

● counseling chaos: techniques for practitioners

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The chaos theory of careers draws together a number of themes in current theory and research. This article applies some of these themes to career counseling. The chaos theory of careers is outlined, and a conceptual framework for understanding assessment and counseling issues that focuses on convergent and emergent qualities is presented. Three practical techniques focusing on emergent quality concepts derived from chaos theory are then detailed. It is concluded that a major ongoing challenge for career counselors is to assist clients to understand the reality and confront the challenges of living and working "on the edge of chaos."

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Theory is crucial. Serendipity may occasionally yield insight, but it is unlikely to be a frequent visitor. Without theory, we make endless forays into uncharted badlands. With theory, we can separate fundamental characteristics from fascinating idiosyncrasies and incidental features. Theory supplies landmarks and guideposts, and we begin to know what to observe and where to act.

—Holland, 1995, p. 5

Why do theories in career development matter? What function does or could a theory of careers have? How might such a theory assist in the career and employment counseling situation? What help is a careers theory for someone who is perplexed about career decision making? These are the sorts of questions that career counselors ask. The popularity of Holland's (1985) matching theory of careers may be attributable to a number of factors, including the practical materials and techniques Holland provided that counselors can use in their daily practice. This article is one of a series of our attempts to develop and demonstrate techniques that are based on the chaos theory of careers and that can assist counselors in facilitating their clients' career decision making. The following are some of the underlying principles derived from chaos theory that the three techniques to be presented try to illustrate:

1. Order and randomness are aspects of human experience that need to be acknowledged and accepted.
2. Systems have a tendency to self-organize into order while, because of their complexity, becoming susceptible to unplanned outcomes.
3. Humans have the capacity when dealing with chance to (a) recognize the unexpected possibility, (b) create opportunities, (c) encourage serendipity, and (d) take advantage of the unplanned outcome.

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4. The complexity of human experience introduces unpredictability.
5. This complexity reduces both human knowledge of outcomes and one's control over such outcomes.
6. Unpredictability can result in the total transformation of a system (i.e., a "phase shift").

AN OUTLINE OF THE CHAOS THEORY OF CAREERS

Although it would be easy to obfuscate chaos theory with technical and mathematical formulations, we have struggled to both comprehend and apply the theory to the careers field. In this article, we provide a partial outline of the chaos theory of careers. Elsewhere (Bright & Pryor, 2005), we have devoted an article to helping counselors understand the basic tenets of our approach, and if readers want a deeper understanding of the theory, that would probably be a good place to begin. Bloch (2005) also applied complexity theory concepts to career development.

However, for the purposes of this article, a brief outline of the chaos theory of careers is presented. Elaborate accounts of the theory can be found in Pryor and Bright (2003a, 2003b). Reality is viewed as a multiplicity of systems, all with a dialectic tendency within and between them toward self-organized order on the one hand and chaos and randomness on the other (Kaufman, 1995). More specifically, humans are understood as complex dynamical systems (Morowitz, 2002). Complexity emphasizes the multivariate range of potential and actual influences on individuals and the density of potential or actual interconnections between such influences and their effects. The dynamical nature of human experience is seen in one's capacity and propensity to change and in one's susceptibility to unplanned (or chance) events. Considering individuals in systems terms stresses the interconnectedness of the influences on individuals, the need to consider wholes as well as parts in understanding behavior, and the realities of emergent properties and synergies (Patton & McMahon, 1999).

The chaos theory of career conceptualizes the functioning of complex dynamical systems in terms of the strange attractor. An attractor is a repertoire of behaviors that are directed toward a particular end state (Kaufman, 1995). A variety of attractors are well known as characteristic of various dynamical systems (Pryor & Bright, 2003b; Tsonis, 1992). The strange attractor is characterized by a set of trajectories (behaviors) that are self-similar but never identically repeating. Thus, although it is possible to observe a discernible pattern in the systems functioning (e.g., habits, interests, personality traits, developed skills, values), it is also characteristically limited in its predictability. In career decision-making terms, for example, knowing a great deal about someone (including oneself) is no guarantee that his or her next action will follow predictably and logically from such knowledge. The complex array of potential influences, the limitations of one's knowledge of others or oneself, and the historical uniqueness of every event will always thwart accurate predictability. Indeed, this realization is being reached not only in social science but in physics (Kaufman, 1995), biology, and chemistry (Holland, 1995) as well. If all this sounds rather abstract, just think of the weather. The weather is a complex dynamical system.

