

**THE EFFECTS OF MONEY, TIME AND PERSONAL DATA EXPENDITURES ON DOCUMENT
SELECTION: AN EXPERIMENTAL ASSESSMENT OF THE VALUE OF INFORMATION**

By

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ABSTRACT OF THE DISSERTATION

THE EFFECTS OF MONEY, TIME AND PERSONAL DATA EXPENDITURES ON DOCUMENT SELECTION: AN EXPERIMENTAL ASSESSMENT OF THE VALUE OF INFORMATION

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Purpose: This study seeks to provide a better understanding of how, and in what ways, consumers of digital information are willing to pay for, and thus express their finding of value in, general interest information.

Design/Methods/Approach: The study was designed as an experiment with a control group of 100 participants and three treatment groups of 100 participants each. All 400 participants were instructed to select documents from a standard set of ten documents on a general interest topic. Participants were randomly assigned to one of the four groups. The control group viewed all documents as free. The three treatment groups were required to expend money, time or personal data to select documents. The total number of documents selected was calculated for each participant. Quantitative analysis was conducted to assess whether and in what way the expenditures had an effect on the total number selected. Participants were also instructed to select what they considered to be the best document from the set of ten and to supply a short reason for their selection so that the impact of the expenditures on this selection could be analyzed.

Findings: 1) There was a significant difference in the mean number of documents selected by the four groups indicating that participants changed their selection patterns depending on the expenditure required. 2) There were no significant correlations between the mean

number of documents selected and consumer, demographic or research variables.

Consumer variables measured attitudes behavior relating to information and research variables provided participant assessment of the study. This indicates that the treatments were stronger than any tested individual attributes. 3) There were slight differences in the document selected as “best” by the four groups, and the reasons given for the selection of the best document varied slightly among treatment groups.

Value/Originality: A better understanding of how consumers value information and what they will exchange for it provides a significant benefit to both producers and consumers.

Using different expenditures to test how consumers may change their document selections provided a unique research setting. An interdisciplinary bridge between consumer behavior and human information behavior was enhanced.

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The completion of this degree is the culmination of a long held goal. I have had the support of many people for many years in its ultimate realization.

Special recognition for his role in facilitating this is my advisor Dr. Daniel O'Connor. His inspirational teaching of Collection Development while I was a student in the Masters' program all the way through to his recent guidance in the completion of Quantitative Research Methods in the Doctoral program were essential contributions in the completion of this journey. I consider him a mentor and a friend. The members of my Committee, Dr. Harty Mokros, Dr. Claire McInherney and Dr. James Matarazzo have also provided excellent feedback and maintained high academic standards which set and kept the effort going.

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I also deeply appreciate the contributions of those who helped in the production of this study by participating in the pilot study, providing data for intercoder reliability, giving suggestions for research questions and for proofreading. A pound of highly caffeinated coffee for each of you will represent a small measure of recognition for your efforts.

And finally, thanks to my wonderful family for all their love and encouragement. Deepest gratitude goes to my husband Allen for his patience with my sometimes wondering theoretical conversations about the definition and value of information and for his very concrete help with page numbers when most needed. My children, Matt and Abby, although perhaps wondering why I would undertake such an adventure, continue to be a constant source of joy and amazement as they set and achieve their own goals in the world. My sister Judy, brother Russ, sister-in-law Marty and brother-in-law Chuck and all my treasured nieces provided the needed mental and emotional sustenance along with the vital gift of laughter that makes our shared journey so fulfilling.

I end by dedicating this work to Helen and Frank Wolf, much loved parents and grandparents, as their belief in the value of education and their love for each other and for us, continues to set the tone for our entire family today and as we continue into the future.

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Chapter 1 Introduction

1.1 Problem Statement

“On the one hand information wants to be expensive, because it’s so valuable. The right information in the right place just changes your life. On the other hand, information wants to be free...So you have these two fighting against each other.” (Attributed to Futurist Stewart Brand, 1984)

Brand’s iconic statement has continued to resonate and to manifest itself in a multitude of ways in recent decades, yet our understanding of the value of information continues to remain remarkably opaque. As the ubiquity of free information on the Internet has disrupted traditional distribution models, those providing information to consumers, including content creators, publishers and librarians, have increasingly struggled with how to successfully express the value of the information and information products they supply. The nexus where the desire of information to be free meets its desire to be expensive is the setting for this research.

Nicholas, Huntington, Williams & Dombrowski (2006) claim that the digital environment has brought about fundamental changes in information behavior and that these have caused the creation a digital information consumer who differs in several ways from information consumers of the past. They state that the searching patterns of digital information consumers are shallow, that they show a lack of loyalty to sources and that they typically use a searching behavior which is wide and varied. They also note that digital consumers are also far less predictable than the users who once inhabited the libraries of the 1980s and 1990s. These changes in behavior have had an impact on suppliers. Empirical studies looking at consumers’ behavior as it relates to a willingness to pay for online news and information (e.g. Donatello, 2002; and Dou, 2004) have shown that consumers are generally quite unwilling to express the value they see in information by using financial resources, the traditional mode of exchange between parties, as an exchange

mechanism for it. These studies support the concept that consumers have been conditioned to expect free information and that such a mentality is difficult to dislodge. The financial realities of organizations publishing newspapers and magazines reflect the changes. A 2014 Pew Research Journalism Report stated that newspaper print advertising is now “just 41% of what it was in 2006”, that newsroom staffs continue to decline and that the drop in the value of newspapers themselves is heavily impacted by recent sale prices. Pew notes that The New York Times Company accepted an offer for \$70 million from the Boston Red Sox’s principal owner to buy The Boston Globe – a 95% decline in value from when The New York Times first bought the Globe in 1993 for \$1.1 billion. Navasky & Lerner (2010) in a comprehensive report for the *Columbia Journalism Review* found that only about 30% of magazine websites were profitable: unprofitable enterprises cannot be long sustained in a competitive environment such as magazine publishing.

Explanation of this dramatic situation involves historical trends and technological shifts that are complex and multi-faceted. One of the primary factors involved is the emergence of accessible, participatory content production platforms that have provided agency to millions of unpaid content creators including bloggers, micro-bloggers and encyclopedia editors. Changing social norms have had equal impact on the acceleration of the identified trend towards the democratization of information that arguably began before Guttenberg’s development of the moveable type press in the mid-15th century. This democratization has in turn caused what Dede (2008) has identified as a “seismic” shift in epistemology. Dede (p. 81) claims that the current epistemological shift departs from the classic view of knowledge, which depended on trained authorities, and focusses on a co- construction of knowledge by communities of contributors.

A second critical factor involved in distribution of the traditional model is the near zero cost of content reproduction facilitated by the descendants of Guttenberg’s press as embodied by the millions of computers connected to the Internet and able to communicate and share in a world without political or temporal boundaries. This has resulted in what Samuelson & Nordhaus

(2001) have discussed as the inappropriability of information as producers cannot fully appropriate for themselves the benefits that their productions create. Protective measures created within the legal system, such as copyrights and patents, are efforts to reduce inappropriability, yet these are also under pressure from multiple spheres in the contemporary information environment.

A third factor providing barriers to the reification of value as it relates to information is accessibility provided by the 21st century distribution platform. The ease with which consumers in all domains can access information calls into play the Principle of Least Effort. Bierbaum (1990) claims that this principle underlies much of library and information science and that it explains varied phenomena including library staff resistance to many automated systems, the rapid acceptance of CD-ROM technology as it replaced microfilm and the reliance of scientists on their colleagues rather than professional colleagues to satisfy information needs. One could easily extend Bierbaum's examples to the use of web search engines over the use of traditional resources. There is less effort involved in accessing free information on the Web than in almost any other scenario that can be depicted in a traditional library or information retrieval setting which makes it easily understood how accessibility is able to play such a primary role in the information behavior of today's consumers.

Publishers have attempted to react to the changes in user behavior and to the technology but the balance has clearly shifted towards the information consumer as shown in Figure 1. The authoritative content that was providing the value in their offerings is not given sufficient weight in the balance and publishers are seeking ways to remediate this.

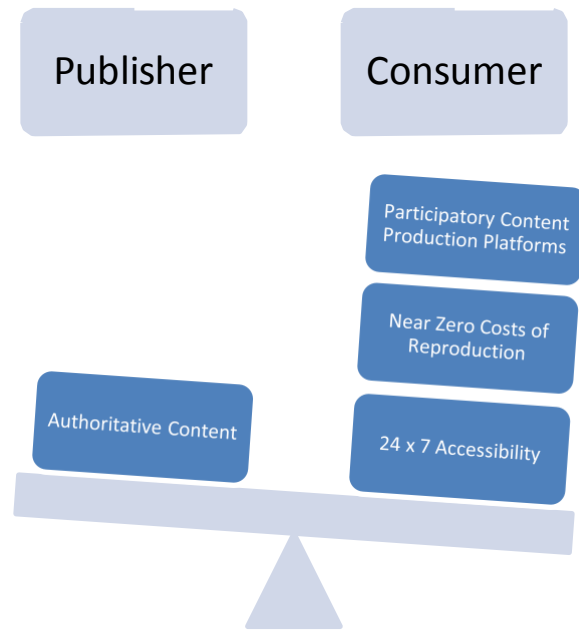


Figure 1 Current Exchange between Traditional Information Producer and Consumer

1.2 Research Direction

Despite the current market chaos in the public sphere, both producers and consumers know intrinsically that “right information in the right place” does have value. This can be quantified to a degree in the ever expanding number of Internet searches and users. Statistic Brain (2015) reports that in 2014, there were approximately 2,095,100,000,000 Google searches done with an average of 5,740,000,000 per day so it appears empirically impossible to conclude that consumers are not finding value in the information to which Google points them. With consumers often unwilling to express value in monetary terms, producers have sought other means that consumers may use to express value. That is the direction of this research.

Information producers are searching for relationships with consumers that can fairly represent the value given by the information provided and the value received by the consumer for that same information in the marketplace. A primary tenant of classical economics is that consumers and producers meet in the market to buy and sell and that the “invisible hand” as

conceived by 18th century economist Adam Smith pushes the market price to equilibrium.

