



SERVANT-LEADERSHIP: A MODEL ALIGNED WITH CHAOS THEORY

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Greenleaf (1977) proposed the true test of servant-leadership as leaders reproducing their inclination to serve in others. However, current servant-leadership models do not clearly demonstrate such generativity. By modifying the Patterson (2003)-Winston (2003) servant-leadership model to demonstrate more clearly the reproduction of the service inclination both in dyadic and in organizational dimensions, this study will contribute to servant-leadership “theory-building” (Lynham, 2002, p. 221). The proposed servant-leadership model, aligned with chaos theory, will give scholars and practitioners a better understanding of the practice and effect of servant-leadership.

The first part of this conceptual study reviews servant-leadership literature and categorizes it as (a) non-model discussions, (b) leader-organization models, and (c) leader-follower models. Non-model writings discuss the practice of servant-leadership without proposing a conceptual model. Leader-organization models illustrate the general way leaders interact with the organization. Leader-follower models propose causal relationships between leader attributes as the leader interacts with individual followers. Because no model addresses both the dyadic and the organizational dimensions, there is a need for model development. The second section reviews chaos theory literature to point out the fractal characteristic of chaotic systems. The fractal characteristic is the reproduction of a basic pattern at increasing scale (Mandelbrot, 1977). The third section compares servant-leadership to chaos theory and proposes a servant-leadership model aligned with chaos theory. The paper concludes with implications for future



research, including testing for the presence of the reproduced service-inclination in followers as the indicator of the presence of servant-leadership.

SERVANT-LEADERSHIP MODELS

Echoing the biblical perspective that “Whoever desires to become great among you must be your servant, and whoever of you desires to be first must be slave of all” (Mark 10:43-44, New King James Version), Greenleaf (1977) indicates that great leaders are servants first. He states that servant-leadership “begins with the natural feeling that one wants to serve” (p. 13). The leader then lives out this service inclination through his attitudes and behaviors. Spears (1998) distills several servant-leader attributes from Greenleaf’s writings including (a) listening, (b) empathy, (c) healing, (d) awareness, (e) persuasion, (f) conceptualization, (g) foresight, (h) stewardship, (i) commitment to the growth of others, and (j) ability to build community. Within these attributes, Greenleaf addresses the desired outcome of servant-leadership when he asks, “Do those served grow as persons? Do they while being served become healthier, wiser, freer, more autonomous, more likely themselves to become servants?” (p. 13). Reproduction of the service inclination is the true test of servant-leadership (Errol & Winston, 2005; Laub, 1999). Moreover, reproduction should occur on an organizational scale as Greenleaf states, “The first order of business is to build a group of people who, under the influence of the institution, grow taller and become healthier, stronger, more autonomous” (p. 40).

A literature review reveals three trajectories in the servant-leadership writings since Greenleaf’s (1977) work. These three directions include (a) non-model discussions, (b) leader-organization models, and (c) leader-follower models.

Non-Model Discussions

Most writers of servant-leadership literature do not propose conceptual models of servant-leadership. Authors of these non-model discussions tend



to build on elements of Greenleaf's (1977) view, including servant-leadership's (a) value base, (b) leader attributes, or (c) outcomes. Such discussions, though rich and valuable, do not propose clear causal relationships between variables.

Value Base. According to Rinehart (1998), "Leadership models from which we operate are rooted in particular values" (p. 30). Russell (2001) indicates that the personal values of servant-leaders are what distinguish them from other leader types. He focuses on (a) trust, (b) appreciation of others, and (c) empowerment. Additional value themes in the literature include (a) following a guiding purpose (Blunt, 2003), (b) voluntarily submitting (Sendjaya, 2003), (c) being a servant (Sendjaya & Sarros, 2002), (d) desiring to help others (Batten, 1997; Spears, 1998), (e) moving from self-interest to service (Block, 1993; Chewning, 2000; Howatson-Jones, 2004; Ndoria, 2004; Tate, 2003), (f) loving followers (Banutu-Gomez, 2004; Whetstone, 2002; Wilson, 1998), (g) focusing on others (Kouzes & Posner, 1993), (h) suspending the need for control (Marquardt, 2000), and (i) creating a culture of self-leadership (Fairholm, 1997). All of these values tend to have in common the leader's placing the needs of others before his or her own needs. Greenleaf summarizes the core value in the service inclination when he states, "Caring is the essential motive" (p. 243).