Although it is possible to discern patterns such as different climates and seasons (i.e., a self-organizing order), meteorologists have found it nearly impossible to predict with any certainty the precise nature of the weather on a particular day beyond 7 to 10 days into the future.

Thus, in chaos theory terms, career decision makers are complex dynamical systems amid a multitude of other such systems, ranging from a single other person to the grand events of world politics and cataclysms of nature. In the midst of such interactions, decision makers both change and can be changed by the influences on them in an ongoing, interactive way.

In this sense, decision makers can create as well as respond to such changes. However, some changes will not be expected or predicted and some will be nonlinear (i.e., the final impact will be disproportionately greater than the initial system perturbation). In creating and responding to change, decision makers either adapt to and accommodate such influences or phase shift into an altered attractor function (new sets of behaviors). Decisions, therefore, are made with limited knowledge of causes and outcomes and restricted control over ongoing implications. Uncertainty is the context of every choice and consequence, however well researched, prepared for, and logically reasoned.

THE COUNSELING QUADRANT

A commonly asked question in relation to the chaos theory of careers is, How does it relate in practice to existing techniques? The Counseling Quadrant (see Figure 1) is an attempt to provide a framework to assist the counselor in understanding the relationship between different theoretical perspectives and practical interventions. The Counseling Quadrant proceeds from the premise that clients can be characterized in terms of their knowledge of their own convergent and emergent qualities. Convergent qualities are those that are shared among many people, such as IQ, skills, and declarative knowledge. Convergent knowledge is common to people and circumstances. It is predictable and replicable. Emergent qualities arise from the complex interaction of the many and varied factors that influence career behavior (Bright, Pryor, Wilkenfeld, & Earl, 2005). Emergent qualities cannot be predicted, but they can be clearly discerned once they have emerged. They are qualities that are unique to the individual and the ones that set them apart from other people. Emergent knowledge is neither predictable nor replicable. Emergent qualities are influential and sometimes determinative in the course of a person's career.

The upper left quadrant describes clients with low levels of knowledge about their convergent and emergent qualities. Such individuals are likely to be unsure of their interests, their abilities, and their strengths and weaknesses. In such cases, a combination of techniques designed to enhance clients' knowledge of convergent and emergent techniques would be appropriate. For instance, a tool such as an interest inventory would be useful in providing clients insights about their vocational interests. Abilities testing would provide clients with a better understanding of their strengths and weaknesses. Such techniques are commonly used by counselors and may be thought of as being part and parcel of traditional career counseling.

Knowledge of Emergent Qualities			
		Low	High
Knowledge of Convergent Qualities	Low	Manifestations Lost Pointlessness Depression Ennui Counseling Interests assessment Abilities assessment Personal history Stories, themes, patterns Encouraging exploration, trial and error	Manifestations Thwarted ambition Passivity Compromise or circumscription On the verge of action Self-doubt/anxiety Unrealistic goals Counseling Confirming/revealing knowledge Skills, abilities, attitudes Identifying ways of fulfilling the dream Reality checking emergent qualities through patterns, stories, themes
	High	Manifestations Stuck Frustration Lack of direction Inappropriate goal setting (e.g., wealth/materialism) Nagging sense of emptiness Emphasis on predictability Counseling Values Work rewards Temperament Value of community, helping others Contemplation, self-reflection Spirituality Themes, stories, patterns Career change strategies Voluntary work	Manifestations Satisfaction Self-understanding Self-actualization Positive uncertainty Counseling Avoidance of complacency Spirituality Ongoing adaptation and reflection

FIGURE 1

The Counseling Quadrant

If the counselor has been successful in increasing the clients’ knowledge of their convergent qualities, then the clients may now be best characterized as being in the lower left quadrant. Such clients may be frustrated and feel as though they have lost their direction. Although they have a sound idea about their vocational interests and their own abilities in relation to most other people, such knowledge is insufficient. They may have a sense that they are different than other people, but they have not yet managed to identify what this nagging doubt is and what their true motivating preoccupations are. In chaos theory of careers terms, they have failed to understand their strange attractor. For such clients, techniques that emphasize their individuality and take into account their personal circumstances are more likely to prove successful in identifying their preoccupations (e.g., Savickas, 1997), understanding their life stories, or identifying their strange attractors (e.g., Bright & Pryor, 2005).