Publisher expenditures include salaries, materials and distribution systems among many other inputs. Publishers must maintain profitability in order to satisfy obligations to shareholders and make investments into infrastructure for future growth. Customer needs include relevant, authoritative and easy to access information at a fair price among other related considerations. Consumers must feel they are receiving fair value for the price they pay but, as Nicholas et al (2006) have found that today's digital consumers are also far less loyal now than in the past which may make it more difficult for a publisher to retain them.

The advent of the Internet and the new digital model have disrupted much of the marketplace balance that previously existed between publisher and information consumer. This has caused some of the systemic organizational problems outlined in Section 1.1 and caused producers to seek additional exchange mechanisms to stabilize the marketplace balance. This study examines some of these mechanisms, including requiring consumers to use money, time and personal data as expenditures to obtain information.

1.3 Theoretical Framework

This study is fundamentally one of human information behavior, specifically document selection. It builds on an evolutionary theory of human information behavior. Spink & Currier (2006) have attempted to build a strong case for the use of an evolutionary lens and noted that "Information has chiefly been conceptualized as a secondary need...not a primary need like that of food or shelter. An evolutionary approach may support the elevation of information as a primary need." (p. 28). This conceptualization is related to Bates' berrypicking theory (1989) and the related information foraging theory of Pirolli & Card (1999). These theories are based on an evolutionary framework to understand information behavior and depict information consumers in a natural environment, one which Bates likens to picking berries in various patches in a forest and Pirolli and Card call "the information patch". (p. 2). This study draws on this theoretical

foundation and seeks to better understand what causes certain documents to be selected or rejected by providing an experimental situation that is as close to a real world setting as possible. In this environment, consumers react to the items in the patch by evaluating their desirable qualities but also face barriers to picking them in the form of expenditures that they may be required to spend in order for them to select the desired fruits.

Figure 2 is Bates' Berrypicking model as depicted in her 1989 work. The black line illustrates the path of the consumer through the patches with the queries represented by number, documents collected represented by the pages outside the queries and "T" representing thought that the consumer put into the search process at various points.

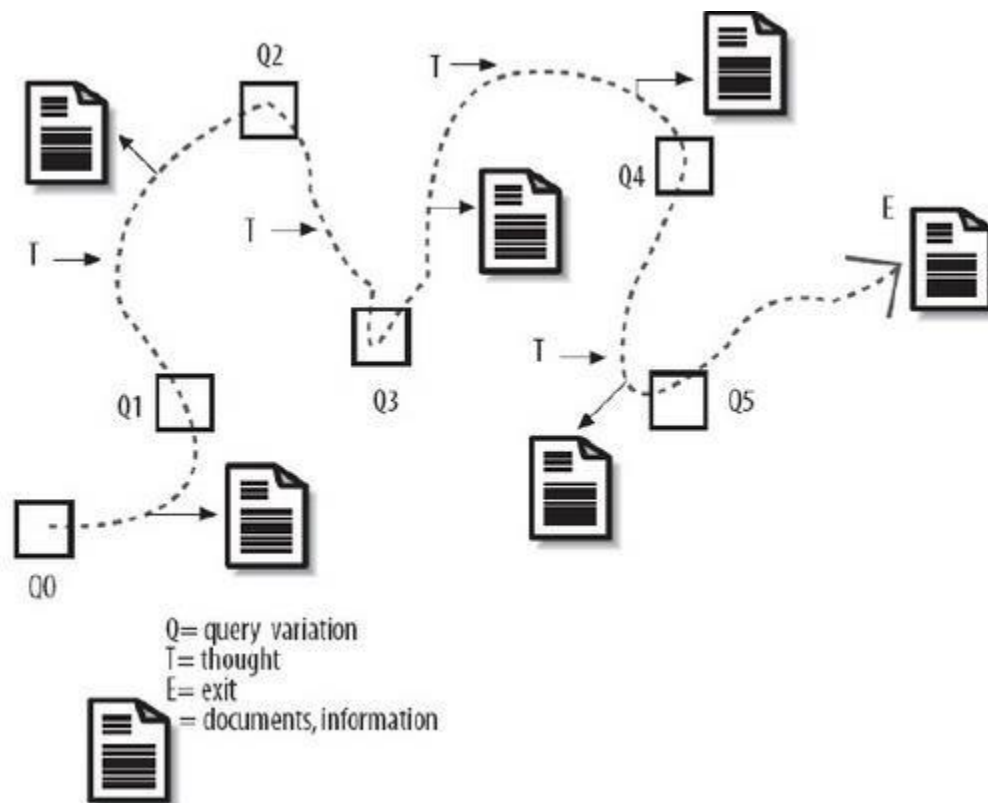


Figure 2 Bates' Berry-picking Model (1989)

From <http://www.gseis.ucla.edu/faculty/bates/berrypicking.html>

Figure 3 is a version of Bates' 1989 model with the concepts being tested in this study added to it. The black line illustrates the path of the consumer through the patches but in this version patches have been modified to show that expenditures are required to select documents from a patch and to reflect what individuals may encounter in the online world of 2015. Consumers continue to collect documents but the number and type may be influenced by the expenditure.

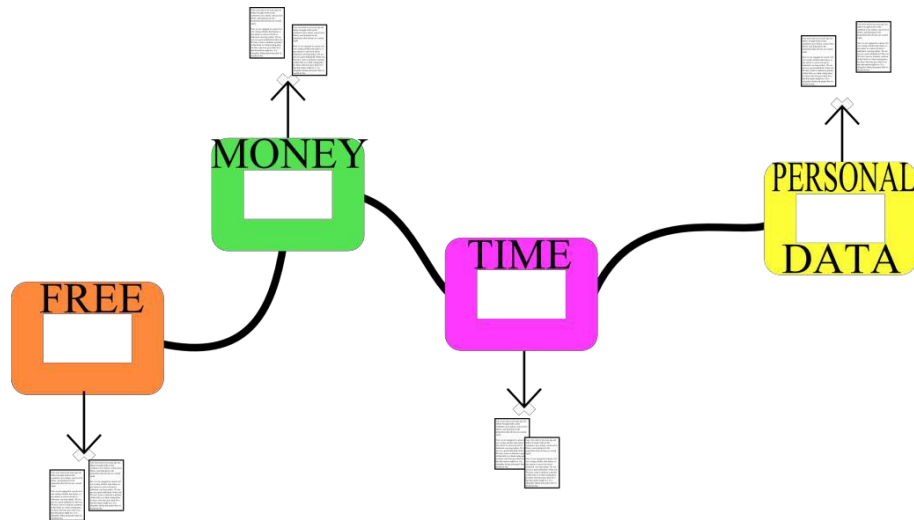


Figure 3 Bates' Model Revised by Author for Information Consumer Facing Document Sets With Expenditures (2015)

1.4 Research Questions

The present study seeks to understand how the requirement that consumers expend time, money and personal data impacts their information behavior, specifically their document selection behavior. The following issues and corresponding research questions provide the structure for soliciting the data needed to better understand the problem.

Issue One: As consumers have increasingly subscribed to Brand's assertion that "information wants to be free", their behavior and attitudes have changed. Publishers can no longer count on the same willingness to pay for information as in the past and they seek alternative ways to re-balance the market transaction. This issue results in Research Question 1, as follows:

RQ1 What impact on document selection behavior occurs when information consumers are faced with expenditures of money, time or personal data to select documents compared to document selection when all documents are free?

Issue Two: Individual consumers express wide variation in the ways in which they expend money, time and personal data to acquire both tangible and intangible items. From the spendthrift to the tightwad, the constantly time-pressed consumer to those with time to spare and from those expressing little concern or great worry about revealing personal data, it is possible that these individual differences may correlate to document selection behavior. This results in Research Question 2, as follows:

RQ2 Do consumer variables, including those measuring attitudes and behavior about money, time and privacy, impact document selection when the expenditures of money, time and personal data are placed on documents?

Issue Three: The ubiquity of information means that all individuals are touched by the changes in the information environment but the impact of personal characteristics may cause variation in the ways they react to it. Socioeconomic characteristics and status are known to have wide impacts on individual behavior. These conditions result in Research Question 3, as follows:

RQ3 Do demographic variables, including age, gender and educational level, impact document selection when the expenditures of money, time and personal data are placed on documents?

Issue Four: There is wide variety in the manner in which participants in a research study such as the one presented here may react to the research and how that attitude may affect the behavior they exhibit in document selection. This results in Research Question 4, as follows:

RQ4 Do the variables involved in assessment of the research study impact document selection when the expenditures of money, time and personal data are placed on documents?

Issue Five: It is known that consumers value certain documents more highly than others when viewing document sets but it is not known how different types of expenditures may impact that assessment. This results in Research Question 5, as follows:

RQ5 Does the selection of a “best document” from a document set vary when the expenditures of money, time and personal data are placed on documents?

Issue Six: Individual consumers may express a variety of reasons for selecting a best document from a document set but it is not known how different types of expenditures may impact those reasons. This results in Research Question 6, as follows:

RQ6 Does the reason individuals provide when asked to select one “best document” from a document set vary when the expenditures of money, time and personal data are placed on documents?

1.5 Objectives and Scope of the Study

This study is designed to provide a better understanding of how, and in what ways, consumers of digital information are willing to pay for, and so to express their finding of value in, general interest information in an experimental setting. It seeks to discover how different methods of payments, or expenditures by a consumer, will impact which documents and how many documents they select. The study views the digital information user as a consumer and attempts to bring together the scholarly perspectives of information behavior and consumer behavior. It employs a research setting designed to focus on the aspects of information that would categorize it as a commodity to be consumed in much the same way as a physical product is consumed.

The findings should prove useful and be of interest to all those involved in creating, disseminating and consuming information. It is recognized that there are other ways of

measuring consumer value in addition to those studied here; however, the three expenditures used were chosen primarily for their popularity, durability and ability to be measured. As the Internet continues on its seemingly inexorable course to become the dominant distributor of popular, scholarly and business information for individual consumers, academics and those in all types of corporations, there will be continuing efforts by publishers to better understand the new digital consumer and to seek the optimum path to recreate marketplace equilibrium. Brand's described "fight" between free and expensive.