Leader Attributes. A leader's behavioral characteristics emanate from personal values (Errol & Winston, 2005; Maciarello, 2003; Russell, 2001; Snyder, Dowd, & Houghton, 1994). Accordingly, the literature reveals specific characteristics for servant-leaders. Common attributes include (a) authenticity (Autry, 2001; DePree, 1989; Rinehart, 1998; Sendjaya, 2003), (b) listening ability (Hunter, 2004; Keichel, 1993; Kuczmarski & Kuczmarski, 1995; Pollard, 1996), (c) relational focus (Kouzes & Posner, 1993; Sendjaya, 2003), (d) vulnerability (Autry; DePree; Kuczmarski & Kuczmarski), (e) vision (Banutu-Gomez, 2004; Howatson-Jones, 2004; Keichel; Kouzes & Posner), (f) dependability (Kouzes & Posner; Pollard), (g) role modeling (Banutu-Gomez; Whetstone, 2002), and (h) use of influence (Sandjaya; Whetstone, 2002).



Outcome. There is some diversity in the literature regarding the outcome of servant-leadership. Bennett (2001) indicates servant-leaders can enhance (a) individual, (b) team, and (c) organizational performance. Similar outcomes include growth in others (Rowe, 2003; Whetstone, 2002) and empowerment (Block, 1993; Bowie, 2000; Hyett, 2003; Lloyd, 1996; Rinehart, 1998; Tate, 2003; Wilson, 1998). Though these perspectives are consistent with service reproduction as promoted by Greenleaf (1977), they do not specify this outcome.

Choi and Mai-Dalton (1998) more clearly specify the desired outcome as reproduction of the service inclination, proposing that sacrificial leadership should bring reciprocation by the followers. Stone, Russell, and Patterson (2003) suggest that the desired outcome is not service to the leader, but service to others. Errol and Winston (2005) suggest that servant-leaders build trust not only between a leader and a follower, but also between followers. Similarly, Page (2004) indicates that servant-leadership leads to interdependence among personnel. Blunt (2003), Buchen (1998), and Howatson-Jones (2004) all assert that servant-leaders help others to become leaders.

Summary. Scholars consistently regard servant-leadership as having a value base that elevates service to followers above the leader's self-interest. Various leader attributes emerge from this value base. The desired outcome is typically consistent with or specified as a reproduction of the service inclination in the followers. The focus of the reproduced service inclination includes both reciprocal service to the leader and service to other followers, even to the point of producing more leaders. Although this reflects Greenleaf's (1977) assertion that institutions led by servant-leaders "will grow more leaders faster than any other course available to us" (p. 89), these non-model discussions do not propose clear causal relationships aimed at producing the outcome.

Leader-Organization Models

One set of conceptual models focuses on the general function of ser-



vant-leaders within organizations. Moreover, the writers cite leader attributes, rather than reproduction of the service inclination, as the measure of the presence of servant-leadership. The Russell and Stone (2002) model shown in figure 1 represents this type of approach.

Like the non-model discussions, Russell and Stone (2002) propose that “cognitive characteristics” (p. 153), including values and core beliefs, “incarnate through the functional attributes of servant-leaders” (p. 153). They propose nine functional attributes that indicate the presence of servant-leadership and eleven accompanying attributes that moderate “the level and intensity of the functional attributes” (p. 153). Furthermore, servant-leadership itself is a dependent variable that subsequently functions as an independent variable affecting organizational performance. However, the model gives limited attention to causal relationships between leader attributes, and the outcome is organizational performance rather than reproduced service.

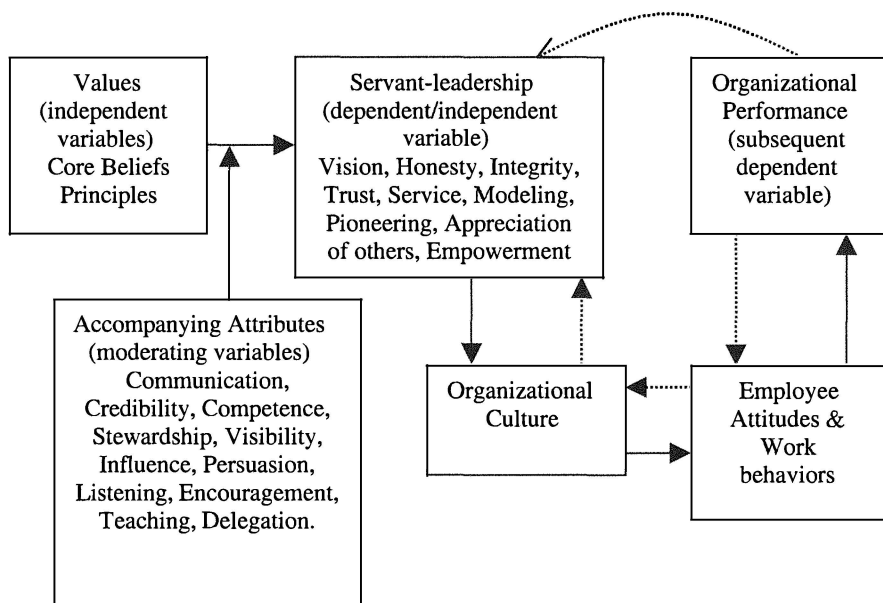


Figure 1: Russell and Stone (2002) servant-leadership model.



