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Information Apprenticeship:

Integrating Faith and Learning in the Library

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ABSTRACT

Librarianship is built on information. As we proceed further into the 21st century, librarians need to understand the concept of “information” as it cannot be easily defined. This paper presents a brief overview of information theory and reviews several concepts proposed by non-librarians. Also, these ideas, when viewed from a Christian perspective can help our understanding of “information.” A review of related scriptures is also included.

Information. The term is ubiquitous. What does it mean? More importantly, of what value is it in librarianship? It would be a dereliction of duty if we as librarians do not have an understanding of it since “information” is our business. This is quite important today because we live in a self-described “information age,” yet, society does not seem to have a good understanding of what “information” is. Since libraries are in the “information business” we need to have a better understanding of the current situation. John Gantz, from EMC,¹ says this:

The digital universe in 2007 – at 2.25 x 1021 bits (281 exabytes or 281 billion gigabytes) – was 10% bigger than we thought. The resizing comes as a result of faster growth in cameras, digital TV shipments, and better understanding of information replication. By 2011, the digital universe will be 10 times the size it was in 2006 (John F. Gantz, Project Director, March 2008, p.2).²

That is an unbelievable estimation. If we have no real understanding of it, then how do we know we have it? Also, to what extent is there a place for God in librarianship and the information age? The author will not attempt to define it but will instead work through an understanding of several concepts of “information” leading readers ultimately to Christian understandings of it. Instead of defining information from a technical, statistical measurement, he posits that information is best described as a process unique to individual researchers. Also, it works best when researchers work cooperatively with God to create and shape “information” in a manner similar to how an apprentice craftsman works with the master in order to learn a trade.

General Overview

Bill Gates isn't the only person to blame for the “information age.” Dr. Claude Shannon should be included. Shannon was a mathematician and the pioneer of information-communication theory. He studied at the University of Michigan and earned a B.S. in Electrical Engineering and another B.S. in Mathematics. Later, at MIT, he graduated with a Master's degree in electrical engineering and Ph.D. in Mathematics. In 1938, he published a critical engineering paper that would ultimately transform the telephone industry. Many recognized the importance of his work and Bell Telephone hired him (1941-72). In 1949, Shannon and Dr. Warren Weaver published *The Mathematical Theory of Communication*, based on Shannon's 1938 paper. Today, many consider it the cornerstone of what is called “information theory” which outlines a definition of information based on statistical measurements. The first part presents Shannon's statistics followed by Weaver's comments. Weaver condenses Shannon's formulae into three components:

1. Technical (“Did you hear me?”),
2. Semantic (“Did you understand me?”), and
3. Behavioral (“What will you do?”)
(Shannon and Weaver, 1949)

Others since have developed newer insights into “information.” Interestingly, a general database search of information theory would show that other disciplines apply Shannon's theory, e.g., electrical engineering, biology, genetics, physics, neurobiology, and economics, etc. Indeed, the implications of Shannon's work are far-reaching. Since many believe that a common definition of “information” is unobtainable, non-librarians are developing new ways of understanding information that can benefit our profession. One viewpoint posits the social construction of information, which is a human “production.”³

3 Constructivism describes the usefulness of information, which is defined and constructed by individuals.

Peer Reviewed

¹ The EMC Corporation deals primarily with information lifecycle management.

² The Diverse and Exploding Digital Universe: An Updated Forecast of Worldwide Information Growth Through 2011, March 2008 (<http://www.emc.com/collateral/analyst-reports/diverse-exploding-digital-universe.pdf>).

Dr. Brenda Dervin, professor in the Department of Communications at Ohio State University, for instance, has developed her sense-making theory that deals more with a variation on Shannon's second point – semantics and understanding (Dervin, 1999).⁴ She sees many synonyms for the term "information" (data, knowledge, fact, song, theory, or metaphor) but whatever term is used, "information" has always been designed (Dervin 1999, pp. 36, 50).⁵

In her 1999 tome, she believes that humans walk a fine line alternating between order reality and a state of chaos where information cannot be designed or organized. It is that fine line between order and chaos that determines reality for humans and leads her to the conclusion that, "By assuming ontological chaos as well as order, we force ourselves to understand that it may be more powerful to conceptualize human beings not as information seeking and finding, but as information designing" (Dervin 1999, p.40,41).