Chapter 2 Literature Review

2.1 Introduction

This study seeks to gather data about information consumers' selection of documents from a defined set to better understand what they value in those documents given different expenditures required to acquire them. It builds on previous scholarly research from several areas. The inclusion of some popular articles from authoritative sources was required due to the nature of the research with its emphasis on current news and information and its dynamic nature.

The scholarly fields found in this literature review include Library and Information Science, Consumer Behavior, Economics, Decision Making and Philosophy. Several fundamental questions needed to be addressed using existing literature and research in order to frame this study including:

- What is information? What are some accepted definitions of information? Is information a commodity? It is a public or private good?
- What is value, specifically as it relates to the value of information?
- Which theories of human information behavior and decision making are most applicable to the behavior being studied?
- How does research about the economics of information and expenditures to acquire it, including money, time and personal data, inform this research?
- How do previous studies of document selection behavior and relevance inform this research? Which other factors inform document selection decisions?
- In what ways can consumer behavior studies inform information behavior as it relates to this research?
- What do empirical studies about information behavior on the Internet reveal about the direction of this research?

An examination of the definition of information and its characterization as a commodity is addressed in Section 2.1 along with a brief discussion of its status as a public or private good. A discussion of value in general and as it applies to information in specifics appears in Section 2.2. Literature on decision making as it intersects with relevant human information behavior theories is reviewed in Section 2.3. In Section 2.4 there is an examination of literature related to the economics of information and a look at different ways individuals may pay for it. A review of previous studies of document selection behavior and relevance and newer aspects of document selection inform this research appears in Section 2.5. The ways in which theories of consumer behavior may help elucidate information behavior and help to illuminate the behavior of this study's participants appears in Section 2.6. The final section of the literature review, Section 2.7, looks at empirical studies about information behavior, specifically on the Internet and outlines how this study builds on their work.

2.2 What is information? What are some accepted definitions of information?

Is information a commodity? It is a public or private good?

Despite the magnitude of information's importance in our current world, there is ongoing debate about what constitutes information. Schement (2001) reports that "the word English speakers recognize as 'information' has its origins in the Latin word *informare*...to shape, to form an idea of, or even to describe...that is, to inform" (p. 3). In that original definition, information appears to take the form of a verb, it *does* something. In many current definitions, information appears as a noun, it *is* something. These lead us to the current environment in which some scholars view information as "process" and some see it as "thing." Buckland (1991) added a third meaning which is information as "knowledge" by virtue of the fact it can reduce uncertainty.

Floridi (2010) states that "over the past decades, it has become common to adopt a General Definition of Information (GDI) in terms of data + meaning" (p. 20). This definition is related to the "information" or DIKW hierarchy, discussed in detail by Rowley (2007). Rowley

outlines the diverse origins of the hierarchy with particular emphasis on the contributions of organizational theorist R. Ackoff, educator M. Zeleny and engineer M. Cooley among others (p. 166). The hierarchy in its most basic form appears as below as Figure 4.



Figure 4 The DIKW Hierarchy

This research is concerned only with level two (information) of the hierarchy but level one (data) can help elucidate a definition that may prove useful. Floridi (2010) states that according to the GDI, information is created from “well formed data” (p. 21). From a linguistic interpretation, it would be easy to see how “well formed data” is indeed “in-formation” as in military troops properly aligned. Floridi expands that by stating that well formed “means that the data are rightly put together, according to the rules (syntax) that govern the chosen system, code or language being used” (p. 21). This definition seems to have a relationship to the concept of “patterns” (p. 5) as elaborated by Bates (2005). Bates cites a 1974 statement by Edwin Parker in which he stated that “Information is the pattern of organization of matter and energy” (p. 5). The search for patterns, which Bates places in an evolutionary framework, is very much the focus of much of data mining and other new types of analysis that seek to create information from data.

Floridi (2010) describes various types of information; with the types most relevant to this research being 1) mathematical and 2) semantic. Mathematical information is a direct

product of the work of mathematician and engineer Claude Shannon in trying to reduce the noise transmitted along with telephone messages in the 1940s. Shannon & Weaver published *The Mathematical Theory of Communication* in 1949 from which sprung information theory and, to a large degree, created the digital age. Shannon and Weaver (1949) presented the following as a model:

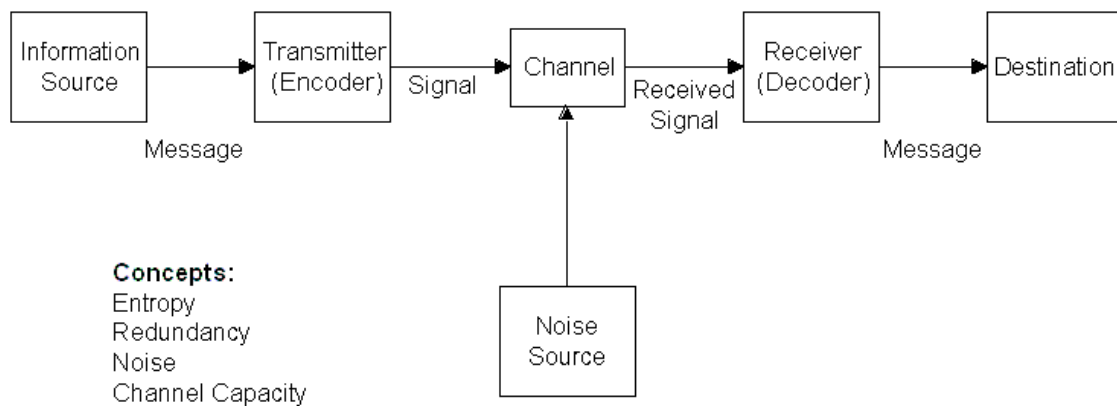


Figure 5 The Communication System (Shannon & Weaver, 1949)

Floridi notes that the Mathematical Theory of Communication (MTC) is concerned with the efficient use of the resources used in the model above. In a telephone conversation, the human voice (the information source) is transmitted into electronic signals. The signals are data. The system does not know what data will be transmitted and so has a “data deficit” which Shannon referred to as “uncertainty.” As Floridi notes, “the basic idea is that information can be quantified in terms of a decrease in data deficit” (p. 42). He continues that “MTC quantifies information by considering the number of yes/no questions required to determine what the source is communicating” (p. 43.) One question is sufficient to determine the answer to a yes/no question because if the answer is yes, nothing more needs to be learned. This is the basis of binary code with 1 and 0 replacing yes and no. The work of Shannon and Weaver made information quantifiable and measurable in a way that had not before been realizable before this point. Gleick (2011) notes that Shannon’s work meant a

“new unit of measure was needed...Shannon said “The resulting units may be called binary digits, or more briefly, bits” (p. 229).

But is a bit actually information or is it data? Schement (2002) states that it cannot “be easily determined when one has more or less information...because information is symbolic, not physical.” (p. 2) Yet every day we talk about filling up a hard drive (with bits) or having trouble sending a file because it is too large, giving dimensions to what most would call information. The only way to find validity in both positions is to term the ‘bit’ a measure of data and to acknowledge the necessity of human intervention to turn it into information. Floridi (2010) addresses this issue by noting that the mathematical theory of communication should more properly be described as the “mathematical theory of data communication” (p. 46) because information has a semantic content lacking in Shannon and Weaver’s work.

Floridi’s discussion of semantic information makes a distinction between content that is instructional and that which is factual (p. 49). Instructional content tells people how to proceed in a given situation while Floridi defines factual semantic content in the following way “*p* qualifies as factual semantic information if and only if *p* is (constituted by) *well-formed, meaningful and veridical data*” (p. 50).

Mokros & Ruben also (1991) explore the communication-information relationship. They propose three distinct conceptions of information as follows:

- Information_e which is environmental data and stimuli
- Information_i which is information that has been internalized for use by a living system and
- Information_s which is information that is socially or culturally created.

Mokros & Ruben create six propositions that provide a basis for the communication-information relationship stating not only that the two are “inextricably linked” (p. 377). It appears that Information_e, Information_i and Information_s are comparable to data,

information and knowledge in the DIKW hierarchy. This means that information, certainly as Information_e (such as a fossil underground) can have some physical properties. The understanding that information has a physical nature is in alignment with the view of information as a commodity, or information as thing (Buckland, 1991). This view often appears in the scholarship of economics and also in the law.

Allen (1990) explores information as a commodity from an economic viewpoint defining a commodity as a "category of items that are traded for a price (or, more generally, that can be acquired at some resource cost)" (p 268). Allen also looks at some peculiarities of information including:

- Economic agents decide whether to acquire information before they can learn the outcome conveyed by the information.
- The value of information exhibits continuous dependence on its type.
- The demand for information is a "derived" demand such as traders desiring information to make a trade.
- Identical copies of the same information are worthless unless the duplicates can be sold.

Allen notes that the inclusion of information as an economic commodity violates many of the standard assumptions in microeconomic theory (p. 268-270).

Mowshowitz (1992), in his discussion of information commodities, notes that business people have been turning information into a commodity tradable on the marketplace by incorporating it into something that has both appropriability and valuability, and that "books, computer programs, and databases are traded in the marketplace." (p. 231). Hassett & Shapiro (2011) have provided extensive analysis of the economic importance of information and, using Federal Reserve data, show that since the mid-1990s a

majority of U.S. business investments have gone into intangible assets rather than traditional physical assets. These intangible assets include the traditional intellectual property of patents and copyrights; the broader intellectual capital of databases, general business methods, and research and development (R&D); and the firm-specific and task-specific knowledge and practices of managers and workers, or their “economic competencies” (p. iv).

Information provides challenges to many involved in its use and definition as a public or private good. Floridi (2010) notes the basis for some of these challenges in his summary as follows:

- Information is non-rivalrous, meaning that the seller of information still retains it after it is sold;
- Information is often non-excludable as it tends to leak and to be easily shared;
- Information has high fixed costs and low marginal costs; the first copy of a book may be high while additional copies are low (p. 90).