Similarly, Wong and Page's (2003) expanding ring model, shown in figure 2, illustrates servant-leadership that affects organizational processes. Wong and Page's article mentions service reproduction, but their ring model does not make this outcome explicit. Furthermore, Parolini (2004) builds on Wong and Page's model with a competing values approach and clarifies the outcome as increased (a) organizational effectiveness, (b) business performance, and (c) financial performance.

Fairholm's (1997) model also proposes organizational outcomes, including continuous improvement in people and programs. Smith, Montagno, and Kuzmenko (2004) propose that the dual outcomes resulting from servant-leadership include greater success in stable environments but lesser success in turbulent environments. Laub (2003) posits servant-leadership should lead to the good (a) of each individual, (b) of the whole organization, and (c) of those served by the organization. His tabular model proposes the evolution of a servant organization where "the characteristics of servant-leadership are displayed through the organizational culture and are valued and practiced by the leadership and workforce" (p. 3). Although this model is consistent with service reproduction, it does not propose the causal relationships between specific variables that reproduce the service inclination, which makes it like other leader-organization models.

Leader-Follower Models

A second type of conceptual models focuses on the leader-follower relationship. Winston (2004) says Patterson's (2003) leader-follower model improves on the leader-organization models by showing "the causal relationships between the variables in order to build a process model of servant-leadership" (p. 602). Patterson's model begins with an *agapao* love construct as the independent variable. Patterson understands *agapao* love as "moral love, meaning to do the right thing at the right time and for the right reasons" (p. 12). The leader with *agapao* love considers each follower's needs and desires. This appears to be consistent with Greenleaf's (1977) clarification of the service inclination as caring, and with the general non-

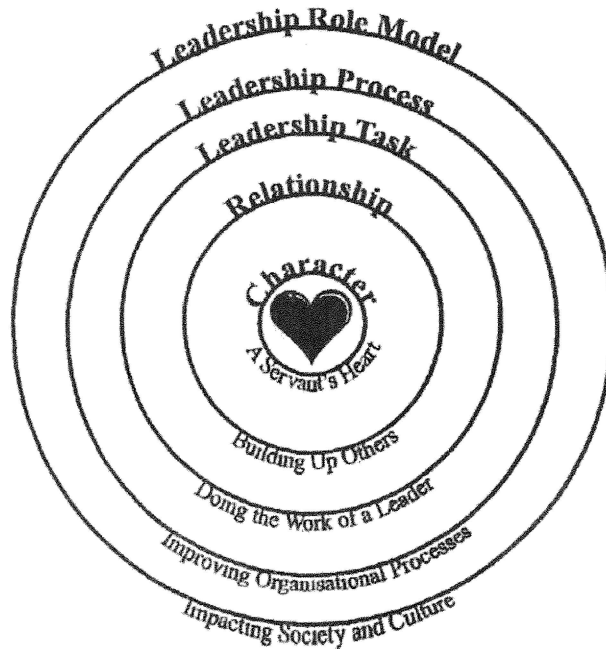


Figure 2: Wong and Page's (2003) expanding rings servant-leadership model.

model position that servant-leadership is other-focused. Building from a leader's love, the Patterson model proposes the mediating relationships between specific leader attributes, including (a) humility, (b) altruism, (c) vision, (d) trust, and (e) empowerment, that all lead to the outcome variable, service.

Patterson (2003) presents humility as a focus on others rather than a focus on self. Altruism is "helping others just for the sake of helping" (p. 17). Patterson's vision construct involves the leader's seeing each follower's potential and helping the follower to reach it. The trust variable describes a leader's confidence in people and willingness to grant them power. Empowerment represents "giving up control and letting the follow-



ers take charge as needed” (p. 25). Patterson identifies the independent and mediating variables as internal virtues; thus, all of these may rightly be part of the leader’s service inclination. However, love, as the independent variable in the model, represents the core of the service inclination.

Patterson (2003) defines the outcome in her model, service, as choosing deliberate behaviors that elevate others’ interests over self-interests. Thus, outward service acts emanate from and reflect the inner service inclination and its *agapao* love core. However, Patterson’s discussion only gives limited attention to the reproduction of the service inclination in followers. Moreover, her model does not clearly propose the causal relationships that lead to reproduced service. To improve Patterson’s model, Winston (2003) proposed a circular extension shown in figure 3.