Dervin believes that most people have a traditional information paradigm in which information is considered external to one's self (Morris 1994, p. 21). In other words, a patron can go to the library and locate one resource to which he can go and get all of the information that he needs regarding his question or query. It is loosely comparable with going to the grocery store to purchase a gallon of milk.

Dervin, however, doesn't believe it is that simple. You may have heard the phrase "space-time continuum" from *Star Trek* or the *Back to the Future* movie series (Dervin 1999, pp.37, 45). She believes the continuum (i.e., one's journey through time) impacts your searching, gathering, and interpretation (Savolainen,

2006, p. 1118ff). Your search process is dynamic but encompasses all of your life experiences, education, beliefs, etc.; therefore, your search methods will change daily. A helpful image is that of berry-picking.

The picker finds ripe or useful berries and plucks them one-by-one to add to the basket. One author puts it this way:

With each different conception of the problem (query) the searcher can identify useful information. Creating one final retrieval set does not solve the problem, but by retrieving bits of information in a series of stages, the process as well as the interim results solve it ... the berries are scattered on bushes; they do not come in bunches" (Ottaviani 1994, p.264).

Ottaviani reminds us that researching involves persistent "digi-hunting" and "digi-gathering." Also, the resources that actually are not relevant to one's search may, indeed, be relevant to the search process and point us in new directions (Ottaviani 1994, p.265) and also serves to fill in our knowledge gaps (Dervin 1999, p.44-47) which occur in time. False hits may yield, for instance, new clues such as useful search terms, subject headings, author recognition, etc. which one can use to refine our search.⁶

Sense-making means that the information seeker is the one who is actively involved in the construction of information. Dervin does not consider information as some external "thing" (Morris 1994, p.21). This segues to another viewpoint to aid our understanding as espoused by Michael Buckland. Buckland sees three principal uses of "information:" 1) information as process, 2) information as knowledge, and 3) information as thing (Buckland, 1991, p. 351). He contends that the evolution of language only adds to the confusion since the average patron who sees books, databases, etc. as "information"

To what extent is there a place for God in librarianship and the information age?

4 An excellent summation of Dervin's work can also be found in Reijo Savolainen's article "Information use as gap-bridging: The viewpoint of sense-making methodology" in the June 2006 issue of *Journal of the American Society for Information Science & Technology* (57(8), 1116-1125).

5 It is interesting to note that C.J. Dippel considers the term "revelation" as a much richer term than "information." See P. van Jijk's article "Revelation and Information" listed in the bibliography and Appendix A.

6 See also Marcia Bates article entitled "The Design of Browsing and Berry-picking for the Online Search Interface." *Online Review*, 1989, vol. 13, no. 5, pp. 407-424. It is available online at <http://www.gseis.ucla.edu/faculty/bates/berrypicking.html>. Accessed: 28 July 2008.

...the individual's own personality, creativity, and life experiences contribute to not only what information is produced but any 'information' that is found.

(Buckland, 1991, p.352).⁷ In sum, Buckland sees anything that is informative as a thing such as stones, brooks, and trees (to scientists), film, databases, and events (Buckland, 1991, p.352-354, 359).

Buckland's view attempts to preserve an "objective" character to "data." There must be "objective" things (i.e., information) which exists independently of the information searcher in order to act upon the information altogether. While Buckland sees an independent world, Dervin sees a world in a specific moment in time. She argues that the moment a "searcher" is involved, information is inextricably tied to a perspective ("information" as the search sees it"). Buckland says, "Human beings do things *with* it or *to* it." It is interesting to note that, theologically speaking, all information (as life itself) emanates from God who is external to our universe.⁸ Does God not interact with us as much as we interact with information?

Dervin disagrees (Morris 1994, p.27). Information is something the seeker designs (gives shape to) on a daily moment-by-moment basis. Buckland tends to lean toward Ottaviani's position regarding berry-picking in terms of information gathering. While Dervin sees information as something processed based upon a person's life history, classroom experiences, and other beliefs including religion. Together, these combine to "give shape" to research just a human potter gives shape to a lump of clay. So, according to Dervin, the individual's own personality, creativity, and life experiences contribute to not only what information is produced but any

⁷ See also Buckland's article entitled "What is a document?" (It is accessible at <http://www.egi.ua.pt/cursos/files/RI/What%20is%20a%20document.pdf>. Accessed 19 May 2009.) Buckland points to the works of Paul Otlet (1864-1944) and discusses Otlet's belief that a "document" could include non-textual resources. Otlet believed that any expression of human thought qualifies as a document. Film and photography were early examples but Otlet even supports the notion of a sculpture as a document.