In the legal sense, information has a special status afforded by Article 1 Section 8 of the United States Constitution as it was adopted in 1787. The law is written as follows: “To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries”. This protection has created the concept of intellectual property although that term was not used until many decades after the Constitution was adopted. The fact that the term did develop does mean there is a “thing” quality for information as created by “authors and...their respective writings” in the law and in the minds of those who use copyrighted works. There is currently significant controversy over copyright, particularly around its continued extension. The most recent Supreme Court decision on extension favored the publishers and extended copyright

for most works to 70 years after the death of the creator, far from its original length of 14 years from issue.

There are three distinct ideological bases found in the discourse of those who validate copyright: those who see it as a natural right, those who believe in its utilitarian use, and those who see a personality argument. Wu (2013) states that “the dominant culture of intellectual property retains persistent linkage with the natural law tradition, which recognizes a natural right in the inventor or creator” (p. 34). Zuckert (1997) traces the influence of British Philosopher John Locke on the thinking of the Founding Fathers and describes how his concept of the role of government to protect “life, liberty and estate” became “life, liberty and the pursuit of happiness” in the American Declaration of Independence (p. 79). This serves to underscore how fundamental the protection of property is in our culture.

Those who take the utilitarian view include Wagner (2003) who has created a taxonomy of information incorporating the impact of copyright as shown in Figure 3. (p. 1003). In Wagner’s taxonomy, Information Type I is the actual work that is protected by copyright law. Type II is information that is in some way directly derived from the underlying creation and Type III is information derived from the original work but only indirectly associated.

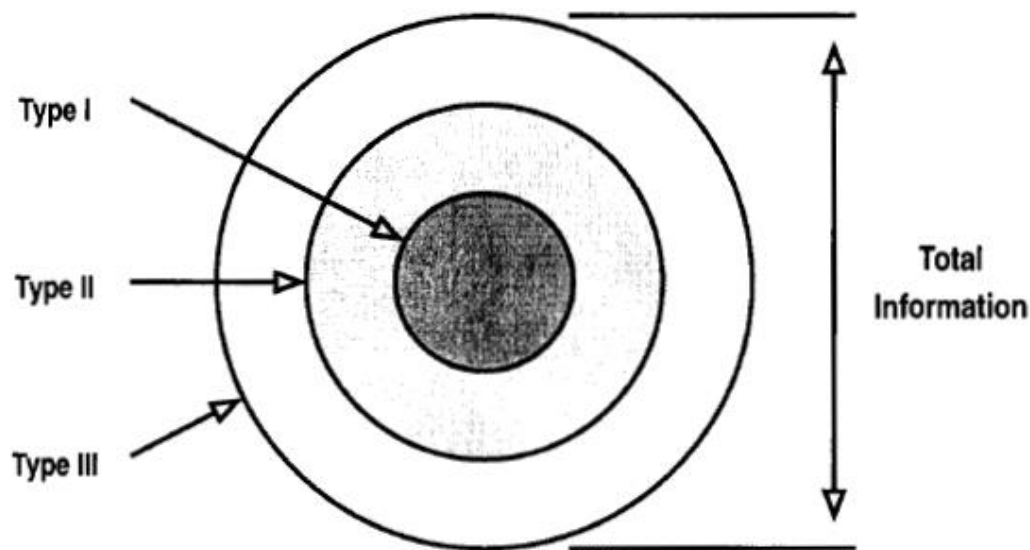


Figure 6 Wagner's Taxonomy of Information

Wagner argues that protecting Type I gives creators the needed incentive to create and that this causes the production of much Type II and Type III information which is now free to spread into all directions. He concludes that "each creation of even proprietary information expands the sum total of open information available for further technological, cultural and social development" (p. 1033).

The third viewpoint in support of copyright is based on the rights of individuals to have their expressions of themselves, seen to represent their personalities, protected by law. Fisher (2001) notes that this perspective calls loosely on the work of Kant and Hegel and suggests that "private property rights are crucial to the satisfaction of some fundamental human needs" and that "policymakers should thus strive to create and allocate entitlements to resources in the fashion that best enables people to fulfill those needs" (p. 6). This is a particularly interesting thinking which seems somewhat out of step with the current environment of the Web where tools such as blogging software, photo sharing and other collaborative platforms have unleashed a huge amount of creative intellectual activity with

many of those creators being either unaware or unconcerned with copyright protections.

There are also those opposed to copyright, and to giving property protection to intellectual and artist works. There are various positions to examine but certainly the most prominent is the argument that information cannot be characterized as property but rather should be considered a public good. This is a position not taken solely by legal scholars but also by economists, communication and information scholars and policy makers. Information as public good is not a specific definition of information but rather a philosophical stance on its nature and best use. Lemley (2004) uses the commonly accepted definition of public good which includes the characterization of it as non-rivalrous and it is also not something from which others can easily be excluded (p. 25). Kingma (2001) notes that public goods provide benefit to more than one person, and cites the examples of a fireworks display or a television broadcast (p. 57). Kranich (2004), in her discussion of an information commons, states that “For democracy to flourish, citizens need free and open access to information. In today’s digital age, this means access to information online” (p. 2).

Those advocating for information to be used as public good, especially in a commons setting, often must face the criticism of those who cite parallels and concerns relating to the physical commons. They note the difficulties of common land wherein one person or a small group can overgraze or overuse the land to the detriment of others. In response, it is noted that overuse is not physically possible with information. Lemley extends this position by claiming that “applying property theory to intellectual property involves the internalization not of negative externalities but of positive externalities—benefits conferred on another” (p. 2). The benefits of having open access to information are multiple. The Scholarly Publishing and Academic Resources Coalition (SPARC) has characterized some of these positives as the ability to “accelerate the pace of scientific discovery, encourage innovation, enrich education, and stimulate the economy, and create a better educated populace” (p. 2).

2.3 What is value, specifically as it relates to the value of information?

Frondizi (1963), in his introduction to value theory, or axiology, poses the ongoing philosophical question of whether values are objective or subjective. He outlines the terms of the debate by stating that “value is ‘objective’ if its existence and nature is independent of a subject; conversely, it is ‘subjective’ if it owes its existence, its sense, or its validity, to the feelings or attitudes of the subject” (p. 19). In further exploration of this issue, he finds both the objective and subjective side lacking. He notes that objectivists fail to account for “the vicissitudes of man’s desires and interests” (p. 135) and yet the subjectivists err when trying to “reduce value to valuation” and that “if values were created by the subject, without taking into consideration any element which might transcend the subject himself...the table of values would fluctuate capriciously” (p. 123). Frondizi tries to bridge the objectivist/subjectivist gap by proposing that the situation must be considered and concludes that “values have existence and meaning only within a specific situation” (p. 158). There has long been identification of two important types of value, these being “value in exchange” and “value in use.” “Value in exchange” is suited to describe value when information is viewed as a commodity to be traded. Griffiths (1982) described value in exchange by stating that “Value is an attribute that does not exist independently...the act of attributing a value to something, in effect establishes an equivalence relationship, or set of relationships, which can be expressed by the following equation:

$$V_a = V_b$$

where the value of A is equivalent to the value of B and $A \neq B$.”

This represents the exchange value, usually expressed in dollar terms (p. 269). She notes that value has three further characteristics which are: 1) It is subjective 2) Assessments are situation dependent and vary over time and 3) It can be either positive or negative (p. 270).

Willemse & Du Toit (1996) support the first two characteristics noted by Griffiths by claiming that “Information value is situation specific. It is always embedded in a specific context. This means no absolute value can be established, only an approximate value” (p. 11).

Repo (1986) states that exchange value is really only suitable for valuing information products, not information (p. 381). King, Griffiths, Roderer & Wiederkehr (1982) define exchange value as ‘what one would be prepared to exchange for the entity being valued’ (p. 8). They note that a dollar amount is usually on one side of the equation and give the example “The value of my house is \$100,000” (p. 8). The dollar amount may frequently become the price of the item being valued but they also note that concepts of demand, availability, and utility confound the determination of price.

“Value in use” is helpful in measuring the less tangible aspects of information. Saracevic & Kantor (1997) state that value in use measures were developed to extend the economic treatment of value to intrinsic value dimensions (such as satisfaction, pleasure and pain) and that this resulted in the unifying economic concept called “utility” (p. 530). This will be discussed further in Section 2.5.

Repo (1986) discusses the two ways of valuing information and claims that “the straightforward empirical economic analysis of information products has met serious problems especially in describing the benefits the use of information products really give” (p. 373). He further notes that information and information products have philosophical values such as emotional, ethical and spiritual values which are “almost entirely unexplored” (p. 375).

Repo (1986) also states that the value in use is the benefit the user obtains from the information and that it can be further categorized by examining the fact of use, measured by payments for information and reading time, the way information is used as described by the user and the benefits of use as measured by time and money savings (p. 375). Repo (1986)

additionally notes that Willingness to Pay has been used to describe expected value in use (p. 375).

King, Griffiths, Roderer & Wiederkehr (1982) state that use value and exchange value are often used in the “value paradox” (p. 8). This classic economic problem, whose creation is credited to Adam Smith, is the apparent contradiction that, although water is on the whole more useful, in terms of survival, than diamonds, diamonds command a higher price in the market. The solution to the paradox is generally seen as situated in the perception that diamonds are scarce and water is plentiful. It appears we live in a time when water and information may have much in common.

There have multiple studies in the value of information over the past several decades. Some of this scholarly work was undertaken to understand the topic more deeply. Much of it has been undertaken to advocate for libraries, librarians, vendors and other players in the marketplace to help survive or thrive in times of change. The work of King, Griffiths, Roderer & Wiederkehr (1982) was part of a large government sponsored study titled “Value of the Energy Data Base.” This data base was used by scientists and engineers at the Department of Energy’s Technical Information Center (TIC). The basic methodology used in the study was to enumerate the “number of readings” of reports done by the scientists and engineers and then to calculate a “savings value” number based on interviews with the readers illuminating how much they felt having the knowledge in the report saved them. Savings were seen in time and equipment and in not repeating work that had already been done. They further calculated that “the DOE investment of \$5.3 billion in the generation of information and about \$500 million in processing and using information yields a partial return of about \$13 billion in terms of savings to scientists and engineers in their time and in equipment. Overall, this partial return on investment is about 2.2 to 1” (p. 1). It should be noted that this study, although conducted by an independent consultant, was financed by the TIC.