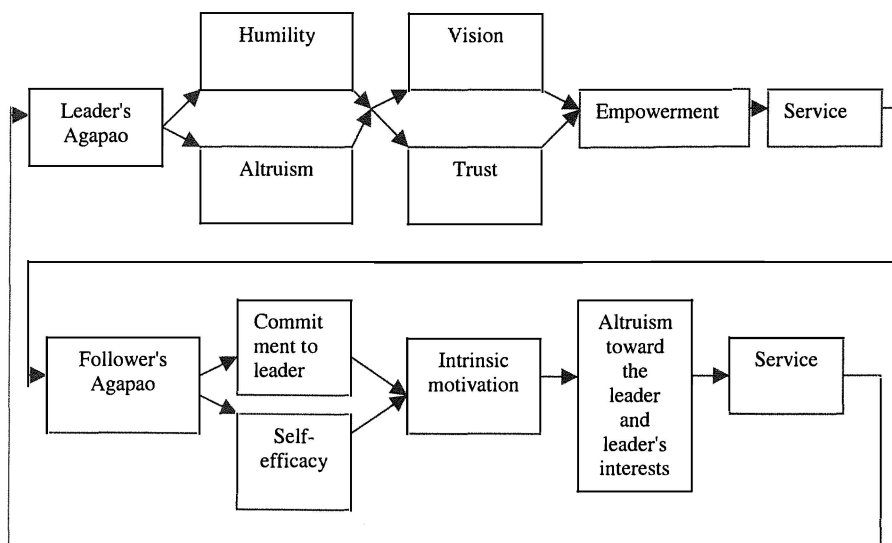


Figure 3: Winston (2003) extension to Patterson (2003) servant-leadership model.

By virtue of identifying the next stage in the model as the follower’s love, the extended model better shows reproduction of the service inclination. Winston (2003) states, “The second half of the story occurs when the



leader's service results in a change in the follower's sense of love. The follower's Agapao love results in an increase in both the commitment to the leader and in the follower's own self-efficacy" (p. 6). Thus, the model suggests that the leader's *agapao* love echoes in the follower's *agapao* love and that the leader's service acts reverberate in the follower's service acts. Winston proposes the set of mediating variables through which the follower's love materializes as service to the leader, including (a) commitment, (b) self-efficacy, (c) intrinsic motivation, and (d) altruism. Winston defines commitment as "the follower's level of positive belief toward the leader" (p. 6). Self-efficacy involves the follower's perceptions of his or her own capabilities. Intrinsic motivation suggests that inner interests and desires regulate the follower's behavior more than external rewards or punishments. The follower expresses altruism toward the leader by helping solely for the sake of helping. Although the Patterson (2003)-Winston (2003) model better shows service reproduction than previous models, Winston conceived the model as a dyadic spiral between the leader and a follower that grows in "intensity and strength" (p. 6) over time because of maturity. Therefore, it remains unclear from the model how service inclination reproduction occurs on an organization-wide scale.

Summary

Greenleaf (1977) identifies the reproduced service inclination in followers as the true test of servant-leadership. Other scholars concur with this outcome, even suggesting that servant-leaders reproduce themselves on an organization-wide scale. However, the existing models do not clearly demonstrate this outcome. Leader-organization models reflect general leader attributes but do not propose causal relationships. Although leader-follower models clarify proposed causal relationships at a dyadic scale, they do not show service reproduction on an organizational scale. There is need for a model to demonstrate the reproduced service inclination at both leader-follower and leader-organization levels. A review of chaos theory



literature provides elements that allow “conceptual development” (Lynham, 2002, p. 229) of such a model.

CHAOS THEORY CONSTRUCTS

Prior to the late 1970s, the definition of chaos included the concepts of disorder and randomness (Ferris, 1991; Smith, 1995). However, Lorenz’ (1993) search for a mathematical formula to explain chaotic weather patterns led to redefining chaos as unpredictability and complexity rather than randomness (Batterman, 1993; Gedzelman, 1994; Murphy, 1996; Smith, 2001; Smith, 2002). Accordingly, science now identifies random events as those without cause. In contrast, unpredictable behaviors do have causes, although they are presently unknown (Cartwright, 1991; Singh & Singh, 2002; Stark & Hardy, 2003). Ironically, underlying the view of chaos as unpredictable and complex is a belief that the universe is inherently well-ordered and predictable, that is, it is deterministic (Smith, 2001; Smith, 2002). Although some posit the deterministic causes to be complex (Iannone, 1995; Smith, 2002), others indicate causality may be quite simple (Lissak, 1997). Batterman (1993) explains that unpredictable events may only appear random to the set of variables used to measure the events. With different measurements, the chaotic system may appear simple and predictable. Smith (1995) identifies three elements in chaotic systems: (a) sensitive initial conditions, (b) self-similarity, and (c) iterative feedback. Wheatley (1994) also discusses a fourth element, the strange attractor. Together, these elements describe the fractal characteristic of chaotic systems. That is, chaotic systems result in unpredictable and amplified reproduction of a basic organizing shape.