⁸ See also P. van Dijk's article, "Revelation and Information" who sees God as the "keeper of all information" (p. 92) and whose creation "exists by and in information." In Dippel's opinion, if "God refuses to provide information this world will fall apart."

'information' that is found. One's life beliefs or experiences always affect what one sees or finds. For instance, if you read a controversial book or view a web site, you might view it as such because of your pre-established beliefs or experiences, and hence, you might distrust the views presented. In other words, for Dervin, in any encounter, you always give meaning to the information based on the totality of your being. There are never any isolated, objective facts/data independent of my own self.

For Dervin, it is not a matter of finding one "right" answer to your question nor is it a matter of simply going to a single, all-encompassing source (Morris 1994, p.27). Information is something the seeker shapes on a daily moment-by-moment basis. Once information is gathered, it is processed based upon that individual's life history, education, and religious beliefs. Together, these help give shape to your research just a human potter gives shape to a lump of clay. The result is a creation based upon an individual's God-given personality and creativity. You give meaning to the information based on the totality of your being.

To rephrase Weaver's behavioral question – so what? Why is it important to have a working understanding of information in the 21st century? As a society, we don't pay attention to the information given to us and we often fail to corroborate it. In addition, we tend to avoid thinking for ourselves. In his famous essay *What Is Enlightenment?*, Immanuel Kant says exactly that. Kant says, "If I have a book to serve as my understanding, a pastor to serve as my conscience, a physician to determine my diet for me, and so on, I need not exert myself at all. I need not think, if only I can pay: others will readily undertake the irksome work for me" (Kant, 1784). Kant wrote this over two hundred years ago and yet this is so prevalent today! In his thought-provoking book, *The Global Achievement Gap*, Tony Wagner contends that the educational system has failed American students because they have not been taught how to think (Wagner 2008). Such is the current state of education: memory and regurgitation (Wagner, p. xxiv). Wagner

believes that critical thinking is not taught yet is vital to the survival of 21st century students who live in a much smaller (i.e., global) world. “Information” plays a large part of developing those skills.

An interesting contrast to Dervin’s sense-making theory is Complexity Theory. Paul Cilliers posits “a complex system is not constituted merely by the sum of its components, but also by the intricate *relationships* between these components” (Cilliers, p.2). It is complex because each individual system has a “life of its own” and yet interacts with other similar entities. It is constantly in a dynamic, changing environment. Small changes in one component could yield great changes in another. It is interesting to note that Cilliers and Dervin agree on the need for adaptability (Cilliers, p.12; Dervin, p.41).⁹ Given the complexities of human thinking and understanding, human use and development of information, the dynamic nature of language, and the role of language in the creation of information, it may be that complexity theory may hold a better model for understanding the nature of information.

Information in Scriptures

Given these theories above, we have the “raw materials” for librarians to create our own artistry and blend our faith with our profession. For librarians, a foundational part of understanding the term “information” begins with basic grammar. According to the *Oxford English Dictionary (OED)*, the root of term “information” is the verb “to inform”. *OED* defines “inform” as: “to give form to, to put into form or shape” (*OED, v. VII, p.942*). This definition brings to mind the image of our Creator bringing shape to a formless and empty earth in Genesis 1.¹⁰ Perhaps we should also consider the imagery of the potter and the clay in Jeremiah 18 as God Himself gives shape to the clay into nations (in this context) or, our

very lives. With the help of the Holy Spirit in the research process, we are the “shapers”, if you will, of information. In a sense, we become information “apprentices” working alongside of God Himself. Nancarrow seems to support this perspective. He sees Proverbs 8:22-36 paralleling Genesis 1 with God as the source of creation while Wisdom is the “master worker” (Nancarrow 1997, p.59). He sees Wisdom not only as a “fashioner” of everything in the world but also as a teacher and shaper of the soul (Nancarrow 1997, p. 61).

