

Article

Looking Through New Lenses: Complexity Theory and the Christian Life

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Black and Smith find that complex adaptive systems are useful tools in understanding a complex world and, in actuality, are tools which point directly to Christ. The authors offer ten principles of complex adaptive systems and give the implications of these principles for Christians.

In the information age, many people find that the torrents of information they receive create mental overload and a need to engage in continuous sense-making (Borredon, 2002; Duchon & Ashmos, 1999; Weick, 1995). Human beings sort and analyze information by using mental processes called *schema groupings* or *cognitive maps* (Bougon, Weick, & Binkhorst, 1977; Huff, 1990; Stubbart & Ramaprasad, 1988). These cognitive maps help people make sense of a world that is inherently ambiguous and complex (Walsh, 1995; McKenna, 1999).

Said differently, schema and cognitive maps are the lenses through which people form and

validate their worldviews. For example, researchers attempt to make sense of the world by using the scientific method as a lens through which phenomena is processed (Burrell & Morgan, 1979; Lee, 1991). In general, people use their culture, family, friends, and the media to develop the lenses through which they understand their world (Weick, 1979; Stubbart, 1989). Christians make sense of the world by using the Bible and Christian ideology to form their lenses, attempting to integrate the understanding of God's Word into their lives (Chewning, 2001). However the lenses are formed, the mental "glasses" we wear help us to make sense of the information

we receive and allow us to take action based on that sense-making (Beyer, 1982).

For those who study organizations, a newly emerging theoretical lens is made up of the various complexity theories, particularly complex adaptive systems theory (Anderson, 1999; Wheatley, 1994). Complexity theories, along with chaos theory (Levy, 1994; Thietart & Forgues, 1995), are borrowed from science and mathematics (Waldorp, 1992). Complexity theories are designed to help us understand dynamic systems in which change is an integral part of the system (Anderson, 1999; Gleick, 1987; Thietart & Forgues, 1995; Waldorp, 1992, among others). Chaos theory helps us understand how complex interactive systems can appear to be simultaneously ordered and chaotic, depending on the perspective of the observer (Gleick, 1987; Waldorp, 1992). Examples of complex adaptive chaos systems include river ecologies, freeway traffic, weather patterns, and groups of people in organizations.

While some organizational scientists have enthusiastically embraced this new lens (Anderson, 1999; Thietart & Forgues, 1995; Stacey, 1995; Wheatley, 1994), others advocate

caution in applying the concepts (Marion, 2001; Morgan, 1997). Complexity theories can be handled in many ways. For example, they have been used to support the contention that intelligent or deliberate design is not necessary because complex systems develop apparently spontaneously from chaos and then adapt, grow, and reproduce (Morgan, 1997).

Nevertheless, the principles of complex systems are useful tools in understanding a complex world (Adler, Black, & Loveland, 2003; Anderson, 1999; McKenna, 1999). We find, for example, that if complexity and chaos theories are approached from a different set of assumptions, they point directly to Christ, Who is the foundation of all things and holds all things together (Col. 1:16, 17). If Christ made all things, He also established the basic principles of complex systems and uses those principles as He wishes. Further, we argue, God works within the church and within Christians using the principles of complex systems and chaos theory. Therefore, these theories can be used as tools to enhance our understanding of how we, as believers, grow into the image of Christ.

The purpose of this paper then, is to illustrate how complex adaptive systems theory can demonstrate the process of a Christian's growth to maturity. We begin the paper with an introduction to the basic elements of complex systems. These elements can be summed up in ten principles. In the second section, we will discuss the ten principles in detail. To make the links explicit between each principle and our integration, we will immediately follow each principle with its application to the spiritual life.

Complex Adaptive Systems

A complex system is a set of elements, often called nodes or points, and the linear and non-linear interactions between them (Anderson, 1999; Cramer, 1993; Waldorp, 1992). A simple definition of a linear relationship is one which shows an observable cause-effect exchange between the elements. A non-linear interaction has an indirect or non-straight line relationship (Lichtenstein, 1999). Non-linear interactions might be feedback loops or a network of interactions between groups of elements.

The relationships form patterns across and between levels in the system (Devaney,

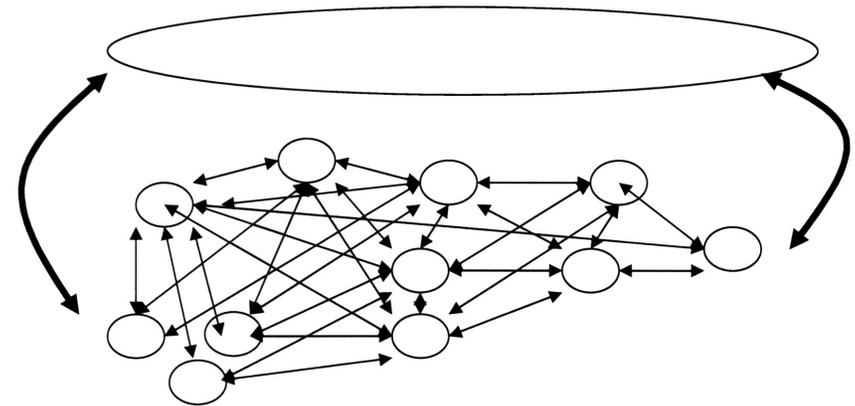
1988; Lichtenstein, 1999). The sets of relationships among the elements result in an emerging pattern at a higher level (Lewin, 1992). That is, activity at one sub-level of analysis results in a pattern created in the larger system (see Figure 1).

Patterns follow stable formation rules, but because many of the interactions are non-linear, the rules are not obvious to an observer (Anderson, 1999; Waldorp, 1992). From the observer's perspective, the system appears to be random and unpredictable — the patterns of order emerge out of what seems to be chaos. However, though from one perspective the system may appear haphazard and anarchic, from another perspective intent and organization are clearly seen. In chaos mathematics, for example, numbers that appear totally random and disordered at one level create beautiful fractal designs at another.

As mentioned before, weather, rivers, freeway traffic flows, and organizations are all examples of complex systems. Complex system and chaos theories attempt to find out how, for example, the interaction of ocean currents, wind, earth rotation, sunspots, fires, and a thousand other things affects the

Figure 1

Simplified Depiction of Chris Langston's Depiction of Complexity as Related to Roger Lewin; Adapted from Lewin, 1992



weather differently in New Mexico and Cambodia. Why does freeway traffic bunch up for no apparent reason and then flow freely? Sense-making using the lens of complex adaptive systems theory would say that the non-linear relationships between the nodes result in the sometimes non-intuitive activities of those sub-system level patterns.