Initial Conditions

Prior to the development of chaos theory, the generally held axiom was that a change in an initial condition resulted in a proportional change in the outcome (Firth, 1991; Murphy, 1996; Tetenbaum, 2001). However,



Lorenz (1993) postulated that a butterfly flapping its wings in Brazil could lead to a tornado in Texas (Pepper, 2002). The butterfly metaphor suggests that changes in the outcome are not proportional to changes in the initial condition. Rather, very small variances can amplify into unpredictable results (Doherty & Delener, 2001; Firth; Flake, 1998; Hartman, 2003; Murphy; Ravilious, 2004; Seeger, 2002; Smith, 2002; Singh & Singh, 2002; Thietart & Forgues, 1995). Accordingly, in chaotic systems, small initial conditions may evolve to have large-scale effects. For example, the panic of one person yelling “fire” in a crowded theater might escalate to catastrophic effects.

Self-Similarity

Part of the evolution of initial conditions occurs because of the self-similarity property that Carr (2004) identifies as a fractal. A fractal is an object whose form is the same regardless of scale (Doherty & Delener, 2001; Mandelbrot, 1977). It is a self-repeating feature (Seeger, 2002; Thietart & Forgues, 1995). Wheatley (1994) states, “Fractal principles have given us valuable insight into how nature creates the shapes we observe. Mountains, rivers, coastlines, vegetables, lungs, circulatory systems. . .are fractal, replicating a dominant pattern at several smaller levels of scale” (p. 162). Singh and Singh (2002) hypothesize that fractal features can exist in any dimension and anywhere between dimensions. Thus, to continue the theater example, the fractal shape of one person’s panic might first be reproduced in others in the immediate area and then in some across the room or in a balcony.

Iterative Feedback

An additional mechanism that allows initial conditions to amplify unpredictably and that allows a fractal shape to reproduce throughout a system is iterative feedback. Wheatley (1994) describes iteration as “information feeding back on itself and changing in the process” (p. 160).



Tetenbaum (1998) states feedback loops are the focus of chaos. The output of each cycle provides the material to begin a new cycle and produce further outcomes (Burns, 2002; Murphy, 1996). With each pass of the feedback loop, small changes, in the form of moderating and mediating influences, introduce variation into the system. Citing Lorenz' (1993) chaotic weather patterns, Firth (1991) states, "A massive volcanic eruption, or meteor strike, might kick the weather off. . .structure" (p. 156). Smith (2002) calls these "situational variables" (p. 522), and Doherty and Delener (2001) call them "small changes in the system" (p. 68). Accordingly, in the theater example, people screaming or individuals shoving one another act as modifying influences in the system that amplify the panic with each cycle of growing alarm.

Strange Attractor

An attractor is a point or multidimensional pattern which a system tends to move toward (Pepper, 2003; Smith, 2001) or away from (Smith, 2002). Eiser (1997) and Duffy (2000) suggest that initial conditions determine the nature of the attractor. The attractor initiates and reproduces the basic structure of a system (Doherty & Delener, 2001; Murphy, 1996; Smith, 2002; Svyantek & DeShon, 1993). Moreover, a strange attractor is a state that repeats itself closely, but never exactly, giving the attractor a fractal quality, but one modified by iterative feedback (Singh & Singh, 2002; Smith, 2002). Thus, the attractor creates the order within chaos (Thiertart & Forgues, 1995), and chaos never exceeds the boundary of the strange attractor (Wheatley, 1994; Svyantek & DeShon). In the theater example, panic is the initial condition. It is unlikely that as the panic grows, a birthday party will erupt in one corner of the auditorium and a formal dance in another corner. However, Burns (2002) points out that even within the limits of the strange attractor, calculating the pattern grows complex. "After multiple iterations the calculation. . .becomes. . . unpredictable" (p. 44). Thus, it is difficult to predict where and at what intensity panic will develop.



Summary and Model

Chaotic systems contain multiple elements, including (a) sensitive initial conditions, (b) self-similarity, (c) iterative feedback, and (d) attractors. These elements describe the fractal characteristic of a chaotic system, which is the unpredictable cyclical reproduction and amplification of initial conditions. Because this can occur in multiple dimensions, a two-dimensional model of chaos is quite limited. However, Singh and Singh (2002) provide a diagram that serves as the basis for a chaotic model shown in figure 4. In the model, the fractal characteristic allows the strange attractor to function as (a) an initial independent variable, (b) the subsequent dependent variable, and (c) the subsequent independent variable (Murphy 1996).