Clients who are identified as being predominantly in the upper right quadrant have a strong sense of their own identity yet may lack any sense of how they connect with other people in the community. For instance, they may not fully appreciate the actual performance levels of their abilities or how their interests relate to those in the workforce. They may feel that they are underachieving or that they have compromised or limited their career development. Similarly, they may express unrealistic vocational goals in light of their personal circumstances. They often feel a strong sense of disconnection between where they would like to be and where they currently are. A variety of techniques can help such clients appreciate the steps they need to take to reach their specific vocational goals. Alternatively, techniques such as reality checking might be useful in realigning clients' vocational goals to the realities of the labor market. For instance, some financially disadvantaged children may be unaware of the educational implications of the careers that they have chosen and thus may have unrealistic vocational goals (Beavis, Curtis, & Curtis, 2005).

The Counseling Quadrant reminds counselors that the goal of counseling is to help clients achieve a better understanding of their convergent and emergent qualities. In other words, the goal is to move clients toward the lower right quadrant. The techniques outlined in this article will help clients move into this quadrant and, in so doing, make truly informed career decisions.

In trying to apply the chaos theory of career (Pryor & Bright, 2003a, 2003b; Bright & Pryor, 2005) to careers and employment counseling, we have used and presented mind maps (Pryor, 2003), circles of influence (Bright & Pryor, 2003), a belief inventory, an experience analysis exercise, a cinema technique, and a forensic interview technique (Pryor & Bright, 2005). Initial attempts (Pryor, 2004) to assess "luck readiness" have also been made and are ongoing. This article continues these efforts to illustrate, explain, and apply the often unfamiliar and occasionally arcane concepts of chaos theory in ways that we hope will be beneficial to those faced with career and employment decisions. We present three techniques that can be used relatively easily in either a group or individual counseling context.

THREE APPLICATIONS OF THE CHAOS THEORY OF CAREERS

In the following paragraphs, we present three techniques—the Signature Exercise, the Sometimes Magic Exercise, and the Parable of the Ping-Pong Ball—in sufficient detail to enable counselors to use them, insofar as they can identify at least some aspects of chaos theory that are relevant to their clients' needs.

The Signature Exercise

The Signature Exercise is a very simple, short technique that can be used at any stage of the career counseling process. The goals of the exercise are (a) to illustrate the nature of reality as a combination of both self-organizing and chance principles, (b) to demonstrate that life is a mixture of both order and randomness, (c) to show that a system can be patterned and variant at the same time, (d) to indicate the lim-

its of one's power to completely control even the most common of everyday tasks, and (e) to reveal the difference between viewing oneself as a machine (a mechanistic, exclusively convergent view of the world) and viewing oneself as a living actor (an organismic and emergent view of the world).

Participants. This exercise is helpful for counseling clients unfamiliar with any aspects of chaos theory. Some clients think that there is no pattern, order, or meaning to human experience or career development. Other clients may have difficulty acknowledging the aspects in their lives over which they have very limited and sometimes absolutely no control (other than their reaction). Furthermore, clients trained in applied science fields such as engineering may have fairly rigid, positivist perceptions of reality (e.g., "Science works by cause and effect: Once you know the cause you can predict the effect").

Materials. The only materials needed are a pen or pencil and a standard size sheet of preferably blank paper. Lined paper can be used, but the effect may be more obvious when there are no external order cues for the task. The counselor requires a clock or watch that can measure seconds.

Procedure. Ask the client to take a piece of paper and, when told to begin, to write his or her signature as many times as possible in 30 seconds. Usually, clients start at the top of the piece of paper and go down the page. If they get to the bottom of the page before the end of the exercise, suggest that they start another column on the same page.