For the purposes of this study, the most suitable framework is exchange value as what is being measured is what individuals are willing to exchange for information.

2.4 Which theories of human information behavior and decision making are most applicable to the behavior being studied?

This research is fundamentally one of human information behavior (HIB) as it seeks to understand more about the ways in which individuals may value and reveal that value by their selection of particular information objects or documents. HIB is a large field with many existing theories and others being developed by scholars worldwide. As discussed previously, one of the most prominent theories in HIB is that of Bates (1989) “berrypicking” in which she focuses on a naturalistic setting for information selection. Bates (2005) further explicated this setting by placing HIB in an evolutionary context, stating that “modes of information perception, processing, transmission, and storage are seen to have developed as a part of the general evolution of the animal kingdom” (p. 1).

Adding to the scholarship which seeks an evolutionary basis for human information behavior, Spink & Currier (2006) seek an historical context, exploring HIB from “pre- historic ages to the 21st century” (p. 17). They state that the “emerging evolutionary approach to HIB represents a shift to a more holistic framework” (p. 28). In a further extension of the historical context, Spink & Currier (2006A) examine the behaviors of historical figures including Napoleon, Darwin and others in an attempt to broaden the range of HIB study and place it in a longer and potentially richer framework, not tied to examination of recent, information rich times.

Another aspect of using evolutionary theory in HIB has come from Pirolli & Card (1999) with their development of information foraging theory. They state that this theory draws heavily upon models and techniques developed in the optimal foraging theory by Stephens & Krebs (1986). They state that “all activities can be analyzed according to the value of the resource currency returned and costs incurred” (p. 7). In this model, the resource

currency returned is the value of the information received and the costs incurred are the costs to the individual to receive the information. Pirolli & Card (1999) cite the following model of C S Holling which shows the “ratio of the net amount of valuable information gained, G , divided by the total amount of time spent between patches, T_B , and exploiting within patches, T_W ”. In this equation, R is the rate of gain of valuable information per unit cost. It (p. 22) appears as follows:

$$R = \frac{G}{T_B + T_W}$$

Pirolli & Card assume that the forager’s activities are divided between activities in which they must go “between” patches (T_B) in the equation and “within” patches (T_W) in the equation although they note that the patch may be a collection of documents or an individual document (p. 22). They thus proscribe information behavior that is based not just on optimization but more fundamentally on what they describe as the “evolutionary ecological perspective” (p. 3). Pirolli & Card also state that although optimization theory models may depict individuals as “classically rational”, the decision-making theory of Herbert Simon and his development of bounded rationality and satisficing must be considered (p. 7).

Simon (1955) challenged the traditional economic model of the “rational man” by claiming that he felt that it was necessary “to replace the global rationality of economic man with a kind of rational behavior that is compatible with the access to information and computational capacities are actually possessed by organisms, including man, in the kinds of environments in which such organisms exist” (p. 99). Simon (1956) further developed this behavior with the description of it as “satisficing” and explained in the following manner, “Since the organism, like those of the real world, has neither the senses nor the wits to discover an ‘optimal’ path—even assuming the concept of optimal to be clearly defined—we are concerned only with finding a choice mechanism that will lead it to pursue a “satisficing” path, a path that will permit satisfaction at some specified level of all of its needs” (p. 136).

Prabha, Connaway, Olszewski & Jenkins (2007) conducted focus groups with faculty, graduate and undergraduate students to investigate what leads them to satisfy their information needs. They indicate that the situational context of both the participants' specific information need and their role in academic society affects every stage of searching, including the selection of resources and deciding when to stop the search. This finding supports that of a 2003 IMLS Study which they cite as stating that participants' approaches to information sources and strategies, and the amount of time and effort they devote to searching, correspond directly to the importance of their objectives. The concept of satisficing has become deeply embedded in many aspects of Information Science as can be evidenced by a universal search of the Encyclopedia of Library and Information Sciences, 3rd edition (2010). A search of its contents finds eight separate chapters which discuss satisficing in topics from "Leisure and Hobby Information and its Users" to "Relevance in Theory" to the expected "Information Use in Decision Making."

Some new developments in neuroeconomics have extended and enhanced the understanding of decision making and may prove promising for all in this field. Farb (2013) states that (neuro) "imaging techniques may help to explain how decision making changes under particular contexts, such as physical environment, mood, or a person's cultural background. Such contexts may transcend accounts of universally rational actors to explain why different people perceive value differently" (p. 2). Ariely & Berns (2010) state that there is currently a lot of "hype" around the nascent field of neuromarketing but also find that "continuing developments in analytical tools for neuroimaging data...suggest that neuroimaging will soon be able to reveal information about consumer preferences" (p. 13). Clithero, Tankersley & Huettel state that "Social scientists (and neuroscientists) should not treat decision-making phenomena as irreducible and mechanism-independent. Instead, the joint investigation of brain and behavior will lead to greater success than either discipline could achieve in isolation" (p. 2351). It seems that the promise of a more biologically based

understanding of human information behavior is solid but not yet realized or ready to be applied in research. Simon's almost 60 year old theory of satisficing, connected to the evolutionary ideas of Bates and Pirolli & Card, create the strongest theoretical foundation for the research here.

2.5 How does research about the economics of information and expenditures to acquire it including money, time and personal data inform this research?

The research presented here uses three expenditures that individuals may exchange for information: money, time and personal data.

2.5.1 Money. Adam Smith's "invisible hand", which pushes the market price to equilibrium, has been tested by the Internet in its capacities as a distribution mechanism. Anderson (2007) notes that the supply of content (i.e. information) has grown by factors of millions but demand has not (p. 140). This relatively sudden disequilibrium seems very likely to continue in the foreseeable future.

A 2005 OCLC report authored by DeRosa titled *Perceptions of Libraries and Information Resources* found that 93% of respondents did not trust information more if they had to pay for it compared to the information in a free source (p. 3-9). DeRosa also found that 87% of respondents had never paid for information from an electronic information source (p. 3- 10). What is perceived as "free" is powerful; Ariely (2008) has described free as a "source of irrational excitement" (p. 49.)

Money is the most traditional of exchange mechanisms and is used in all settings for goods both tangible and intangible. The use of money to pay for information has a long history and can be illustrated most strikingly by the Romans' use of thirty pieces of silver to pay Judas to identify and so betray Jesus. This is a prominent cultural fact throughout Western civilization and may represent one of the most significant transactions of its kind.

From a research viewpoint, in terms of understanding the reasons for the behavior, one of the most-used measures to represent money in an economic transaction is Willingness to Pay (WTP). Le Gall-Ely (2009) found that the “concept first appeared in the economics literature more than a century ago” (p. 92) in a paper authored by economist H.J. Davenport to “determine prices for pure public goods and services” (p. 92.) WTP has been applied in a wide variety of situations, including attempts to understand the value individuals may place on intangible environmental items such as clear air and clean water. Le Gall-Ely (2009) states that WTP is part of the “price perception process” and is related to various types of price judgments including reference price, acceptable price and value. She notes that it is also linked to other variables that influence decision making such as satisfaction, loyalty and culture (p. 93).

Raban & Rafaeli (2004) applied WTP to a study of information in which they used Willingness to Accept Payment (WTA). Raban & Rafaeli (2004) discuss that there are generally three ways to assess the value of information, those being normative, realistic and subjective. Their study focused on the subjective value of information. They found, as previous researchers in similar studies before them, that participants created a discrepancy between WTP and WTA, namely that WTA is a significantly higher number than WTP and that this is related to individual assessments of the value of the information with this value being a subjective judgment. They note that “the value assigned to specific information by a certain person can vary according to external circumstances” (p. 327), a finding that gives additional support to the 2003 IMLS conclusion about the importance of context.

Lopatovska & Mokros (2008) describe WTP as “an intuitively appealing, albeit naïve approach” to gauging the value of information (p. 93). They used both WTP and Experienced Utility (EU) in an information study and found that WTP tended to be a better measure of the “instrumental-rational value that an information object has in problem solving tasks” while

EU “reflects the aesthetic-emotional value that an object has in its own right, as the user engages with the object” (p. 101).

Cooper (1973) proposed that users evaluate documents in a system and then be asked two questions by a researcher. The first would be how much, in dollars, he would be willing to pay to use the document (which is the classic WTP measure) but the second would be how much, in dollars, he would ask to be paid to avoid the document (p. 90). He then proposed that the answer to the first question be used by the researcher to represent the user’s best estimate of the personal worth to him, in dollars, of his encounter with the document. Cooper continues that “This figure we shall call a *document-utility*” (p. 90).

Cooper’s reliance on document utility points to a set of broad concepts in economics including utility, expected utility and marginal utility which are measures used by economists and those studying decision making to better understand consumer choice. Ariely (2010) states that “expected utility drives choice in the marketplace” (p. 3). Saracevic & Kantor (1997) state that “In terms of information, perceived utility can be used as a measure of value.” (p. 530). Ultimately, utility measures, when studied in economics and consumer behavior, are often linked to WTP measures and in this way, and others, utility and value are closely linked. That link is underlying the study here as participants are instructed to select documents that they feel will supply them with optimum information to understand the issue at hand.

2.5.2 Time Research into time as a valued personal expenditure appears in various scholarly areas. Wilson (1997) notes that the “economic issues related to information-seeking behavior fall into two categories: direct economic costs, and the value of time.” (p. 559). He cites Stigler’s model which finds that “the cost of time will not be the same for all persons, since the cost of time is higher for persons with larger incomes” (p. 559). Jacoby, Szabillo & Berning (1976) state that “consumers...use time as a substitute for money and vice

versa" (p. 320) but also that "little is actually known about the time-consumer behavior relationship" (p. 336). They discuss the continued rise of convenience goods which alleviate time pressure on consumers but may cost more in financial terms (p. 327).