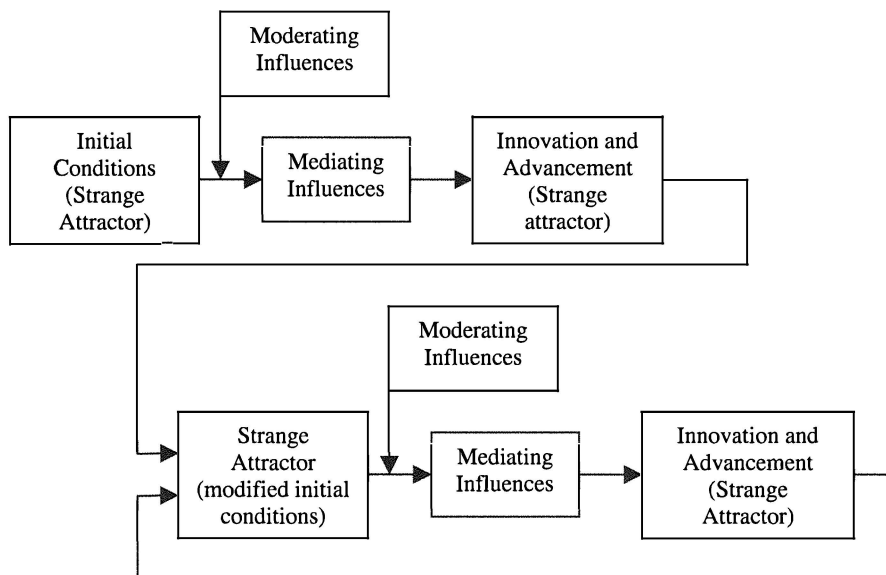


Figure 4: Modified Singh and Singh (2002) chaos model.



SERVANT-LEADERSHIP: A MODEL ALIGNED WITH CHAOS THEORY

Chaos theory is applicable to organizational theory. Singh and Singh (2002) note, “Chaos is the study of unstable aperiodic behavior in deterministic, nonlinear, dynamical (changing) systems” (p. 31). Similarly, Thiertart and Forgues (1995) identify organizations as dynamic, nonlinear systems. Svyantek and DeShon (1993) suggest that organizations are complex systems with attractors. Venkatardi, Rardin, and Benoit (1997) call the fractal cell the basic unit of an organization, and Wheatley (1994) states, “Fractal organizations. . . expect to see similar behaviors show up at every level in the organization because those behaviors were patterned into the organizing principles at the very start” (p. 163). Furthermore, strong comparisons exist between servant-leadership constructs and chaos theory constructs.

Values as Attractor

Greenleaf (1977) suggested servant-leaders begin with the service inclination, and Patterson’s (2003) model shows *agapao* love as the independent variable. Similarly, chaos theory begins with (a) initial conditions (Smith, 1995), (b) a strange attractor (Murphy, 1996), or (c) the basic fractal shape (Thietart & Forgues, 1995). An important point of contact is that a psychological construct, like love (Briggs & Peat, 1989; Murphy; Svyantek & DeShon, 1993), or organizational culture (Murphy) may fill the role of a strange attractor.

Influencing Variables

The servant-leader’s attributes emerge from the servant-leader’s values. Non-model and leader-organization writings provide lists of leader characteristics that mark the practice of servant-leadership. Leader-follower models propose the mediating relationships between the attributes that produce service. Likewise, chaos theory posits situational variables that alter the system (Smith, 2002).



Amplifying Feedback

The dyadic servant-leadership models of Farling, Stone, and Winston (1999) and Winston (2003) view the leader-follower relationship in an ever-growing spiral as the relationship cyclically adjusts for maturity. Likewise, chaos theory proposes cyclical iterations in (a) fractals (Mandelbrot, 1977), (b) the strange attractor (Murphy, 1996), and (c) the feedback loop (Tetenbaum, 1998).

Summary and Model

A comparison of the Patterson (2003)-Winston (2003) servant-leadership model and chaos theory suggests similarities. The loving, caring service inclination of servant-leadership appears to be a strange attractor, beginning as an initial condition and then amplifying as the follower develops *agapao* love and returns service back to the leader. Further, the proposed mediating variables in the Patterson-Winston model and the belief that maturity is a moderating variable each echo some of the modifying influences of chaos theory. Because of these similarities, this conceptual study posits servant-leadership as aligned with chaos theory and proposes a servant-leadership/chaos theory model.