At this point, do not explain exactly what you are trying to illustrate. If clients question the relevance of the task, tell them to trust you and explain that the task will take less than a minute to perform. If a client is unable to trust you for a minute, then you must address these serious trust and empathy problems before any further counseling can proceed.

When the client is ready, show the client (not too histrionically) that you will be timing him or her and then say "Go." If you are dealing with lower ability clients, it may be a good idea to check that they accurately understand the task. After 30 seconds, instruct the client to stop. Then encourage the client to look at the pattern of signatures on the page not for similarities but for differences. Ask the client to mark differences or variations in the letters, capitals, spacing, writing size, slope, or overall levelness of the signatures. Most clients have no difficulty recognizing variations in their signatures. Invite the client to enumerate and illustrate some of the variations. Then ask the client if each of the written names is recognizably his or her signature. The client will invariably respond yes. Conclude by saying that the page of signatures has a clear pattern of order (all the signatures are recognizably similar) but that the signatures also indicate random variations (i.e., there are the subtle differences of graphology between some of the signatures).

This exercise can also be conducted as a group task. In fact, we have done this at professional conferences. Very little adaptation is required. Group participants are usually invited to exchange their sheet of paper with each other for the purpose of identifying the subtle changes in the signatures before the page is returned to its owner. This gives a level of independent validation of chance variations in the total

array of signatures. For participants who do not know each other or who might be reluctant to divulge their signature to others, the task can be modified so that they can write the name of their company, of a well-known product, or of a historical figure.

Conclusion. Everyone tries to sign his or her name the same way each time for practical reasons (e.g., identification, authentication, commerce). However, because people are not photocopy machines, they cannot exactly reproduce even something as simple as their own name. Nevertheless, people do not need to because those who require signatures are also aware (often unconsciously) that a signature can have variations of graphology without being a forgery. As the Signature Exercise demonstrates, it is easy to recognize that signatures have a pattern while at the same time they may contain chance variations in appearance. People could try to control their writing so that their signature looked identical every time by paying closer attention to detail. But even if one bothered to do this, close inspection of such signatures written over time would again reveal subtle variations. There are limits to one's level of control, even over the writing of one's own name. Why? It is the nature of reality: order and chance, predictability and unpredictability, pattern and random variation. If this is recognized by counseling clients, it can become the basis for understanding what can be ordered, predicted, and controlled and what cannot.

In counseling quadrant terms, the Signature Exercise helps clients move from the left quadrants, which are associated with low emergent knowledge, to the right quadrants, which are associated with higher levels of emergent knowledge. By illustrating that people are more than endless repetitions of behavior, the exercise helps clients move away from self-descriptions based solely on convergent qualities.

The Sometimes Magic Exercise

Chaos theory emphasizes that meaning, insight, inspiration, creativity, and opportunity awareness are emergent properties from human experience (Pryor & Bright, 2003a, 2003b). Because chance is a parameter in life, rather than deny it, people should consider ways to embrace and use it in positive ways (Bright et al., 2005). The Sometimes Magic Exercise encourages clients to move toward the lower right quadrant of high emergent and high convergent self-knowledge.

The goals of the Sometimes Magic Exercise are (a) to stimulate people to recognize the unusual, the unexpected, the serendipitous—the magical—in their experience and learning; (b) to help individuals explore where new insights in their lives and experiences derive from; and (c) to provide insight into the ways in which individuals can become personally more creative and learn most perspicaciously—in short, to become more magical.

Materials. This exercise derives closely from the *Sometimes Magic: Celebrating the Magic of Everyday Learning* card sort (Vallence & Deal, 2001). The following procedure represents an adaptation of the original material for career counseling purposes (see Appendix A). This adaptation was undertaken with the permission of the original authors. Each card has a colorful drawing of an Australian animal with the words “Sometimes Magic HAPPENS WHEN . . .,” followed by, for example, “I have a good teacher.”

For individual administration, use the 32 card sort (Vallence & Deal, 2001). For group administration, use an overhead projector and a transparency with a list of some (about 10) or up to all (32) of the situations described on the Sometimes Magic cards (Vallence & Deal, 2001).