Leclerc, Schmitt & Dube (1995) conducted multiple research studies to investigate whether consumers treat time like money when they made decisions. One of their key findings was that "the value of consumers' time is not constant but depends on contextual characteristics of the decision situation" (p. 110). This finding is echoed in the views of Okada & Hoch (2004) who state while "both time and money are exchange mediums" (p. 9), "people can more easily adjust the value of their time to the particulars of the situation" (p. 10). Okada & Hoch (2004), in five experiments found that "it is the inherent ambiguity in the value of time that supports and justifies a different spending pattern than that of observed with money" (p. 314). They also point out the important statement that people have "relative inexperience" in time exchanges and that there is "greater construal in valuing time, which leads to great variance in its valuation" (p. 316).

In a striking example of how direct the tradeoff between time and money can be, Barton (2014) reported on the addition of toll lanes to Florida highways. He stated that "Motorists pay 50 cents to \$10.50 to ride in express lanes, depending on volume...the cost is not a reflection of congestion in the free lanes, but it pegged to the number of vehicles using the toll lanes." This results in a situation where a driver must make a quick and calculated decision to spend time in the free lanes or money in the toll lanes, an equation that those familiar with Benjamin Franklin's oft-quoted statement that "Time is money" would recognize.

In the information world, advertising has long been an additional source of revenue for information providers as advertisers have sought consumer's time to view their messages. Kingma (2001) notes that "nonexclusionary information products are typically financed by

advertising...the information producer sells access to consumers' time by other information producers and continues that consumers must spend time seeing commercials to access the information or entertainment they want" (p. 64).

As information producers vie for consumer "clicks", attention as expressed in consumers' time has joined monetary fees as a critical and prized expenditure by which consumers pay for information. The use of advertising ostensibly relies more completely in the sphere of attention rather than time. If consumers only glance at an advertisement, producers are unlikely to recoup as much value from that interaction as from one in which the consumer pores over the offering. Yet attention is notably difficult to measure and time stands as its substitute. Davenport & Beck (2001) have stated that "Today, attention is the real currency of businesses and individuals" (p. 3) and continue with their contention that "purist economists may take some umbrage at our calling attention a 'currency'. But it does have many attributes of a monetary instrument. Those who don't have it want it...You can trade it; you can purchase it..." (p. 3). Colan (2009) describes the prioritizability of time/attention by stating that it can be managed like other resources by stating "What you *can* manage, however, is your attention. Attention is a resource we all possess" (para 2).

2.5.3. Personal Data Using personal data as a currency is a relatively new development in the marketplace, and has become more prevalent as technology has expanded. Schwartz (2004) states that "personal information is an important currency in the new millennium." (p. 2056). He also states that "a strong conception of personal data as a commodity is emerging in the United States, and individual Americans are already participating in the commodification of their personal data" (p. 2057). Personal data has become an expenditure for information consumers, but what is being expended is more than the data itself as it often expands to encompass the privacy of the individual involved. Berendt, Gunther & Spiekermann (2005) state that in "times of ubiquitous electronic communication...the

maintenance of privacy...becomes a subject of increasing concern" (p. 101.) They note that "given the widespread concerns about personal privacy in a networked world, it is commonly assumed that online behaviors reflect (privacy) concerns" (p. 102.) Norberg, Horne & Horne (2007) have found, along with others, that a "privacy paradox" exists and "for all the concern that people express about their personal information, which could be expected to drive one's intended and actual disclosure, our observations of actual marketplace behavior...suggested that people are less than selective and often cavalier in the protection of their own data profiles" (p. 101.) Acquisti (2004) takes an economic look and finds that

Many are willing to provide very personal information, in exchange for small reward. From an economic perspective, one could make the argument that those individuals who demand privacy but take no action to protect theirs, are actually acting rationally. They discount the potential losses from losing control of their personal information (uncertain, but possibly large) with the probability that such an outcome will take place (uncertain, but perceived as low)" (p. 5).

Grossklags & Acquisti (2007) conducted an empirical study using the indicators of Willingness to Protect (WTP) which was used to measure the monetary amount consumers would pay to protect their personal information and Willingness to Accept (WTA) which was used to measure the monetary amount that consumers would accept in return for supplying their personal information. They found "individuals almost always chose to sell their information and only rarely elect to protect their information even for values as little as \$0.25" (p. 3) Grossklags & Acquisti (2007) posit that the gap they found in WTP and WTA reinforces the existing market reality that consumers are "willing to trade off personal data for small rewards, or are unwilling to change their behavior when privacy threats arise" (p. 6).

Trust is an important aspect in understanding the use of personal data as an exchange mechanism. The reification of trust is exceptionally problematic yet critical when personal

information is used as expenditure. Urban, Sultan & Qualls (2000) have noted that “The most important element of trust is fulfillment. Quite simply, trust is earned by meeting expectations” (p. 42). Similar conclusions were reached by Hoffman, Novak & Peralta (1999) who noted that “consumers simply do not trust most Web providers enough to engage in ‘relationship exchanges’ involving...personal information with them.” (p. 80).

With information suppliers, trust is often viewed through the lens of longevity with more established sources of information being more highly trusted. This can be evidenced in the collection development practices of many libraries that depend on titles that consumers know and trust as a guideline for acquisitions. Yet the new digital consumer may be far less dependent on established sources and consider newness a virtue. The very real decline of the Encyclopedia Britannica and the rise of Wikipedia are illustrative here.

Control, which is another key aspect of understanding personal data as an expenditure, is closely related to trust as can be interpreted from the words of Hoffman, Novak & Peralta (1999) in their statement that “Trust is best achieved by allowing the balance of power to shift toward a more cooperative interaction between an online business and its customers” (p. 85) and that consumers seek both “environmental control and secondary use of information control.” (p. 81). They further explain that environmental control relates to the consumer’s ability to control the actions of a Web vendor. Culnan (1999) notes that “Secondary information use occurs when information collected for one purpose is reused for another purpose; it may be viewed as a privacy invasion when it occurs without the knowledge or consent of the individual” (p. 11) in which case the loss of control by the consumer is palpable.

2.6 How do previous studies of document selection behavior and relevance inform this research? What other factors inform document selection decisions?

Much of the vast body of scholarly research on Information Retrieval systems focusses on the interaction between system and user and on providing relevant results. Relevance has been a primary focus of document selection for several decades. Saracevic produced two important publications on relevance presenting literature reviews and frameworks, the first in 1975 and the second in 2007 which reflects how long the subject has been of keen interest. In 1975 Saracevic stated that ““One of the major conclusions that can be drawn from experiments is that relevance judgments are not at all associated with a random distribution. Although it may appear that relevance judgment is a very subjective human process, it has associated with it some remarkable *regularity patterns*” (p. 342). He outlines seven different types of relevance (subject knowledge, subject literature, logical, system, destination, pertinence and pragmatic) and concludes that “subject knowledge seems to be the most important factor affecting the relevance judgment as far as human characteristics are concerned” (p. 341).

Saracevic’s 2007 work elaborates on other aspects of relevance including those shown in the table below:

Table 1 Saracevic’s Relevance Aspects

| | | |
|--|--------------------------------|---|
| Relevance is a relation | Relevance is a property | Relevance is a measure |
| Relevance has context, external and internal | Relevance may change | Relevance has a number of manifestations or kinds |
| Relevance is not given | Relevance is inferred | Relevance is created or derived |
| Relevance involves selection | Relevance involves interaction | Relevance follows some intentionality |

Barry (1994), in her work on relevance, identified 23 criteria through content analysis as identified by academic users to determine relevance and found the following:

Table 2 Barry's Relevance Criteria

| | | |
|---------------------------|------------------------------|--------------------------|
| Depth/Scope | Tangibility | Effectiveness |
| Accuracy/Validity | Clarity | Recency |
| Background/Experience | Ability to Understand | Consensus with the field |
| External Verification | Content Novelty | Source Novelty |
| Stimulus Document Novelty | Relationship with Author | Affectiveness |
| Source Quality | Source Reputation/Visibility | Availability |
| Personal Availability | Access | Time Constraints |
| Obtainability | Cost | |

Rieh (2000) specifically focused on cognitive authority in Web documents which would most closely align with Barry's relevance criteria of source quality and source reputation/visibility. Rieh completed a content analysis of her data and identified six major facets of judgment mentioned by the subjects as follows:

Table 3 Rieh's Judgment Aspects

| | | |
|---------------------|---------------------|----------------------|
| Information Quality | Cognitive Authority | Topical Interest |
| Aesthetic Aspects | Affective Aspects | General Expectations |

Rieh also created a category for "Don't know" which included subjects who expressed that they did not know, were not sure or did not care about the process (p. 101).

Relevance and document selection are obviously closely intertwined. Wang & Soergel (1999) used a model for a study of document selection with 3 areas of consideration before the accept, reject or maybe decision as depicted in Figure 7 below:

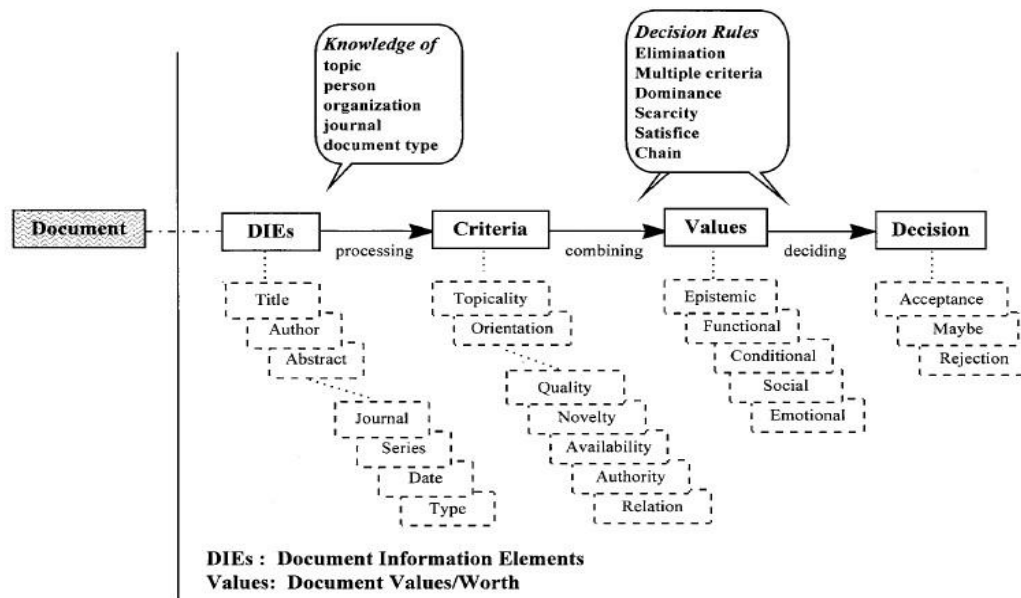


Figure 7 Wang & Soergel's Document Selection Model

The values they use are drawn from consumer theory and redefined for document selection. Additional discussion of this relationship appears in Section 2.6.