Organizations are systems that embody interplays between various group and individual agendas, different organizational layers and departments, and formal and informal power structures. The nodes, consisting of customers, suppliers, employees, and other

stakeholders, exchange communication and influence within a complex environment (Ashmos, Duchon, Hauge, & McDaniel, 1996). Communication and influence flows contribute to the interactive relationships between the people in the various roles and to the actions they do, or do not, take (Cialdini, 2001). For example, different power structures between individuals may result in a collective understanding based on the most powerful person, which then inhibits future changes (Giddens, 1977).

Consider, for example, the infinite complexities in the

relatively simple bureaucracy of a small college. The husband of the IT manager is the internship coordinator for the career center. The vice president of finance meets frequently for lunch with a librarian, a maintenance person, and a psychology professor because they all love opera. The son of the chairwoman of the board of trustees is a student in your accounting class, and you go to church with three families who have sent their children to your college. Just from these sets of

relationships, it is relatively easy to see that information and influence can flow in unanticipated ways. For example, in your auditing class a discussion occurs between you and the students, with a sub-discussion among the students. The son of the board chair picks up an erroneous idea from the discussion and mentions the idea to his mother in a phone conversation that evening. This triggers a thought in her that results in a conversation at a

board meeting, where the flow of information and influence results in the emergence of a policy, which is then conveyed to the college at large (see Figure 2). To make the figure clearer, arrows indicating the direction of flows are not included.

The example in Figure 2 illustrates the key effect of the network of relationships in a complex adaptive system. Notice that this network includes activities between individuals with patterns and exchanges at individual, group, and organizational levels. The relational complexity involves the participation of multiple stakeholder nodes in communication and decision-making. Formal structural relationship networks, such as the information and influence links between professor and student and board chair and members, are reasonably clear and change relatively predictably. However, the informal communication and decision relationships, such as the discussion among the students and the influence links between parent and child, are non-linear and thus far more complex (Dutton & Webster, 1988).

The impact of the informal information and influence flows

in an organization can be significant. For example, several years ago a group of students decided to picket the graduation ceremony at the university of one of the authors of this paper. In a chance meeting on the sidewalk, a staff friend told the author about the plan. The author did not know the students involved but had a mentor relationship with another student, with whom the author discussed the planned event. This student, who was graduating, happened to be a good friend of the roommate of one of the leaders of the protest. The student was appalled at the potential disruption to her graduation ceremony and persuaded the group to abandon the protest. The informal communication structure did what the formal power structure could not possibly have done — assured that the ceremony would run without interference (see Figure 3 on next page). Here we included arrows indicating flow directions since this feature is critical in understanding the example.

Notice that the information was not evenly dispersed among all associates at the college but flowed between some sub-levels and not others, even when the others were of the same stakeholder category (i.e., not

Figure 2

Information and Influence Flows at a College Between and Across Levels

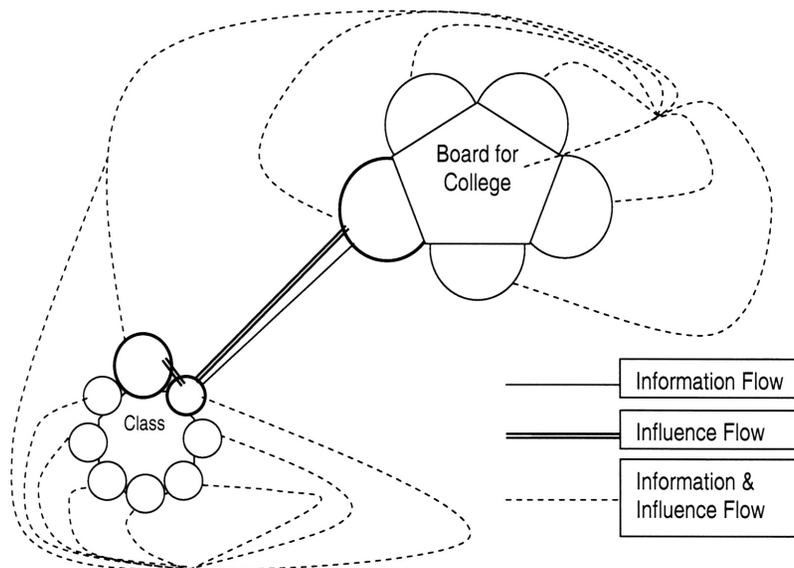
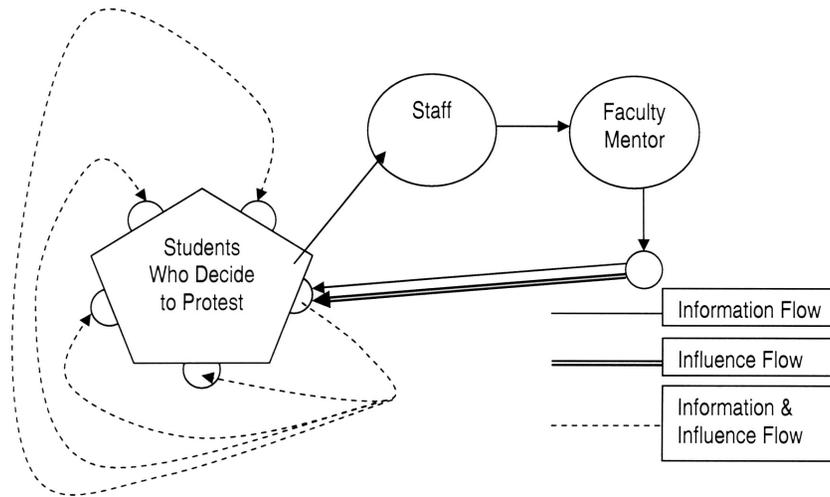


Figure 3

Information and Influence Flows Through Informal Network at College



all of the students had all of the information). In this situation, members of the formal network (staff, faculty) conveyed information but not influence. The informal network conveyed all of the influence and little information.

Using complex adaptive systems as a lens can help us better understand actions involving groups of people. It can also help us better understand some of the ways that Christians interact with Christ, why Christ commands some of the things He does, and perhaps help us gain insight into the character of God. Striving to

understand the ways of God is a pattern found in maturing Christians. We argue that using a lens based on complex adaptive systems theory can help us illuminate the ways of God and contribute to our spiritual maturity.

