiencing the pain of a disorienting dilemma. Taking an appreciative and proactive point of view is likely to be more successful, and when we do so in relationship with others we increase both our individual agency and the agency of the group.

Meaning making at the edge of chaos will make a new future possible. It is the gateway to transformative learning and the link between dialogue and learning. As a collective practice, it provides the opportunity to explore different paths and opens up a world of possibility through diverse viewpoints. In collaboration with others, we have greater strength to look for the distant horizon ahead of us and resist the urge to stay stuck in the past. Meaning making at the edge of chaos, if it is to achieve transformative learning, must defy the pull of homeostasis. While returning to the status quo provides comfort, certainty, and solace, it will only be fleeting. In the words of John Schaar, “The future is not some place we are going to but one we are creating” (n.d.), and meaning making at the edge of chaos will set us on the journey.

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