In the New Testament, it is fascinating that God chose the term “Word” to describe Himself in John 1:1. God communicates with us through His Son and His Word. In 1:14, John says “and the Word became flesh, and dwelt among us, and we beheld His glory, the glory as of the only begotten of the Father, full of grace and truth.” The Word was sent (1:1), the Word dwelt (tabernacled, pitched His tent with us) among us (1:14), and the Word was received (1:14). The Word was not understood until He came to us in the flesh. Then He could clarify and explain Himself to us. In 16:13, John continues saying, “when He, the Spirit of truth, has come, He will guide you into all truth; for He will not speak on His own authority, but whatever He hears He will speak; and He will tell you things to come.” This reminds us that God is the author of all truth and all information.

Information must be evaluated against truth. Jesus Christ is the ultimate embodied truth and the Bible is the written, inspired Word to communicate with us more clearly with us. The question of truth suggests a re-training of the mind and bringing it under Lordship of Christ so information can be evaluated for its truthfulness. As one proceeds through the Gospels, Jesus suggests that our thinking processes are in need of re-focusing on His preeminence. For instance, Jesus states that He did not come to eradicate the teachings of the Torah (Matt. 5:17). A pointed example of this is when Jesus questions the traditions (hand-washing) of the Pharisees in Matthew 15:1ff.

⁹ Cilliers uses terms such as adaptability, coping with change, and self-organization. Dervin uses terms such as sense-making, information designing, overcoming gaps, and factizing (Dervin, p.41).

¹⁰ See Appendix A for more information.

Our belief in God and our obedience to the scriptures helps us to give shape to the information we seek and use.

In Acts 17:11, we have the example of the ancient precursors to Kant – the Bereans. They examined everything that Paul said. They wanted to verify that Paul gave the correct “shape” to the scriptures. If we do not verify or test the information we receive or process, then we become vulnerable to acting on or spreading misinformation. We can also misuse information by taking it out of context (accidentally or deliberately). How often today have we heard scientists or pastors pull information (statistical or hermeneutical) out of context merely to prove a point? How often have we seen students plagiarize? Brody suggests that information providers including reporters, intelligence operators, as well as database providers are as prone to information naïveté as the average person.¹¹ To prove the point, a Wikipedia editor deliberately inserted a false quote on Wikipedia in the summer of 2009 testing how reporters used Wikipedia.¹² Some reporters published the quote without corroborating it and the quote slipped into several major publications prompting Wikipedia to develop WikiTrust (a color-coded truth checker). Ultimately, information may or may not be put into a proper “form” (as defined by *OED*); therefore, information can be both used and abused and must be verified.

Continuing through the epistles, Paul makes several key points about our minds and thinking. First, in Romans 12:1-2, Paul calls us to renew our minds. He also says more to the point that 1) our words can be overshadowed by the power of the Holy Spirit, 2) all knowledge and wisdom come from God, and 3) we can evaluate and judge all things with God’s knowledge because His Spirit resides in us (I Corinthians 2:1-15). Paul continues in II Corinthians 10:4-5 making his strongest case encouraging us to do battle with any piece of information that comes into our mind against the Kingdom of God. The question

11 Brody (2008) defines information naïveté as “the belief held by an individual or a group that information designed, created, obtained, or stored is comprehensive and where this belief is without a grounding or understanding of the situation of that information within its own contexts.”

12 For more see <http://www.findingdulcinea.com/news/technology/2009/sep/Will-Color-Coding-Wikipedia-Make-It-a-Trustworthy-Source.html>.

is that of implementation in our personal and professional lives. Given Dervin’s sense-making principles, perhaps our relationship with Christ is our information system for those of us who follow Jesus Christ. Our belief in God and our obedience to the scriptures helps us to give shape to the information we seek and use.

Christian Theory of Information

Dr. Werner Gitt has a unique Christian view of information that can benefit librarians. Gitt is the retired director and professor at the German Federal Institute of Physics and Technology and was the Head of the Department of Information Technology. Gitt believes that information is at the root of all activities of living organisms (Gitt, p. 12). This is true from biological perspective but it can also be true from a human (social) perspective as well. Humans need information for our daily tasks.