10 Principles of Complex Adaptive Systems and Their Implications for Christians

The principles of complex adaptive systems can be used to focus on multiple levels of a system and clarify how deep changes occur. Ten basic principles of complex systems

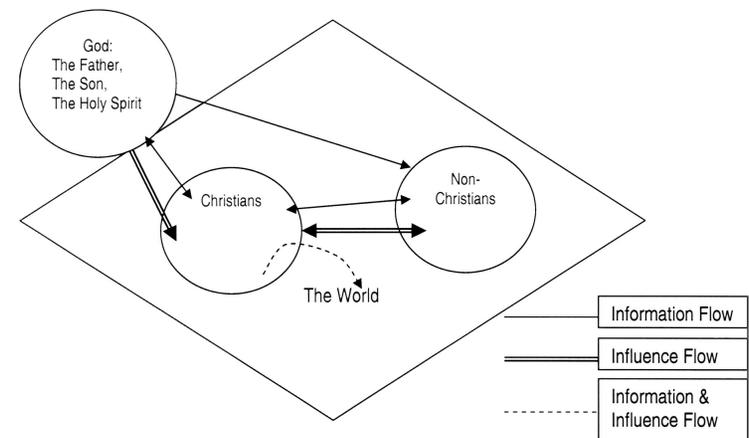
stand out to the careful researcher (Anderson, 1999; Cramer, 1993; Lichtenstein, 1999; Stacey, 1995; Waldorp, 1992): 1) Systems are composed of elemental parts and relationships between parts — relationships are key; 2) One non-linear relationship makes a system complex; 3) All relationships follow deep rules, but the rules are not obvious; 4) Patterns result from the interactions based on the deep rules of the systems; 5) Patterns form simultaneously, but not uniformly, across all levels; 6) Systems must be treated as “wholes,” not parts; 7) When the relationship rules change (deep change), the pattern changes

(surface change); 8) Details of emergent patterns are not predictable; 9) The impacts of deep changes are not predictable; and 10) Even when deep change does not occur, pattern changes (surface change) will occur.

To ease the communication process, in the rest of this paper we will use the term “network” or “system” to mean the complex adaptive system based on the information and influence interactions between Christ and the members of His church. This system interacts with an environment — the non-Christian world. The system and environment are illustrated in Figure 4.

Figure 4

Information and Influence Flows in God’s Spiritual Network



Principle 1: Systems are composed of elemental parts and relationships between parts — relationships are key.

Principle 1: A system, complex or not, consists of nodes (non-decomposable parts) and relationships between the nodes. It is not the nodes, but the relationships between the nodes that create patterns and energy in the system and impel the energy exchange between the system and its environment (Waldorp, 1992). Therefore, the focus of attention must not be on the nodes but on the relationships between the nodes.

*Application:*¹ As people of God, we are nodes in a network that was initiated by God at creation (Genesis 1) and reinitiated by God in the second covenant: “For God so loved the world, that He gave His only begotten Son, so that whoever believes in Him shall not perish, but have eternal life” (John 3:16). This system includes God, ourselves, and other Christians, and it exchanges energy with the environment consisting of non-believers (see Figure 4).

Principle 1 helps us understand that it is not ourselves, but our relationship with God and with each other that defines us as Christians. When a person

becomes a Christian, the Holy Spirit places him or her in a personal relationship with God and also connects the person to Christ’s body, the church (Eph. 1:13). The person is defined by his or her position in this spiritual system — a child of God (Eph. 1:5) and a member of God’s spiritual family.

The relationships between nodes create the spiritual energy in the system and the spiritual energy exchanged with the environment. A metaphor used by our Lord for the most important energy exchange is that of the Vine and the branches. “Abide in me,” He commanded. “Apart from Me you can do nothing” (John 15:4, 5). As energy is exchanged between the vine and the branches, the outcome (fruit) of the exchange is love, joy, peace, and so forth (Gal. 5:22). This energy outcome spills into the non-Christian world as Christians become, to use the biblical metaphor, fountains of living water (John 7:38).

This godly energy does not develop in isolation but results from a believer’s relationship with the Vine. Developing this relationship includes activities such as a consistent devotional and prayer life (getting information from God and

getting to know His ways better) (Law, 1955), the exercise of spiritual disciplines (Willard, 1988), and accountability and learning interactions with fellow believers (Law, 1955). The energy outcome of the relationships is an overflow of loving actions towards fellow Christians and non-Christians (Eph. 2:10).

Using the lens of complex adaptive systems theory can help us understand that the focus in our spiritual walk should not be ourselves — the nodes — but our relationships within the network — God, fellow Christians, and the world that God longs to bring into a relationship with Himself.

Principle 2: One non-linear relationship makes a system complex.

Principle 2: A system is considered complex if there is a single non-linear relationship within it (Anderson, 1999). A system with many parts, where all of the parts have linear relationships, is not a complex system. A system of two nodes with a non-linear relationship between them is a complex system (Cramer, 1993). However, most complex systems contain both linear and non-linear relationships.

As already discussed, linear relationships show an observable cause-effect exchange between the elements (e.g., professor-student). In a non-linear relationship, the commonality that creates the relationship between the nodes is outside the system (e.g., the opera lunch group), is not easily observed (students to son to parent), or is mutually generated. Mutually generated causality means that the presence of one element enhances or accentuates the performances of others. All of us have had classes where one student or a small group of students spur the class to success or rebellion. When Michael Jordan played with the Chicago Bulls, for example, the team had winning seasons. Teammates who left to join other teams were not as successful as during their time with the Bulls. When Jordan left the Bulls, the team was not as successful. The lessened performance of players outside of the team and the lessened team result when Jordan left imply that Jordan acted upon his teammates in a mutually enhancing way.

Application: Principle 1 emphasized that Christians are part of a network initiated by God. In this network, many linear information and influence

relationships are obvious. Christ is the head of the church (Eph. 1:22), and we are to obey His commands (John 14:15). The person who encourages us at a difficult time ministers to us directly.

We directly minister to the Sunday school class we teach or to the

missionary we write to and support. These actions are part of the “good works,” as Paul put it, that are expected of the maturing Christian (Eph. 2:10).