Starting from the Patterson (2003)-Winston (2003) model, the servant-leadership model in figure 5 shows the leader's love-based service inclination functioning as a reproduced and amplified initial condition which reflects the fractal characteristic of chaotic systems. Reproduction and amplification of the love-based service inclination finds theoretical support in the non-model discussions of servant-leadership that predict the outcome of servant-leadership as the follower reciprocating service to the leader (Choi & Mai-Dalton, 1998) and as the follower developing a service inclination toward other followers (Stone, Russell, & Patterson, 2003). Moreover, Greenleaf (1977) predicts that servant-leadership will reproduce leaders. Accordingly, figure 5 shows the fractal characteristic of reproduction and amplification when service not only feeds back to the leader, but

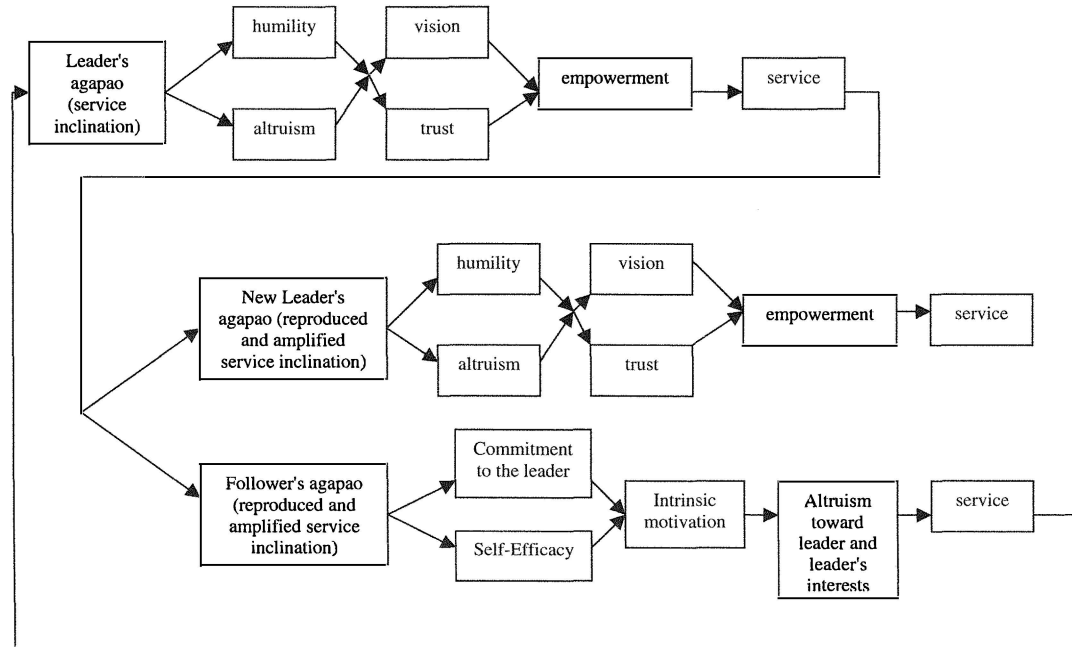


Figure 5: Servant-leadership/chaos theory model utilizing Patterson (2003)-Winston (2003) model.

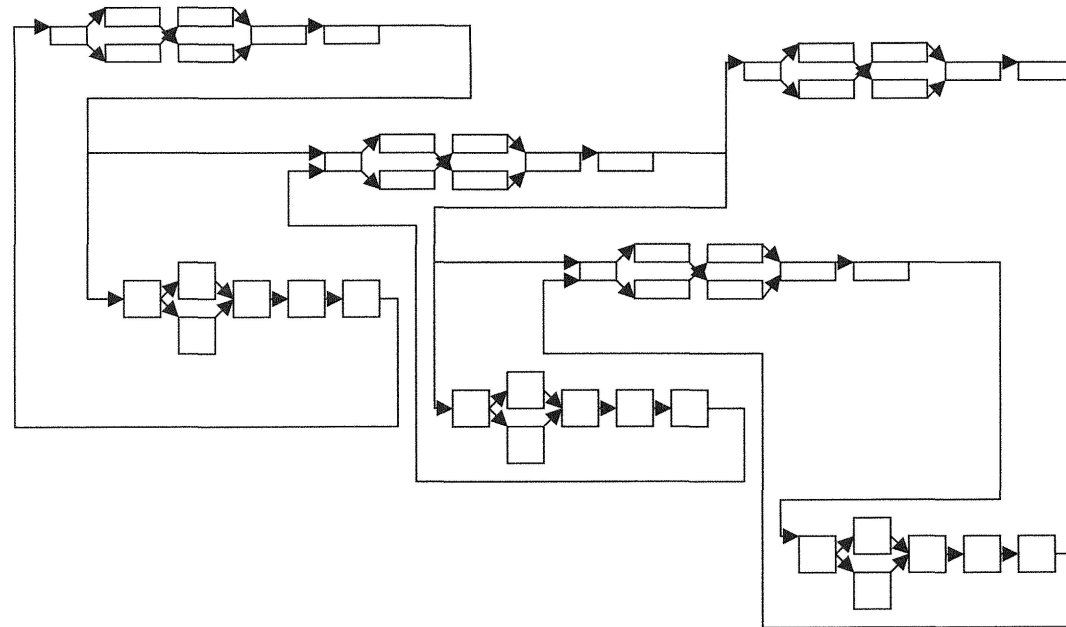


Figure 6: Chaotic model of servant-leadership with possible fractal shape iterations.