Procedure. For individual administration, introduce the exercise by explaining that unexpected, unplanned, and chance events happen to everyone. Sometimes people are surprised by their experiences. In the process, people often learn new things about themselves, others, and the world. In this sense, experience is magical and unpredictable. The Sometimes Magic cards have typical descriptions of experiences and circumstances in which such magic might happen. By thinking about these experiences, people may discover a new understanding of themselves as well as ideas about how they might be better prepared to recognize and take advantage of opportunities or to create opportunities.

Hand out the Sometimes Magic cards. Ask the client to sort through the cards and to separate those that suggest special experiences that they have had. For practical purposes, it is usually best to restrict the number of cards according to the time available for discussion. If time is short, restrict the number to less than 5. If more time is available, 5 to 10 cards could be used, assuming the client chooses that many.

If the number of cards must be reduced, simply hand back the cards the client has selected and invite him or her to pick out the four or five experiences described by the cards that are most special. Then invite the client to consider each card and to think of a particular event or experience that relates to this card's description. When the client has decided on an experience for a particular card, invite the client to describe it. Then ask the client how the experience related to the description.

At this point, a number of questions can be asked, including the following: (a) What was magical for you in that experience? (b) What did you learn about yourself? Others? The world? Life? (c) What strategies did you use to cope with this situation? Which ones worked? Which ones did not work? (d) Would you like to have this experience again? Why? Why not? (e) How could you have acted differently in the situation? and (f) What do you think would have happened then?

For group administration, give the same general reasons and benefits for doing the exercise as for the individual administration. Display an overhead transparency with about 10 situations derived from the Sometimes Magic cards (see Appendix A for an example that we have used). Invite group members to read through the list to see if they can identify one or more experiences in their lives that might relate to the descriptions in which something unplanned, creative, surprising, or unexpected occurred. If you think the group—or particular group members—may have difficulty with this idea, then consider giving an example from your own life. Choose an experience, represented by a description on the list, in which you learned something very important that greatly affected your life or that reveals something significant you have come to understand or value.

Next, ask participants to copy the situation from the list and write a few brief notes about the experience it has brought to mind. Then ask some of the questions outlined earlier. These questions can serve as the basis for group discussion. Alter-

natively, ask group members to write down some brief responses, or split the large group into groups of two or three participants and have them share their experiences and insights with each other. These experiences can then be shared with the large group as the beginning of a plenary discussion about magic in human experience, particularly in career development.

The procedure of selecting descriptions from the Sometimes Magic list and identifying corresponding experiences and the insights gained as a result could be repeated. Then this procedure could be repeated several more times, possibly requiring a second list on an overhead transparency of a set of descriptions from other Something Magic cards. This process builds a set of notes for each client. The client can later, on his or her own, reflect on these data and consider what patterns, values, and personal paradigms emerge. Such notes could also form the basis of a journal in which the client can explore patterns of responding and thinking that give insight into what chaos theory denotes as the “fractal” of individual experience. In Counseling Quadrant terms, the purpose of the exercise is to move clients from thinking in purely convergent terms to consider the possibilities for change, opportunity, and creativity.

The Parable of the Ping-Pong Ball

Using myths such as the myth of Narcissus, iconic stories such as *The Wonderful Wizard of Oz* (Amundson, 2006), and animal allegories such as *Who Moved My Cheese?* (Johnson, 1999) is one of the ways counselors can stimulate clients’ creativity, awareness, and sense of exploration in career development. We have found that some techniques available to counselors are too esoteric, too long, or too unfamiliar to be effective with some of our clients. Instead, we sought to develop a more homely, everyday example that could be concisely presented in verbal, written, or pictorial form and discussed in a single counseling session (see Appendixes B and C).