However, within the body of Christ, an entire set of indirect linear relationships also encourages spiritual growth. For example, Christ tells your friend to encourage you during that difficult time. It is He that gives you the key points for your Sunday school lesson.

The spiritual gifts provide an example of simultaneous direct and indirect relationship links. The Holy Spirit gives each believer a spiritual gift to exercise for the benefit of the church (Romans 12:6). When Christians exercise their gift(s), the primary benefits to the church might appear linear but often are not. For example, the man with the

gift of helps who organizes the church barbeque (direct link) might never know the encouragement another person received from the event or the example of humble service he

was to the watching teen. The missionary who benefits from a “love offering” (direct link) might never

know the woman who exercised her gift of faith to give over and above. The indirect linkages between the church members go very deep. “If one member suffers,” said Paul, “all the members suffer with [him]; if one member is honored, all the members rejoice with [him]” (I Cor. 12:26).

As we mature in Christ, we also respond more overtly in love to our non-Christian neighbors. This might be a direct response, such as sending money to the victims of an earthquake, or an indirect response of driving in a civilized manner when another car cuts us off on the highway. Collectively, the church can also indirectly affect the world. For example, a local church in my area decided to clean up several vacant lots in their neighborhood. Those lots are

... the primary system rule for spiritual growth is love: first love of God, then love of others.

now safe places for the children to play. There is a stirring of pride in the neighborhood, evidenced by flowers being grown in yards for the first time, houses being painted, and old cars being moved to the backyard.

Principle 2 shows us that many spiritual influences are non-linear. As we base more actions in God’s love, we indirectly influence more of the people around us in love. Christ’s pleasure and the encouragement of others, coupled with our obedience, reinforce our ability to love. The loop is non-linear, a virtuous cycle (Akkermans, 2002).

Principle 3: All relationships follow deep rules, but the rules are not obvious.

Principle 3: The relationships between the nodes may be non-linear, but this does not mean that they are arbitrary. Relationships follow deep rules, and apparently random outcomes are still based on the rules (Anderson, 1999; Cramer, 1993; Stacey, 1995; Waldorp, 1992, among others). However, the rules are not obvious, particularly to the person outside of the system or observing the early workings of the system (Black & Fabian, 2000; Prigogine, 1996).

Application: The relationships in God’s spiritual network are not capricious — they are based on deeply held rules. When a person becomes part of the system, his or her heart is opened to the rules. The basic rule of the network is love: love for God first and then love of neighbor. On this, as Jesus said, hang all the rules of conduct, holiness, justice, mercy, and hope (the Law and the Prophets) (Matt. 22:37-40).²

In the discussion of Principle 2, we asserted that the love energy created by godly relationships manifests itself in non-linear ways. The point here is that love is both the outcome and the deep rule of the system. God is love (I John 4:16), and God does not change. Of course, not every relationship in the system is characterized by love. God allows his children free will, and some prefer to let pride, self-interest, or pleasure rule their relationships. However, as a person becomes more deeply embedded into God’s network, energy is exchanged between the Vine and the branches, and the outcome is the fruit of the Spirit, which starts with love (Gal. 5:22). Thus, the primary system rule for spiritual growth is love: first love of God, then love of others. This is clear throughout Scripture. However,

the different outcomes of this deep rule set are not necessarily obvious.

Consider, for example, how Martin Luther applied the primary rules of love to the Christian's social and economic life. Luther argued that both Christians and non-Christians have states in society. A man's state simultaneously can be a husband, a son, a businessperson, a citizen of his country, a leader in his church, and a leader in his community (Barnette, 1964). However, a Christian is additionally called by God to vocation — a relationship with one's neighbor that is designed to reflect God's love in the earthly sphere. Vocation is a way to minister and show love to the people that surround one. A man might have the state of a son, but his vocation as a son would be as a chaste and wise young man that brings joy to his parents (Wingren, 1957).

Luther also applied vocation to a Christian's economic life. An occupation allows a Christian to provide for his own and his family's economic needs. Vocation is an additional summons to work for the sake of one's neighbor (Sherman, 1984). According to Luther, one demonstration of agape love

through vocation is to honorably and honestly meet another's economic needs (Wingren, 1957) — for example to give an honest day's work for a day's wages, to be competent at one's job, or to provide quality goods at a reasonable price.

Another non-obvious application of this principle is that, according to Christ, following the primary system rule of love will result in hate from the world. "If you were of the world," He said, "the world would love its own; but because you are not of the world ... the world hates you" (John 15:19). It is easy for the Christian to forget that as he or she gains more of Christ's characteristics, the result may be disdain or persecution from others. "All who desire to live godly in Christ Jesus will be persecuted," stated Paul (II Tim. 3:12). The believer must come to terms with the war between the flesh and the spirit in order to be able to triumphantly proclaim, "For I am convinced that neither death nor life ... nor anything else in all creation, will be able to separate us from the love of God that is in Christ Jesus our Lord" (Rom. 8:38-39).

Most of us have been taught about the primacy of love in our Christian relationships. However,

this principle from complex systems theory helps us focus on love as the deep rule of our faith. It also helps us understand why some of the responses to our loving acts are not as we would expect or desire them to be.

Principle 4: Patterns result from the interactions based on the deep rules of the systems.

Principle 4: The appearance (pattern) of the entire system emerges from the interactions between the system elements as they engage in their relationships with the other elements (Waldorp, 1992). There are primary patterns and sub-patterns. Patterns emerge after many relationship iterations based on the deep rules. Any change of members or any change in relationship rules results in disruptions of the previously forming pattern, possibly a time of chaotic-appearing activity, and then the formation of a new pattern.

Application: Many practical applications to the Christian life can be made from this principle. We will suggest two.

First, God knows what the entire system pattern will look like when everyone in it bases his or her actions on love — heaven is an example of this. We, of course, do not and cannot know

(I Cor. 13:12). Part of this is due to the fact that human beings are bounded intellectually and rationally (Bougon, et al., 1977). However, another reason we do not know what the system will look like is because as long as there are non-Christians in the feedback loops or Christians who do not govern their relationships by the deep rules, the primary pattern will not fully reflect the deep rules. Jesus discussed this issue in the parable of the wheat and the tares. Rather than the farmer pulling up the wheat, the tares are allowed to grow until harvest (Matt. 13:24-29). By implication therefore, we should not be surprised when our churches and Christian universities do not look like heaven.