Gitt suggests that information has qualitative properties that are very similar to those proposed by Shannon. According to Gitt’s proposal, the sender sends a signal and man receives it processing it through several layers included syntax, semantics, pragmatics, and, what Gitt calls “apobetics”.¹³

Gitt goes into much more detail in his book. It is well worth reading. In both cases, the technical and syntax levels are primarily related to statistics to which Gitt does not ascribe much value. Gitt’s level two and three correlate closely with that of Shannon; however, Shannon does not include a fourth level – apobetics. It may be that Shannon did not include apobetics in his elements because this would have merely been a measure of statistical success; i.e., if the message was received without errors, then the transmission was successful.¹⁴ Let’s compare Shannon & Weaver with Gitt’s properties and his Christian perspective of them along with how librarians can benefit from his thinking.

13 Gitt uses apobetics to conform to the other terms. He developed the term from the Greek apobeinon meaning result, success, or conclusion (Gitt, p.77).

14 The best biblical example for Gitt of his properties and successful information transfer is Acts 8:26-39, the story of Philip and the Ethiopian (p.152).

Sender:

God who sends his message in a multitude of ways
(see Ex. 19:19; Matt. 3:17; Ex. 31:18; Heb. 1:1-2, 2:2; Ezek. 1:1; Acts 1:2; II Tim. 3:16)

Signal:

Word of God



Recipient:

Man (NOTE: There is a barrier – scientific and spiritual between God and man.)

Table 1: Gitt’s Property Definitions (adapted from Gitt 2005, pp. 145-146). For Gitt’s Biblical support, see Chapter 14.

Shannon’s Elements	Gitt’s Property	Gitt’s Christian Application	Librarian Application Possibilities
Technical	Statistics	Storage purposes. Word Counts may be of use.	<ul style="list-style-type: none"> • Use of concordances.
	Syntax	God’s thought encoded in human language (Hebrew and Greek) which can be translated so that all will here (Acts 2:14; Matt. 24:14).	<ul style="list-style-type: none"> • Teaching dictionary and language skills. • Importance of language in search syntax. • Following local library’s cataloging rules based on AACR2. • Use and understanding of MARC headings • Demonstrating catalog records in library classes.
Semantic	Semantics	Basic biblical concepts can be understood. Matt.7:7, 13:15; Luke 24:25; 2 Cor. 1:13, 10:5; Ex. 4:21; Is. 6:9-10; Ezek. 2:4; Jn. 7:17; Is. 55:8-9.	<ul style="list-style-type: none"> • Teaching reference resources to understand basic subject concepts. • Web evaluation skills
Behavioral	Pragmatics	The goal of information in the Bible is to move people to action . See Deut. 32:46-47; Matt. 7:24, 25:31-46; Luke 19:13,17,22; James 1:22, 4:17; Rev. 20:12	<ul style="list-style-type: none"> • Working knowledge of various types of data creation software (MS Office, etc.), • Knowledge of rhetoric databases (Opposing Viewpoints, e.g.)
	Apobetics	From the sender’s perspective, information transfer is successful when the purpose intended for the recipient has been achieved. See John 5:24. God’s objectives for the Bible: a) Defining who God is (Rom. 1:20, 6:23; Is. 6:3, 45:5; I Jn. 4:16, 5:20) b) Defining who man is c) Creation was purposeful: Gen. 1-2; Col.1:16. d) Manual of instructions for life: Prov. 2:7; Is. 40:31; Matt. 11:28; Jer. 31:3; Ps. 119:9. e) Signpost to heaven: Ezek. 33:11; Rom 3:25, 10:13; Jn. 1:12; 5:24; Tit. 3:7.	<ul style="list-style-type: none"> • Keeping various library statistics to determine success or progress, • Instruction classes • Giving post-tests following library training, • Clarifying and defining role of librarians and researchers.

What will you do with information that challenges your research or your faith?

Other Practical Considerations

Today, the frontline of library work and responsibility is the library's interface with its constituents. This could be an interview at the reference desk or information via the library's web pages. Library philosophy for the past one hundred years has been to teach patrons to be self-sufficient in their research; however, thanks to the convenience of the open Internet, but too many believe they are "researchers".¹⁵ Most fail to realize that research is a dynamic process and will likely be in a state of perpetual change. Reference desk interviews should remind us that patrons are the most important part of the research process. Morris states,

(sense-making) regards the user not as a passive receiver of external information but as the center in an active, on-going process of change; information triggers perceptual changes in the user, and changes in the user alter how the information is perceived (Morris, p.22).