In using the Parable of the Ping-Pong Ball, the goals are (a) to illustrate how increasing complexity results inevitably in decreased predictability of outcomes; (b) to demonstrate that even though one’s ability to predict a situation’s outcome is limited, this does not mean that one cannot understand or explain what happened; (c) to indicate nonlinearity of change; (d) to introduce the notion of the phase shift; (e) to highlight human limitation of knowledge and control in the problem-solving (decision-making) situation and the necessity of making decisions without having total, or often even adequate, knowledge of influences and outcomes; and (f) to acknowledge the reality and necessity of making decisions and facing challenges on an ongoing basis.

Participants. This parable is helpful as a nonthreatening homework exercise near the beginning of a series of career counseling sessions. It can stimulate clients’ thinking about their situations, careers, and lives in ways that they might not otherwise consider.

The parable can also be useful with those who feel daunted by the challenge of career decision making. The parable points out how virtually all life-influencing decisions are made with incomplete knowledge and limited control of outcomes. The parable can also challenge clients who think they “have all the answers” or who believe that one choice is “going to solve all their problems.”

Furthermore, the parable can be used with groups as an introduction to the realities of life transition decision making beyond “I came to find out what the tests say I am best suited to.” The only materials required are a copy of the parable and a copy of the questions. For group situations, a whiteboard or some form of overhead projection on which one can write and draw is all that is additionally needed.

Procedure. With individual clients, the parable has been used as a homework exercise between career counseling sessions. It can also be used in a counseling session, although it is recommended that sufficient client confidence and rapport be established first. Otherwise, some more skeptical clients may question the relevance of the exercise because jobs are not mentioned.

If a client lacks reading skills, read the parable or play a recording of it. Sometimes it is also useful to draw the story in cartoon form in front of the client. Outstanding graphic design skills are not required. Just break the story up into a series of between 6 and 10 events. Draw squares on the page, and then draw each scene with a little more elaboration than stick figures and line drawings. We find that if the counselor is a little self-effacing about his or her drawing skills, most clients will “bear with you” and the parable can be effectively communicated.

Similarly, in a group situation, if there are two presenters, one can expressively tell the story while the other presenter does the drawing. If counselors are worried about their drawing ability, we suggest that they talk to someone they know who is gifted at drawing to give them a few tips or examples of how to draw human figures and dogs.

In group situations, present the parable and the accompanying questions (see Appendixes B and C), allowing sufficient time for participants to write down their answers. Then discuss some of their answers. Alternatively, ask the group to respond to some of the questions, and then as the discussion proceeds, write the main points of the discussion on a whiteboard or overhead transparency.

Regarding the content of the parable, there may be a gender issue for some clients and counselors. The names of the characters in the story were chosen to be unisex, but it is impossible when using singular pronouns in English not to have to nominate a gender. If the counselor wants to “feminize” the parable, all that is needed is to change the pronouns. This may be important if the counselor wants particular clients to identify with the characters in the story, especially younger clients or those with rigidly defined perceptions of sex role behavior. Another possibility is to make one of the characters male and the other female by simply changing a few pronouns.

Conclusion. The counselor should relate the discussion of the story to the salient goals for the counseling situation as outlined at the beginning of this section. For example, it can be seen that as the situation in which the Ping-Pong ball was dropped became more complex, the capacity of Alex or Chris—or indeed anyone else—to predict when, or if, the ball landed on the floor also became more difficult. As the number of potential influences on the ball became greater, so too did the unpredictability of its behavior.

Furthermore, if one examines the circumstances of the parable, it is possible to make sense of what happened. However, such an understanding emerges only after the event. What happened could not have been predicted beforehand in any precise detail. A multiplicity of influences interacting inconsistently on one another (as well as

on the Ping-Pong ball) also made it virtually impossible to identify the effect of a single influence.

The more complex the situation became, the more unstable it became. While the windows were closed, the task remained basically unchanged, although there were some measurement variations. However, the variable winds, the inconsistency of Chris's dog's Ping-Pong ball interest, and the wild exuberance of the pack of dogs continually added to the situation's susceptibility to change. Eventually, this resulted in a total change in the activity of Alex. Although he had started dropping Ping-Pong balls, he finally ended up chasing a pack of dogs.