However, this principle also says that patterns do emerge after many action iterations based on the deep rules. We need not be discouraged if the pattern is not yet discernable, but we do need to continue relationships based on the deep rules. "Let us not become weary in doing good," Paul said, "for at the proper time we will reap a harvest if we do not give up" (Gal. 6:9).

A second implication of this principle concerns the ability to discern character in others. At an

individual level, life patterns eventually reveal the deep rules that the person is living by. We all know people who seem spiritual but do terrible things. Often a discerning observer of these people can see life patterns of pride, self-indulgence, or the like. Proverbs is full of patterns that identify the mocker, the violent man, and other people to avoid spiritually. As Christ said, “By their fruit you will recognize them” (Matt. 7:20). “Can both fresh water and salt water flow from the same spring?” is the way James expressed this principle (James 3:11). It is reassuring to know that deeply held rules will eventually be revealed in behavior patterns. This is a major form of protection for the discerning Christian.

Principle 5: Patterns form simultaneously, but not uniformly, across all levels.

Principle 5: Patterns form across and between levels — not sequentially level by level (Devaney, 1988). As a result, from within the system it typically looks like a chaotic mess. From without the patterns can occasionally be observed and recognized (Wheatley, 1994).

Application: The patterns of godliness in our life do not form

sequentially. This principle has several implications. One is that individually or corporately, Christians should not specify the route that God must or will take to embed holiness and love into lives. Specific actions done at certain times or in certain sequences are not signs of spirituality. Take, for example, the fruit (singular) of the Holy Spirit. Galatians 5 says that the pattern emerging from the Spirit is love, joy, peace, and so forth. But from Scripture and experience, we know that the Holy Spirit does not, for example, work exclusively on our anger and, when that is eliminated, turn to our lack of love. Rather, as we develop a little love, our anger diminishes and peace emerges. This allows more love to grow and so forth. Peter explained this process by using the words “add to.” “Add to your faith goodness; and to goodness, knowledge ... and to brotherly kindness, love” (II Peter 1:6-8). The patterns emerge in response to faith, but at what level they form is not necessarily predictable.

This principle also provides insight into God’s admonishment to leave judgment to Him. As the new man develops Christ’s characteristics across and between

levels, it is sometimes difficult for others to see the emerging pattern of godliness. “Man looks at the outward appearance,” God told Samuel, “but the Lord looks at the heart” (I Sam. 16:7). We may condemn our brother for being addicted to anger or video games when God is working on his joy and longsuffering. Furthermore, recall that patterns require many iterations of the relationship to emerge. In order to achieve the mind (pattern) of Christ, our thoughts, public and private actions, and relationships at work, church, or on the sporting fields all need constant renewal in our relationship with the Vine. Across corporate and individual levels, godly patterns are being generated that reflect the primary rules, but the generation may appear chaotic or non-existent to the observer. We should not be discouraged if the pattern does not emerge when we would like it to or think it should. Rather, our responsibility is to pray and persist.

On the other hand, it is encouraging to understand that parts of the system’s pattern remain consistent across changes.

So, too, relationship patterns informed by the deep rule of love will be recognizable during changes in personal or corporate circumstances. In the middle of pain or difficulty, we can reflect joy (James 1:2).

Here, the value added in using the lens of complex adaptive systems is in understanding that spiritual patterns are a work of God and we cannot predict

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them. This gives some insight into why the set of spiritual fruit contains the elements it does. Some of the elements, such as love and peace, emphasize the deep rule that forms the foundation of the pattern. Others, such as patience and longsuffering, are vital in permitting God’s timing to be in control. Still others, such as joy and goodness, result from the pattern being formed. The patterns are stable across circumstances.

Principle 6: Systems must be treated as “wholes,” not parts.

Principle 6: Because the patterns are relational and networked across and between levels, it is not possible to decompose the system into its

parts and extrapolate back to the whole system. There are characteristics of the system that are only present when the entire system is in place and active in a dynamic, synergistic state (Anderson, 1999; Cramer, 1993; Wheatley, 1994).

Application: This principle, which emphasizes that some system characteristics are present only when the entire system is active, has many implications. For example, it places an emphasis on something Western Christians occasionally underrate: the place of community in the process of spiritual growth. God's model is to place believers into a group. Throughout the New Testament epistles, there is a continuous use of "us" and the plural "you." "The body is not one member, but many," said Paul. "To each one is given the manifestation of the Spirit for the common good. ... The eye cannot say to the hand, 'I have no need of you' ... God has so composed the body ... that the members may have the same care for one another" (I Cor. 12:7-27). There is spiritual growth that is only possible when the entire system is present and the individual Christian is actively using his or her spiritual gift for the benefit of all.

This principle also illustrates the impossibility of individual Christians decomposing their life-system into parts that have spiritual consequences and parts that do not. The life of God either courses throughout the entire system or it is dormant. There are many applications of this principle. For example, some Christians feel that people in "ministry" professions, such as missions, are more spiritual than those in "secular" professions, such as advertising. Martin Luther vigorously opposed this view, arguing that God is the Lord of our entire existence — the God of everything we do. Even mundane tasks such as sweeping the house or washing diapers can be done as a service to Him and an avenue of His blessing. Luther said:

Our natural reason ... takes a look at ... life ... and says "alas, must I rock the baby, wash its diapers ... labor at my trade?" What then does the Christian faith say to this? It opens its eyes, looks upon all these insignificant, distasteful, and despised duties in the Spirit and is aware that they are all adorned with divine approval as with the costliest gold and jewels. ... When a father goes ahead and washes diapers

... God, with all his angels and creatures is smiling — not because that father is washing diapers, but because he is doing so in Christian faith.³

If every part of our life belongs to God, it follows that God's grace can be found in everything. Therefore, anything we do can be done to His glory and become a holy activity, an act of worship shot through with God's glory. Monday activities are no less God's than Sunday activities.

While this unity principle can be understood using other theoretical lenses, complex adaptive systems theory emphasizes that the emergent whole has unpredictable and additional properties not found in an individual constituent part. This principle of synergy allows us to see how we may be partakers of God's vastness while we are limited creations. The collective is much more than the sum of the individuals.

Principle 7: When the relationship rules change (deep change), the pattern changes (surface change).