also emerges as the beginning of a new leader line. Figure 6 takes the fractal shape of the chaotic model of servant-leadership shown in figure 5 to several possible iterations, showing how dyadic relations, when amplified, might begin to have organization-wide effect by involving ever-increasing numbers of organizational members.

CONCLUSION

The chaotic servant-leadership model derives from the Patterson (2003)-Winston (2003) model and shows predicted causal relationships between variables. Additionally, through the inclusion of the fractal characteristic of chaotic systems, it begins to explain the reproduction of the service inclination at both dyadic and organizational scale. Conceptualizing servant-leadership as a form of chaos theory also provides implications for further research:

1. Following Lynham's (2002) general method of theory-building, the conceptual development in the present study needs to be followed by an empirical phase, including the generation of confirmable hypotheses or other "empirical indicators" (Lynham, p. 232). Accordingly, a case study of an institution led by a reported servant-leader should allow observation of service-inclination reproduction. DeVaus (2002) says about an explanatory case study, "On the basis of a theory we predict that a case with a particular set of characteristics will have a particular outcome" (p. 221). Accordingly, positing servant-leadership as aligned with chaos theory predicts the cyclical presence of the service inclination.
2. Asher (1983) indicates that one must construct reliable and valid indicators in research. Because the service-inclination materializes through leader attributes, these may serve as an indicator of the presence of servant-leadership and, therefore, the service inclination. Patterson's (2003) leadership attributes include (a) humility, (b) altruism, (c) trust, (d) vision, (e) empowerment, and (f) service. Sendjaya and Sarros' (2003) servant-leadership scale provides subscales with similar constructs, including (a) humility, (b) moral actions, (c) trust, (d) vision, (e) empowerment, and (f) acts of



service. Their instrument may serve as an effective tool to measure the presence of relevant attributes. Laub's (1999) Organizational Leadership Assessment (OLA) may also be effective due to his contention that servant-leader qualities should be evident throughout the organization. Moreover, because Greenleaf (1977) indicates that the true test of servant-leadership is reproduction of the service inclination, an important indicator of the presence of servant-leadership should be the presence of servant-leader attributes, which emerge from the reproduced service inclination, in followers. Looking for the service inclination in followers as supporting the presence of servant-leadership is the most significant research implication of a servant-leadership model aligned with chaos theory. Further, because the model anticipates ongoing iterations and fractal reproductions, the longer the tenure of a servant-leader, the greater the number of followers who should exhibit servant-leader attributes.

3. Singh and Singh (2002) point out that a chaotic system may have both positive and negative feedback. Positive feedback amplifies the system, while negative feedback stabilizes the system. Winston (2003) suggests that growing maturity causes growth in the dyadic spiral, while declining maturity causes a corresponding decline. As part of the ongoing refinement and development of theory-building research (Lynham, 2002), future research might examine whether other relational or organizational features operate as either positive or negative iterative feedback mechanisms.

4. Smith (2002) points out that a chaotic system may have both positive attractors to which the system is drawn and negative attractors from which the system is repelled. Page and Wong's (2003) opponent process model of servant-leadership suggests that authoritarian hierarchy and egotistical pride are negative attractors for servant-leadership. Future theory development and refinement might discover other variables that serve as negative attractors in the chaotic servant-leadership model. Additionally, research might explore how the system reacts when a leader who possesses negative attractors follows a servant-leader at the helm of an organization.



In summary, current servant-leadership models tend to focus on either the leader-organization dimension or the leader-follower dimension. Extant models also do not clearly demonstrate the reproduction of the service inclination. However, because the true test of servant-leadership is the reproduction of more servant-leaders (Greenleaf, 1977), servant-leadership functioning at the dyadic scale should eventually have organization-wide influence. The addition of chaos theory concepts, particularly a fractal characteristic of reproduction and amplification, allows modification of the Patterson (2003)-Winston (2003) servant-leadership model to show service reproduction at both dyadic and organizational scale. The leader who holds *agapao* love for her or his followers and serves them provides the organizing principle for a system that can amplify and reproduce servant-leaders. Therefore, the leader who starts with the small initial condition of serving even one person can have an organization-wide effect.

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