From the Parable of the Ping-Pong Ball, one can draw a number of conclusions, including that (a) the attempt to predict the outcomes of client decisions is fraught with problems and should not be the goal of career counseling; (b) the richness and complexity of reality render precise prediction and control unachievable; (c) the understanding of reality may only be possible as an explanation after the event rather than as a prediction before it; and (d) reality in its complexity is sensitive to change and, on occasion, transformation. Therefore, rather than becoming preoccupied with the matching of individuals to occupations, career counselors and clients need to focus on handling transitions as well as using and creating change and lifelong learning. In Counseling Quadrant terms, this exercise can be seen as progressively moving the client from a highly convergent view of the world, where things are ultimately predictable and repetitive, to an emergent view of the world that embraces uncertainty, pattern, and randomness.

CONCLUDING COMMENTS

In all the sciences, paradigms are changing from narrow-focused, reductionist, and exclusively positivist-oriented approaches to broad-based, systemic, and open-ended approaches to the study of natural phenomena. Even the ultimate capacity of the "hard" sciences such as physics to be predictive is being trenchantly questioned (Kaufman, 1995; Prigogine, 1997). Fundamental assumptions about how the universe works are being reevaluated. For example, Einstein's famous dictum that God does not play dice is, in light of quantum mechanics and chaos mathematics, simply wrong (Kaufman, 1995). Thus, Peacocke (2000) concluded that "we now know, through key developments in theoretical biology and physical biochemistry, that it is the interplay of chance and law that allows the matter of the universe to be self-creative of new forms of organisation" (p. 44). For psychologists and career counselors, such perspectives present astonishing and exciting challenges as they assist clients in making important life transition decisions in a world that is itself subject to a complex array of influences and continues to change at a seemingly ever-increasing rate.

Chaos theory provides a conceptual framework in which to understand such developments and suggests ways in which it is possible for individuals to respond constructively. Ideas from chaos theory are also becoming more prevalent in the popular media. For example, the film *Sliding Doors* (Pollack, Braithwaite, Horberg, & Howitt, 1998) is premised on notions of constructivism and nonlinearity. The X-Men mov-

ies (e.g., Donner, Winter, & Singer, 2000) are premised on biological phase shifts in evolution, and *The Butterfly Effect* (Bender et al., 2004) is a film that explicitly links nonlinear dynamics and systems thinking. In the extras to the DVD, there is an expert discussion on aspects of chaos theory. Moreover, it is possible to interpret techniques developed in response to counseling clients' contemporary needs as illustrated aspects of chaos theory. For example, the Pattern Identification Exercise (Amundson, 2003) seems to explore the systemic aspects of the strange attractor. The current wave of techniques being developed to explore spirituality in career and life transitions (e.g., Anderson, 1998; Bloch, 2000; Covey, 2004) can all be understood in terms of attempting to map the fractal constraining the boundaries of being. Mitchell, Levin, and Krumboltz's (1999) work on "planned happenstance" reflects an attempt to respond adaptively to the realities of unpredictability and chance—both of which are key notions of chaos theory.

Chaos theory confronts many long-held beliefs about science and about the realities of existence. It highlights people's limitations as well as abilities. Nevertheless, at the same time as it points to the inevitability of some of these limitations, it inspiringly draws attention to the human potential to develop, adapt, and overcome. Counselors will find reconciling human potential and human limitations to be a difficult balancing act. Often, counselors believe that drawing attention to limitations promotes negativity in clients' thinking and behavior, which will in turn confirm poor self-esteem and perception of powerlessness. Occasionally, this may happen. However, we believe that "mindless optimism," which ignores the realities of existence, also will not serve career decision makers' best interests. Here, then, is the counselor's challenge to balance limitation and potential, unpredictability and expectation, human ignorance and insight, impotence and control, chaos and order. This is what it means to acknowledge that all human life is lived "on the edge of chaos." Of course, counseling chaos is no easy task. However, as a number of thinkers (e.g., Kaufman, 1995; Lewin, 1999; Prigogine, 1997; Waldrop, 1992) have indicated, it is on the edge of chaos where human potential, creativity, achievement, and fulfillment are ultimately found and experienced.