Principle 7: If the relationship rules change, the system will change to reflect the

new rules. This will then change the system patterns (Cramer, 1993) and pattern recognition timing. There will usually be a time of apparent confusion as the rules and patterns adjust (Waldorp, 1992).

Application: Principle 7 reflects several important issues. First, it is a clear illustration of what happens to us at salvation. When we accept Christ as our Savior, our relationship rules change and we become new persons. Rather than we ourselves being the sum of our existence, it is now our joy to place God at the point of highest esteem. This immediately changes the focus of the main relationship in our life systems from self to God.

As the love of God starts to prevail and iterate in the primary relationship, the deep rules of our other relationships start to change from self-love, immorality, ambition, enmities, jealousy, and anger (Gal. 5:19-20) to love, joy, and faithfulness (Gal. 5:22-23).

The change of rules, once enacted, is revealed in our action patterns. It may take time for others to see the pattern, but each time we make decisions based on holiness and love, we strengthen the pattern of being people who have passed from the kingdom of darkness to the kingdom of light.

As we walk in the light (I John 3:10), our life patterns begin to reflect light.

This principle also illustrates how we mature as we start to use the spiritual disciplines — prayer, Bible study, fasting, silence, worship, and so on — that help deepen our relationship with God. As we develop in Christlikeness, there comes a point where we must follow Jesus into a disciplined life in the Spirit in order to become more like Him (Willard, 1988).

As we start, with the help of the Holy Spirit, to utilize these disciplines, the rules that underlie

our relationship with the Lord deepen and develop.⁴ Slowly, the rule changes in our primary relationship will iterate through all our relationships. Eventually we develop in spiritual patterns what Moses manifested as a physical phenomena — God’s glory reflected by his face (Exodus 34:29-35).

Principle 7 illuminates the reason we can expect changes in the life patterns of those who have accepted Christ. The lens of complex adaptive systems theory shows that rule change is at a more fundamental level than

pattern change. The changes to the pattern will occur as the underlying rule base changes.

Principle 8: Details of emergent patterns are not predictable.

Principle 8: While the general appearance of a pattern based on the deep rules may be predictable, the details of the emergent pattern are not. This is true whether we are discussing the initial pattern (Black & Fabian, 2000) or one that results

after an initial pattern has been disrupted (Cramer, 1993; Waldorp, 1992). Therefore, the person changing

the rules cannot predict what the emergence or specific details of a new pattern will be (Wheatley, 1994) — a real problem for change agents. The “problem of point predictability,” as it is called (Cramer, 1993; Waldorp, 1992), is due to the non-linear relationships in the system and to initial condition sensitivity — the so-called “butterfly effect” (Wheatley, 1994, among others) which is discussed in detail in Principle 9. Briefly, the “butterfly effect” says that changes may have unpredictably disproportionate effects on

outcomes (small change/large result; large change/small result).

Application: A general pattern can be recognized as based on God’s love, but specific elements of the sub-patterns will not be predictable.⁵ This principle can be applied many ways. We will discuss two.

Jesus said that people will know that we are Christians (general pattern) because of our love (John 13:35). We can see this principle in action when we engage a stranger in a conversation and get that “good feeling” from them that suggests they may be a fellow Christian. In subsequent conversations and observations, we confirm or deny that initial understanding. For Christian academics in a secular world, the discovery of other Christians can be a pleasant surprise. It can be a “that explains why we get along so well” moment.

This principle also reminds us to not focus too closely on the details in groups of believers. One side of the coin is not to be too eager to transplant details from one group of Christians to another. An appealing sub-pattern may have emerged in a particular church in the form of a program appropriate for the people and conditions under which it was

generated. This program may not be optimal in other conditions or with other people. Caution should be exercised in transplanting systems and programs from other churches.

The other side of the coin is to understand that the general pattern is the key, and the sub-pattern details of liturgy, practices, or music are less relevant. There are doctrines that are vital to the major pattern, but many church splits are not over the deep rules but over the details. On a less explosive though no less destructive level, many Christians grumble about their pastor, church, or fellow Christians because of the unpredictable details. The church is growing, but the change means the church members can no longer enjoy their preferred parking spaces or sing the type of music they like as often as they would like. Furthermore, the new people in the congregation have different ideas about appropriate dress and activities. As long as the primary pattern is solid, Principle 8 should act as a curb on some of the “bitter water” that spews from God’s people.

As the church forms from every nation and culture on earth, this principle emphasizes that the pattern is recognizable though the

details are unpredictable. Each groups' way of manifesting God's love may differ in its specifics and yet be recognizable to other Christians. Likewise, every Christian is changing into Christ's image in a different way.

Principle 9: The impacts of deep changes are not predictable.

Principle 9: The pattern will be changed if there is a change in the elements or in the deep rules of interaction. However, very small apparent changes may cause disproportionately large disruptions (Wheatley, 1994). An example of this is the famous illustration of the "butterfly effect" which (true or not) argues that the flutter of a butterfly's wing in China will disturb the wind. The effect multiplies until there is a hurricane in Brazil. Changes may have proportionate effects (small change/small result; large change/large result) or disproportionate effects (small change/large result; large change/small result). When the change is made, the effects are unpredictable.

Application: It is significant that the principles of a complex system will not allow human reason to determine the effects of change (growth) in the spiritual realm. Many human ethical

systems depend on reason to determine relationship patterns — "if you do this, the result will be this." In contrast, God insists on being in exclusive charge of the effects that our spiritual development has on relationships with others.⁶ For this we can be grateful. It is not possible for the human mind to encompass all the ways our actions or words might impact others, even in linear relationships, let alone non-linear ones.

For example, how often has a word or action you intended for good been misunderstood by those hearing or seeing it? A friend once paused as he discussed an issue in class and looked vaguely towards one side of the room. A student assumed the discussion was pointed at her and resented the professor for several years until she gathered the courage to confront him. Given the immense potential for misunderstanding from cultural differences, gender differences, and personality differences, it is a wonder that we ever communicate accurately at all.

Nor is it possible to control the "butterfly effect." As professors, we are regularly stunned by the implication that a student received from a brief encounter or by an off-the-subject

remark that became a watchword in someone's life. It is with relief and joy, then, that we realize God knows all the impacts in our system relationships and can turn each to good as we conform to the deep rule of love (Rom. 8:28). We can relax, live in joyful relationships, and quit worrying about controlling the results of our words and actions.