In addition, there is the matter of teaching evaluative techniques (e.g., analyzing citations and web sites). Given Shannon & Weaver, Dervin, and Gitt's theories, librarians can easily overlook the value of God's guiding hand in the research process. It seems conceivable that God's involvement in this research process depends on our relationship to Him.

It is most difficult for a researcher to understand these issues. Understanding search dynamics is one thing but it is impossible to corroborate *every* fact. The average person could not do this. For graduates, we can hope that they realize the significance of ethical issues surrounding research as they enter the job market.¹⁶ After graduation, homework becomes reports that can be considered research.

In addition, Morris points out that information bombards us daily and we are driven to make quick decisions "based on the most likely

interpretation of incomplete information". Further, "when we act with incomplete information, even using our best guess as to what is most likely, what we gain in speed we sometimes lose in accuracy" (Morris, p.28). The combination of hasty decisions coupled with incomplete information can help to generate additional misinformation that causes poor information quality as well as lead to poor decision-making (Brody, 2008).

Once that definition or philosophy is developed, it becomes helpful to think of ourselves individually as information "apprentices" (with God) who are the key part of any successful search, discovery, and evaluation process. The researcher shapes the information discovered. The information found – however useful or useless – is directly related to the search preparation, including,

- well-constructed search queries,
- unique synonyms for the key words in the query, and
- spelling and language variations.

Once relevant information has been located and evaluated, the information must be used in proper context. Someone observed that the issue now becomes the "context in which we use items of information versus their intended purpose of the information".¹⁷ The word "their" presumably refers to the original creators of the information. Will we take that information out of context merely to prove a point rather than keeping it in its original context? What will you do with information that challenges your research or your faith? How will we shape the information we discover? How will it be used? It is a deliberate process that needs careful development from beginning to end and needs the oversight of a Master.

Conclusion

Just as it is critical for us to develop a working understanding of information in our profession, we need to realize the implications

¹⁵ "Open Internet" meaning Google, Wikipedia, and web sites free for everyone's use. This does not include the "closed Internet" including databases and specialized resources to which the library subscribes.

¹⁶ See Appendix B for more.

¹⁷ The source of this quotation cannot be located at this time.

of this for our faith. As the student becomes our apprentice and learns research skills, we become apprentices of God as we apply these same principles in our lives and profession as believers.

These principles do not develop in a vacuum but develop in the life of every individual (including our students) every day. We also are responsible to God to help “shape” our students as we seek to teach them His ways. Teach them Philippians 4:8 which says,

finally whatever things are true, whatever things are noble, whatever things are just, whatever things are pure, whatever things are lovely, whatever things are of good report, if there is any virtue and if there is anything praiseworthy – meditate on these things.

Again, suggests a re-training of the mind. Notice that truth is first. Sometimes we can't discern the truth because we are speeding through our research or our Bible study and cannot hear God speak.¹⁸ We are bombarded with information and driven to make quick decisions “based on the most likely interpretation of incomplete information” so we cannot do God's will.¹⁹ Recall Morris's statement about acting too quickly with incomplete information only to lose accuracy. This, too, would help avoid creating additional misinformation in research.

Based on the idea of mental re-training and an understanding of information coupled with Dervin's sense-making theory, it could be posited that God and His followers (whether they be librarians, students, or individuals), shape information in such a way to reveal more of Himself to us which serves to deepen our relationship with Him and teach us more about Himself (e.g., His character and His ways). This is in keeping with Gitt's suggestion of apobetics. Dr. Stephen Olford, pastor and professor, says, “The Lord gives wisdom

[Proverbs 2:6] in order to reveal Himself to us” (Olford, 2001, p. 12). “Information” is a step toward gaining wisdom and helping us better understand our Creator and how we should act on His behalf. Colossians 1:15-18 seems to support this as Paul states:

15 He is the image of the invisible God, the firstborn over all creation. 16 For by Him all things were created that are in heaven and that are on earth, visible and invisible, whether thrones or dominions or principalities or powers. All things were created through Him and for Him. 17 And He is before all things, and in Him all things consist. 18 And He is the head of the body, the church, who is the beginning, the firstborn from the dead, that in all things He may have the preeminence. (NKJV)

If Christ is indeed preeminent over all things, then He is Lord over information, its users, as well how information is used.