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APPENDIX A

Sometimes Magic Happens

- . . . when I look at things differently
 - . . . when I am heard and understood
 - . . . when I ask questions
 - . . . when I believe in myself
 - . . . when I take risks
 - . . . when I get started
 - . . . when I help others learn
 - . . . when I seek feedback
 - . . . when I am open to new experiences
 - . . . when I can take small steps
-

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APPENDIX B

The Parable of the Ping-Pong Ball

Alex was an inquisitive kind of person. He was always asking questions, wanting to know how things worked and what would happen if you changed this or that. One day, Alex was in the games room of his house. He phoned his friend Chris to come around to play Ping-Pong with him. While waiting, Alex started to wonder how long it would take for the Ping-Pong ball to drop from about waist high to the ground.

So he went out to his games room where he kept his Ping-Pong balls. He picked one up and held it as close as he could to the height of his waist and let the ball fall. He held a stopwatch in the other hand. As he dropped the ball, he timed how long it took to hit the floor. He then picked the ball up and repeated the experiment again and again. There was some variation in the time, but it seemed pretty close each time until one of the small windows of the games room slowly blew open.

A light wind started to filter intermittently into the room. Sometimes it caught the Ping-Pong ball as it fell, and sometimes it did not. When the gentle breeze did, the ball took longer to hit the floor, and it did not always hit the floor in the expected "landing area." Suddenly, another larger window of the games room was blown open by a gust of wind while Alex was continuing his Ping-Pong ball dropping. Now when the ball left Alex's hand, the wind sometimes blew the ball almost to the other side of the games room before it landed. The time variation was becoming greater and greater.

Then Chris arrived with his pet dog, Woody. He opened the games room door, and they both came in. Woody liked chasing balls of any kind, but the games room also had lots of interesting smells. So sometimes Woody tried to catch the falling ball, and sometimes he disregarded it unless the wind blew into one of the scent-filled corners where he was investigating an interesting odor. As a result of these events, Alex's measurements of the drop time become even more variable.

While all this was going on, several of the neighbor's dogs had become sufficiently excited when Chris and Woody had walked by to Alex's place earlier that four of them escaped into the street, formed a pack, caught Woody's scent, and tracked him to Alex's games room. In the games room, the pack charged excitedly. Everybody started barking, including Alex and Chris! Woody grabbed the Ping-Pong ball in his mouth and started charging around the assorted objects in the games room with the four other dogs chasing him.

Alex was becoming increasingly fearful for the future of the Ping-Pong ball. He started chasing the pack of dogs, with Woody out in front, all around the room, out into the backyard, and finally up the street, seeking to rescue the only Ping-Pong ball he had. Meanwhile, Chris had almost collapsed with laughter at Alex pursuing the pack and variously issuing commands and curses in roughly even numbers.

APPENDIX C

Exploring the Parable

This story is about trying to find an answer to a problem. Making choices in life and career is also about problem solving. Look closely at how Alex and Chris tried to deal with their experience and the real world. Try to think about how the events in the story tell you something about life and careers.

General Questions Regarding the Parable

1. What is your reaction to the characters in the story? Do you like or dislike them? Which ones? Do you think they are dumb or smart? Which ones?
2. How would you interpret this story?
3. What things influence what happened in the story?
4. What does the story tell you about human knowledge?
5. What does the story tell you about change?
6. What does the story tell you about human control of life circumstances?
7. Do you identify with anybody in the story? Who? Why?
8. Do you see any part of the story reflected in some way in your own life or career experience?
9. Do you see any part of the story reflected in some way in your own attempts at making important choices or trying to understand things?

Specific Questions Regarding the Parable

1. Alex got different answers to his investigation of the fall of a Ping-Pong ball. Why was this? What factors influenced the differences? When you seek answers to life's questions, what is likely to affect the results you get?
2. How much control over the "experiments" did Alex and Chris have? How much do you think they needed?
3. How did the task change for Alex as the story progressed? What does this tell you about change in life circumstances?
4. What does the parable tell you about the nature and origin of challenges we experience in our lives? How might this relate to challenges in your career?
5. What do you think Alex could have done differently to find out what he wanted to know? How could he have averted the final disaster?
6. The story does not finish with "they lived happily ever after." What does this suggest about career and life decisions?