Another application of this principle is the often-repeated admonition to let God take charge of circumstances. When one is faced with unpleasant circumstances or ineffective bosses, it is tempting to create change, particularly when one knows how. However, the deep rule of love and obedience admonishes us to "rest in the Lord and wait patiently for Him; do not fret ..." (Psalm 37:7). Principle 9, properly understood, can be a curb to too-precipitous action. We do not know all the implications to the change we propose. God does, and it is wise to leave the situation in His Hands.

Principle 10: Even when deep change does not occur, pattern changes (surface change) will occur.

Principle 10: Even when the deep rules remain the same,

disruptions in the patterns will still occur (Favre, Guitton, Guitton, Lichnerowicz, & Wolff, 1995). Disruptions occur when specific change points manifest themselves because of organizational tensions (Morgan, 1997) or when the system reaches a stage of maximum chaos and is forced to either disintegrate or reinvent itself at a higher level. Following these disruptions, the patterns will have changed.

Application: Once we have accepted Christ as Savior, our Christian life is not static. We grow or we become retarded (Heb. 6:1-3). Neither do we mature systematically. Godly patterns are formed and then disrupted in the form of feedback opportunities and learning curves. The Scripture says some of these disruptions are caused by inherent tensions, such as unrepented sin, as the new and old man struggle (Romans 7). The Lord then introduces potential change points. "Those whom the Lord loves He disciplines, and He scourges every son whom he receives," Hebrews says. "... He disciplines us for our good, so that we may share His holiness" (Heb. 12:6-12).

One example of a pattern disruption that God uses is trials.

When we face a trial, there is often internal chaos. Typically, there comes a point when we are fed up with the situation and either choose to rebel or to accept the trial as from the hand of a loving Father. Choosing acceptance almost always elevates the chaotic situation to a higher level in which we experience the peace and provision of God. “Consider it all joy,” said James, “... when you encounter various trials,” because the testing of faith produces endurance. Endurance creates spiritual completeness (James 1:2-4).

There are other applications of this principle. For example, a pattern disruption that Christians look forward to is the return of Christ. His millennial reign on earth will be a glimpse of life in heaven. During that time, Satan and those who have accepted the deep rules of hell will be removed from the network. However, the freedom of the human to choose between self and God will remain. Some will choose self; even so, the pattern of life during that time will be significantly different than our current patterns. The final pattern disruption will be when we are in Heaven where all follow God’s rule of love and have chosen to do so.

Using the lens of complex adaptive systems helps us accept the trials and changes that occur even when all is apparently going smoothly. Understanding Principle 10 allows us to not be tossed to and fro by waves of doubt (James 1:6) but rather to be confident that if we are following God’s deep rule of love, our circumstances will contribute to a pattern that may change in detail but still reflect God’s glory and light.

Summary: Using the Lenses of Complex Adaptive Systems to Understand the Christian Life

The ten principles of complex adaptive systems exhibit some significant parallels in the spiritual growth of Christ-bearers. A person accepts Christ and thereafter the deep rules of his or her life change. He or she is a new person, ordained by God to good works that result in the praise of His glory (Eph. 2:10). But the outworking of this new life does not happen overnight. Rather, the believer changes patterns as he or she walks more and more in light. The Scripture uses the images of being transformed from glory to glory (II Cor. 3:18) and of running a race to obtain a prize (Heb. 12:1-2).

The Christian does not experience change in isolation. Rather, God puts each believer into a relational system with Himself and with other Christians. This system is one of the primary means through which the Christian matures in his or her faith.

From complex adaptive systems theory, we can see how different sets of relationship rules result in different patterns. While the details of any pattern are not predictable, the pattern can still be classifiable. Love is the deep rule in the system of divine and human relationships. “If someone says, ‘I love God,’ and hates his brother, he is a liar,” said John. “For the one who does not love his brother whom

he has seen, cannot love God whom he has not seen” (I John 4:20). Christians from a variety of

authority levels, personalities, ages, and gifting use love to contribute to each other’s spiritual growth. For example, Paul outlines different responsibilities to be done in love by different age groups, sexes, and economic levels (Titus 2:1-10).

However, if the believer or groups of believers live by other

deep rules, the spiritual growth of all will be blunted. Love of the world eliminates the love of the Father (I John 2:15, 16). For example, if a church makes politically correct rather than spiritually correct choices, the spiritual impact of the church will be dulled. If individual Christians pursue deep rules contrary to love, such as persisting in a sin habit, the spiritual growth of the entire group can be hindered (I Cor. 5:6-8). The church must be of one mind — the mind of Christ.

A believer networked in love within the system of Christ and other believers changes. He or she develops more Christlikeness.

... a pattern disruption that Christians look forward to is the return of Christ.

The way these changes happen reflects the principles of complex system change — they follow rules that

are not always obvious; they form patterns but not uniformly across levels; deep changes create surface changes, but surface change will occur without deep change if the system tensions require it; change will often create a period of chaos; and the details of the resulting new pattern are not predictable.

Conclusion

Should Christians avoid chaos and complexity theories? Not at all. Even from this brief integration, we can see that these theories point to the Lord. He established the nature of complex systems and He uses them to form the results He wishes. He created us to be an active part of the system and sent Christ to reinstate us into the network. He provided us with directions on what to do and what general pattern attributes to expect. We can use complexity theories, and complex adaptive systems theory in particular, to better understand why God has chosen to do what He has done. Given the immutability of God and the mutability of our relationships and networks, it is useful to know that there are reasons why such changes occur and why we can expect to be able to recognize patterns even when the details differ.

Future research on organizations, Christians in organizations, and Christian organizations, using the lens of complexity theory, might be fruitful for organizational scholars. Additional research questions such as “Can complexity theory be informed from Scripture?” encourage future

investigations and integrations. We invite others to join us in this stream of research.

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ENDNOTES

¹It should be noted that there are many possible applications for each of these principles. We have suggested only a few. The reader is encouraged to make his or her own applications.

²The deep rule of love is, of course, based on faith. It is beyond the scope of this paper to explore this issue in depth. However, the authors suggest that faith is the system trigger that God uses to bring all the nodes into love relationships. This matter would be worth exploring in a future paper.

³M. Luther, *The estate of marriage* (Cited in Ryken, 1979), p. 15.

⁴Unfortunately, it is beyond the scope of this paper to discuss the practice and impact of the spiritual disciplines. Interested persons are directed to Dallas Willard's book, *The Spirit of the Disciplines* (San Francisco: Harper Collins, 1988).