Hopefully, this discussion has led you to reshape the nature of “information” and what should be your role, attitudes, and actions might be regarding the ever-changing field of research and library science. As we progress farther into the twenty-first century, the Scriptures have a very appropriate word for us. As David gathered his army to fight against King Saul, the writer of I Chronicles discusses the “men of Issachar (in 12:32), who understood the times and knew what Israel should do.” Should we not do the same?

Oswald Chambers summarizes this discussion quite nicely with his devotional thought from April 7th in his book, *My Utmost for His Highest*. He has several poignant comments for us:

- “In fact, you were not able to understand them (Jesus's words) before because you had not yet developed the proper spiritual condition to deal with them.” (Chambers later refers to John 16:12.)
- “God cannot reveal anything to us if we don't have His Spirit.” (Chambers, 1935, 1963)

18 It is interesting to note that this point relates to Shannon's first point in his theory (the technical aspect). In this case, did we hear God?

19 This would seem to relate to Shannon's third point (behavioral aspect). In this case, what are we going to do about the information we have from God?

*If Christ is indeed
preeminent over
all things, then
He is Lord over
information, its
users, as well how
information is used.*

As you do your research, give your
“information” to God to see how He can
shape your research (and your life) as we all
daily seek to conform to His image. As the
hymn states,

Have Thine own way, Lord, have Thine
own way,
Thou art the potter, I am the clay.
Mold me and make me after Thy will,
While I am waiting, yielded and still.²⁰ †

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²⁰ “Have Thine Own Way, Lord,” text by Adelaide A. Pollard.

Appendix A

Chaos theory is a tangentially related to information theory. Though its roots go back to the 1800s, Edward Lorenz popularized what we now know as chaos theory. Lorenz was doing computer weather modeling in the 1960s and discovered that small changes to various weather variables can make big differences (a.k.a. “the butterfly effect”). This can give the appearance of randomness. In library research, the same is true. Small changes in search variables or methods or can also lead to big swing in the number and quality of results. This can even be true in seemingly simplistic systems.

Hutchingson asks, “What is the source and nature of the chaos on the first day of creation and where does it go after the sixth day?” He posits that “chaos” serving as “infinite variety” for God. Bonting seems to agree as he states, “the positive aspect of chaos allows the Creator freedom and creativity” (p.327). What is the nature of this chaos or “formless void” in Genesis 1:2? To what extent is this representative of all of life without God interjecting order? The spiritual context adds a different perspective to traditional chaos theory and its relationship to information theory. Also, it is interesting to note that Jews use the symbolism of the sea to represent chaos. A scriptural passage of particular interest is Jeremiah 4:23-26, which seems to be a reversal of Genesis 1 (a return to chaos) in reference to Judah’s impending destruction by Babylon. What does this text say about God and his relationship with chaos in light of Genesis 1?

Dippel opens the argument for entropy (uncertainty) by stating that the “introduction of information into a system means increasing order, decreasing uncertainties, and diminishing interpretation options.” He argues that accepting God’s revelation “limits our options and directs our actions.” This relates to Dervin’s statement that humans walk a fine line between chaos and order.

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Appendix B

As stated earlier, Tony Wagner believes that if America is to be competitive in the 21st century job market, educational curricula must include both critical thinking and information literacy. There is debate whether or not the two are actually one and the same. Whatever you choose to call it, businesses say they need students who are better equipped in library research skills. Businesses often use the catch phrase “knowledge management” and, for a time, some companies had a CKO (Chief Knowledge Officer) but interest in this seems to be waning. Articles describing the significance of research skills in post-graduate employment seem to be few although more research is needed. Sherman stated in 1996 that “many jobs focus on research.” Businesses seem to stress the need for good research skills yet seem unwilling to change their corporate practices to training their employees. Likewise, universities have not found a way stress the value of research beyond the collegiate years. This can be a wonderful opportunity for both public and academic libraries to reach their communities with helpful programming. This effort could be enhanced with a solid foundation of information theory.

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