The goal of relevance, which to a large extent seems solved by current search engine algorithms, is to ease the decision making in terms of document selection by the user. If the most relevant documents are presented, the user can simply carry them off to perform whatever information task they may be facing.

Other more recently developed aspects are surfacing in the information environment which may be having an impact on the way users make decisions about which documents or content to select. As the Web has moved from a text-heavy space to a visual landscape, aesthetics are most likely playing a larger role in decision behavior. Norman (2002) who has studied usability, has concluded that "attractive things work better" (p. 17) and that "tensions between aesthetics and usability as well as those between affect and cognition" (p. 63) must

be resolved. Norman's work may be partially responsible for some of the rich and visually satisfying websites that draw users back to them on a regular basis.

The rise of the second iteration of the Web, known as Web 2.0, and the interactive and social aspects of document selection that Web 2.0 facilitates, are just beginning to be a focus of study. Muchnik, Sinan & Taylor (2013) have investigated whether knowledge of the aggregated opinions of others has an impact on decision making when rating content on a social news aggregation site. Their findings indicate that "prior ratings created significant bias in individual rating behavior" (p. 647) which illuminates the social behavior involved in this environment. Another example of the social impact on document selection appears in the comments section of the website of *The New York Times*. Registered readers can select certain posts to "like" and those with "likes" are ranked under a tab titled "Readers" Picks". Posts with the highest number of likes appear first and, as based on common knowledge of user behavior, items appearing first in a list of results are more likely to be read than those appearing further down in the list.

2.7 In what ways can consumer behavior studies inform information behavior as it relates to this research?

At first glance, there seems to be little apparent overlap between the scholarly fields of consumer behavior and human information behavior although they share some similar goals. This may be a result of the fact that consumer behavior is most often allied with traditional economics and tends to focus on commodity products and exchange value which, as has been shown, can be limiting in valuing information. When information is discussed in Consumer Behavior literature, it is most often information about products and the impact that such information can have in making decisions or changing behavior as illustrated in the studies as published by Bettman & Kakkar (1977), Bettman & Park (1980) and Dodds, Monroe & Grewal, (1991).

Sheth, Newman & Gross (1991) developed a theory of consumption values in consumer behavior and identified five consumption values which Information Scientists Wang and Soergel later used in a document use study (1998), discussed below. These are functional value, conditional value, social value, emotional value and epistemic value. They note that “a decision may be influenced by any or all of the five consumption values.” (p. 160). The table below defines each value more fully:

Table 4 Consumption Values in Consumer Behavior from Sheth, Newman & Gross

| Value | Definition |
|-------------------|--|
| Functional Value | Perceived utility acquired through functional, utilitarian or physical performance; traditionally presumed to be the primary driver of consumer choice |
| Social Value | Perceived utility acquired from an association with one or more specific social groups |
| Emotional Value | Perceived utility acquired from the capacity to arouse feelings or affective states |
| Epistemic Value | Perceived utility acquired from the capacity to arouse curiosity, provide novelty or satisfy a desire for knowledge |
| Conditional Value | Perceived utility acquired as a result of the specific situation facing the choice maker |

Wang & Soergel (1998) stated that “there is a clear analogy between purchasing goods and reading documents: Both are need-driven, both involve decision making based on value judgments and both consider the cost (money or time) of acquisition” (p. 117). They also note that “document value is the user’s perception of the desirability or potential utility of a document. Utility is the capacity to satisfy a need” (p. 121). Wang and Soergel’s modification to Sheth, Newman & Gross’ work appears in the following table:

Table 5 Wang & Soergel's Consumptive Values

| Value | Definition as applied to information |
|-------------|--|
| Epistemic | Perceived utility to satisfy a desire for knowledge or information that is unknown. It can be assumed that this is the prerequisite for all other types of value. (p. 121) |
| Functional | Perceived utility of a document to make a contribution to the specific task at hand |
| Conditional | Perceived utility to be decided circumstantially |
| Social | Perceived utility based on association with specific groups including famous author or institution |
| Emotional | Perceived utility stemming from its ability to arouse feelings or affective states. |

In their study, which involved decision making on documents by academics during an actual research project, Wang & Soergel (1998) found that documents with epistemic and functional value were most often selected, those with conditional, social and emotional value significantly less so. (p. 121).

In another effort in the consumer behavior field, Holbrook (1998) created a Typology of Consumer Value that includes eight types of value. These are efficiency, play, excellence, aesthetics, status, ethics, esteem and spirituality. He defines consumer value as “interactive relativistic preference experience” (p. 5). He elaborates on each of the elements in the definition by detailing how “interaction” can be categorized as objective (with value in the object) or subjective (with value in the consumer) and urges a middle ground in which the value involves an interaction between object and consumer. He continues by describing how “relativistic” means that consumer value is comparative (involving

preferences among objects), personal (varying from person to person and situational (specific to a context). The use of “preferential” in Holbrook’s definition as he details it involves a wide variety of value-related terms including items such as affect, attitude, evaluation, predisposition, opinion and valence (p.8). The aspect of Holbrook’s definition that he terms “experience” encompasses the notion that products provide services that translate ultimately to experiences. It is interesting to consider how closely that allies with Varian’s (1999) characterization of information as an experience good (p. 5). Holbrook additionally proposes a framework designed to categorize the various types of consumer value that reflects what he sees as its three key dimensions: (1) extrinsic versus intrinsic, (2) self-oriented versus other oriented and (3) active versus reactive (p. 9).

Using Holbrook’s framework to try to assess consumer value of information would bring in several new and interesting elements not seen in most studies to date. It also raises the issues of the many different kinds or uses of information. Bates’ (2006) definition of recorded information” as “communicatory or memorial information preserved in a durable medium” (p. 1036), allows for a panoply of different types and uses within. In a superficial browsing of the eight types of consumer value, it can be seen that there are certain types of information which more closely align with certain values, as shown in the table below:

Table 6 Holbrooks' Identification of Consumer Values (1998) with examples by Burton (2015)

| Consumer Value | Type of Information |
|----------------|---|
| Efficiency | Referring to a "How to" Manual |
| Play | Reading a Novel |
| Excellence | Using Google |
| Aesthetics | Browsing a Coffee Table Book |
| Status | Quoting Harvard Business Review at a business meeting |
| Ethics | Protecting personal information about a colleague |
| Esteem | Creating a Ph.D. dissertation |
| Spirituality | Studying the Bible, other holy books |

As is evident from this primary categorization, it is important to note that Holbrook has stated that the typology characterizes some values as extrinsic (Efficiency, Excellence, Status and Esteem) and some as intrinsic (Play, Aesthetics, Ethics, Spirituality). So an individual may read a novel for fun but also because they feel a need to impress friends with being up on the latest, a businessperson may quote *Harvard Business Review* to impress colleagues but also because the findings in the article may increase the firm's efficiency and a parent may study the Bible to gain more robust spiritual life but also to gain any ethical teachings they could pass along to their children. The intrinsic and extrinsic values of information have been little studied.

2.8 What do empirical studies about information behavior on the Internet reveal about the direction of this research?

Multiple research studies have found that consumers are highly resistant to paying and price at all for general news content delivered over the Internet. Donatello (2002), Dou (2004) and Wang, Zhang, Ye & Nguyen (2004) have produced findings that confirm users' unwillingness to pay for online news content. Donatello cited the fact that

consumers are “not conditioned” to paying (p. 40), Dou found that “the biggest obstacle that content sites have is the prevailing “free” mentality among internet users” (p. 357) and Wang, Zhang, Ye & Nguyen point out that “one of the biggest challenges facing online service businesses is the Internet culture that has developed over the years: consumers have become accustomed to the belief that such businesses are financed by advertisers and therefore should provide their content/services for free” (p. 306).

Regazzi (2014) has created the term “infonomics” to describe the new information economy in which consumers expect information to be free. He cites a 2002 survey in which “librarians and scientists were asked to name the top scientific and medical search resources that they used or were aware of. The differences between the two groups are startling. Librarians named Science Direct, ISI Web of Science, Medline, and PubMed as the top resources while scientists named Google, Yahoo and PubMed.” (p. 8). While the past 13 years may have seen a shift in the habits of librarians, it seems likely that the shift has been to the free services so popular with scientists in 2002.

Saracevic & Kantor (1997) reported on an empirical study of value of library and information services which was sponsored by the Council on Library Resources. The work involved developing taxonomy of value-in-use of library and information services based on users assessments. The taxonomy had three general areas including *Reasons* for using a library or information service, *Interaction* with a library service and *Results* of using a library service. The results area is the most pertinent to this discussion as it relies on user assessments of what benefits they received. Saracevic & Kantor did not evaluate any specific library or information services in this work; their goal was to develop the taxonomy for others to use. They provided a note of caution by stating that “as a rule, users cannot or do not sustain a focus on value when interviewed about their assessments of the value of a

service.” (p. 561). They state the need for special training by interviewers to successfully gather and analyze responses in this area. At this time, it is not known how many libraries or information services have employed the taxonomy to better understand value.