⁵This statement refers to human beings. Naturally, God can predict what the new pattern will be.

⁶He does, however, tell us of the effects of different actions on people with certain personality patterns. Proverbs is one of the key books that develops this.

REFERENCES

Adler, T., Black, J., & Loveland, J. (in press). Complex systems, boundary spanning, and education. *Journal of European Industrial Training*.

Akkermans, H. (2002). Vicious and virtuous cycles in ERP implementation: A case study of interrelations between critical success factors. *European Journal of Information Systems*, 11(1), 35-46.

Anderson, P. (1999). Complexity theory and organization science. *Organization Science*, 10, 216-232.

Ashmos, D.P., Duchon, D., Hauge, F., & McDaniel, R.R. (1996). Internal complexity and environmental sensitivity in hospitals. *Hospital and Health Services Administration*, 41(4), 535-553.

Barnette, H.H. (1964). *Christian calling and vocation*. Grand Rapids, MI: Baker Book House.

Beyer, J.M. (1982). Ideologies, values, and decision making in organizations. In *Handbook of organizational design* (pp.166-202). New York: John Wiley & Sons.

Black, J.A., & Fabian, F.H. (2000). Fractals, nested resources and competence based competition. In R. Sanchez & A. Heene (Eds.), *Theory development for competence-based strategic management* (pp. 1-30). Chichester, UK: John Wiley & Sons.

Borredon, L. (2002). Creating patterns of meaning: A collaborative approach to sense making. *Career Development International*, 7(5), 305-309.

Bougon, M., Weick, K., & Binkhorst, D. (1977). Cognition in organizations: An analysis of the Utrecht Jazz Orchestra. *Administrative Science Quarterly*, 22, 606-639.

Burrell, G., & Morgan, G. (1979). *Sociological paradigms of organization*. Heinemann.

Chewning, R. (2001, Fall). A dozen styles of biblical integration: Assimilating the mind of Christ. *Journal of Biblical Integration in Business*, 114-151.

Cialdini, R. (2001, February). The science of persuasion. *Scientific American*, 76-81.

Cramer, F. (1993). *Chaos and order*. (D.I. Loewus, Trans.). New York: VCH Publishers.

Devaney, R.L. (1988). Dynamics of simple maps. In R.L. Devaney and L. Keen (Eds.), *Chaos and fractals: The mathematics behind the computer graphics*. Providence, RI: American Mathematical Society.

Duchon, D., & Ashmos, D. (1999). The central role of sense making for managing small business as a complex adaptive system. *Journal of Business & Entrepreneurship*, 11(Special Issue), 61-76.

Dutton, J., & Webster, A. (1988). Patterns of interest around issues: The role of uncertainty and feasibility. *Academy of Management Journal*, 32(3), 543-576.

Favre, A., Guitton, H., Guitton, J., Lichnerowicz, A., & Wolff, E. (1995). *Chaos and determinism: Turbulence as a paradigm for complex systems converging toward final states*. (B.E. Schwarzbach, Trans.). London: The Johns Hopkins University Press.

Giddens, A. (1977). *Studies in social and political theory*. New York: Basic Books.

Gleick, J. (1987). *Chaos: Making a new science*. New York: Penguin.

Holy Bible, New American Standard Version. (1990). Grand Rapids, MI: Zondervan Publishing House.

Huff, A.S. (1990). *Mapping strategic thought*. New York: John Wiley & Sons.

Huff, A.S., & Schwenk, C. (1985, October). Bias and sense making in good times and bad. Paper presented at the Strategic Management Society, Barcelona, Spain.

- Law, W. (1955). *A serious call to a devout and holy life* (J. Meister, Ed.). Philadelphia, PA: Westminster John Knox Press. (Original work published 1728).
- Lee, A.S. (1991). Integrating positivist and interpretive approaches to organizational research. *Organization Science*, 2(4), 342-365.
- Levy, D. (1994). Chaos theory and strategy: Theory, application, and managerial implications. *Strategic Management Journal*, 15, 167-178.
- Lewin, R. (1992). *Complexity: Life at the edge of chaos*. New York: Macmillan.
- Lichtenstein, B.M.B. (1999). A dynamic model of non-linearity in entrepreneurship. *Journal of Business & Entrepreneurship*, 11(Special Issue), 27-43.
- Marion, R. (2001). Leadership in complex organizations. *The Leadership Quarterly*, 12, 389-418.
- McKenna, S.D. (1999). Maps of complexity and organizational learning. *The Journal of Management Development*, 18(9), 772-793.
- Morgan, G. (1997). *Images of organizations*. Thousand Oaks, CA: Sage Publications.
- Prigogine, I. (1996). *The end of certainty*. New York: Free Press.
- Ryken, L. (1979, October 19). The Puritan work ethic: The dignity of life's labors. *Christianity Today*, 15-19.
- Sherman, D.R. (1984). *Toward a Christian theology of work*. Unpublished doctoral dissertation, Dallas Theological Seminary, Texas.
- Stacey, R.D. (1995). The science of complexity: An alternative perspective for strategic change processes. *Strategic Management Journal*, 16(6), 477-495.
- Stubbart, C. (1989). Managerial cognition: A missing link in strategic management research. *Journal of Management Studies*, 26(4), 325-347.
- Stubbart, C., & Ramaprasad, A. (1988). Probing two chief executives' beliefs about the steel industry using cognitive maps. *Advances in Strategic Management*, 5, 139-164.
- Thietart, R.A., & Forgues, B. (1995). Chaos theory in organization. *Organization Science*, 6(1), 19-31.
- Waldorp, M.M. (1992). *Complexity: The emerging science at the edge of chaos*. New York, NY: Simon & Schuster.
- Walsh, J. (1995). Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science*, 6(3), 280-321.
- Weick, K.E. (1979). *The social psychology of organizing*. Reading, MA: Addison-Wesley.
- Weick, K.E. (1995). *Sense making in organizations*. Thousand Oaks, CA: Sage Publications.
- Wheatley, M. (1994). *Leadership and the new science*. San Francisco, CA: Berrett-Koehler.
- Willard, D. (1988). *The spirit of the disciplines*. San Francisco, CA: Harper Collins.
- Wingren, G. (1957). *Luther on vocation*. Philadelphia, PA: Muhlenberg Press.