Chapter 3: Methods

3.1 Research Design

The advantages and disadvantages of both qualitative and quantitative methods were considered in research design. Creswell (2003) states that quantitative approaches are most used in situations where postpositivist claims for developing knowledge exist, such as situations involving cause and effect thinking. This study is based on such a postpositivist approach as it seeks to understand how consumers will react to certain expenditures and the effect that such expenditures will have on their document selection. The research questions focus on a clear pattern of human information behavior which can be measured, so this also pointed to the direction of quantitative methods. The research questions are seeking explanations to identified phenomena, observable to all contemporary information producers and consumers, and this indicated again that the collection and analysis of quantitative data would be most effective. This decision aligns with Krathwohl's (2009) assertion that quantitative methods are most often suitable for situations in which a clear conception of the problem has emerged before data gathering. In addition, Saracevic and Kantor (1997), in their work on the value of libraries, found that users have difficulty in sustaining a focus on value when assessing information services.

This indicated that interviews and other qualitative research might have difficulties in any study such as this one that is seeking more understanding of value. It was decided to collect a limited amount of qualitative data to enrich the quantitative results.

The advantages of quantitative data were deemed to outweigh that of qualitative for the study being proposed and a modified experimental method was then selected as the most effective way to get meaningful results. Creswell (p. 19) states that surveys and experiments are most often the chosen strategies of studies involving postpositivist claims and quantitative data. It was hoped that statistically significant patterns would be found and that the ability to

generalize results to a larger population might be achieved. Any study of human behavior involves significant complexity because there are so many variables involved in understanding it. Within human information behavior, individual variables including pre-existing knowledge, epistemological views, experience and familiarity with different types of content and socio-economic status may impact document selection. In addition, situational variables including the environment in which information is encountered and the needs of the individual in a particular place and at a particular time may cause changes in behavior. This results in the need for considerable attention to be paid in the creation of the variables so that they most closely represent the factors that contribute to the behavior being studied.

The research uses a quasi-experimental design in lieu of placing individuals into randomly selected and randomly assigned tightly controlled treatments. The design used here is quasi since it uses volunteers as subjects who are randomly assigned to one of four treatment groups. The treatment and control group use similar selection procedures, however, the control group does not have a treatment requirement prior to selecting documents. The other three groups are informed that they must spend money, time or personal data prior to proceeding with the selection of their documents.

3.2 The Research Model

The experiment strives to be straightforward in design yet contain a large enough number of variables and cases to provide sophisticated insight into the proposed hypotheses.

The research model, depicted in Figure 8, tries best to simulate a real life setting with the control group in the most familiar setting, in which all documents are free, while the three treatment groups will be presented with the necessity of using expenditures to select documents, expenditures with which they are likely to be some familiar. An in depth discussion of these expenditures as research treatments appears in Section 3.4.

The model contains three different types of independent variables, collected at two

different stages in the research. The first set of variables, classified as consumer variables, are collected at the beginning of the research process, before the experiment begins. The second set of variables, classified as demographic variables, are collected at the end of the experiment. The third set of variables, classified as research variables, are collected after the demographic variables at the close of the survey. All variables are designed to provide additional information about the participants and to provide data for analysis to determine if there are correlations between the variables and document selection behavior. A full description of all variables and the concepts they operationalize, appears in Section 3.3.

The dependent, or outcome, variable is the number of documents selected by each participant. This variable is created after the participant completes the survey.

Variables → → → → → ... → ... → Outcome

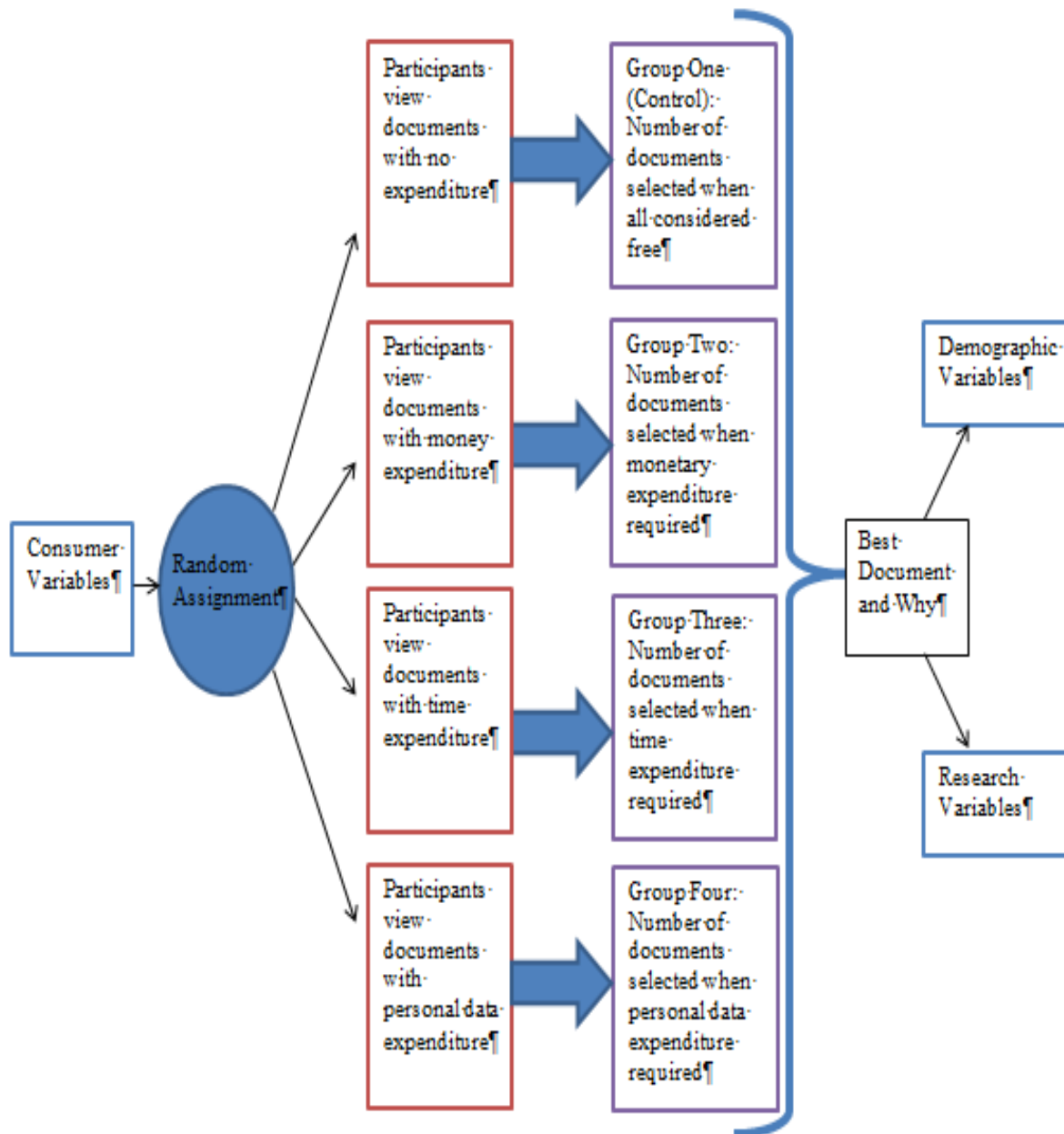


Figure 8 Research Model

The model functions as follows:

1. Participants are presented with 15 questions designed to collect data about their consumer attitudes and behavior
2. Participants are assigned a random treatment group by randomizer in the survey software (free, money, time or personal data). The randomizer randomly assigns participants to the four treatment groups by an automated process until each group is filled with the required number of participants.
3. Participants are presented with a set of ten document summaries collected from a Google search on the health impacts of caffeine and instructed to select the documents that they feel will supply them with the optimum amount and variety of information needed to understand the issue. They are informed they can review all documents and go back and forth in the selection process as needed
4. Participants are asked to select one document from the set of ten that they would classify as the best document
5. Participants are asked to describe, in 4-20 words, why they feel the selected document is the best document
6. Participants are presented with seven questions designed to illicit key demographic information
7. Participants are presented with five questions to illicit an understanding of how they reacted and related to the research itself

3.3 Consumer Variables

The variables were developed to best operationalize the concepts as expressed in the research questions. The consumer variables are designed to understand both attitudes that consumers may hold as well as how their actual behavior in the marketplace. They are described below.

Attitude about Spending Habits

Since money is one of the expenditures used in the experiment, it was necessary to operationalize and be able to quantify how individuals spend (and conversely save) money. The way in which individuals spend money varies and is it not necessarily dependent on available wealth. There are those who purposely spend below their means and those who spend well above. Rick, Cryder and Loewenstein (2008) developed a scale that looks at both ends of the spending spectrum. Their “tightwad/spendthrift” scale provides a measure of individual differences and is based on the variable “pain” of paying. It was decided to use an 11 point Likert scale as this scale allows for discrimination along a continuum which functions as a numeric indicator of the individual’s response and it allows greater opportunity to express assessments than a traditional five or six point scale. This scale provides a true mid- point for participant responses.

Attitude about Saving Habits

As a secondary question to solicit data about an individual’s handling and attitudes about money, users are asked about their ability to save money versus spend over their income.

Attitude about Time Habits

Time is another expenditure in the experiment and this variable is intended to measure people’s personal attitude toward it. Davenport (2001), while positing that the “time century’ is over” notes that “most of us are still paid for how long we take to complete a job” (p. 29) so the pressure of the clock still reigns for many individuals. There are many factors that apply to how people manage or are managed by time, far too many to try to elaborate upon here, but it is an observable phenomenon that some people always feel rushed and others do not. It seems possible that people who are always rushed feel that time is a scarce resource and may value it more highly and want to save it more often than those who are not feeling rushed.

Attitudes about Personal Data/Privacy

The third expenditure used is personal data. This Consumer variable is designed to determine the current patterns of an individual's expenditure of personal data on the Web in order to receive something that they desire. The implied agreement between the consumer and the information producer is that the consumer is forfeiting something that will reduce their overall online privacy.

Current Behavior Patterns-Monetary/subscription

This variable is designed to elicit actual behavior patterns as it relates to paying for information. The payment of fees is currently of two types: subscription or individual payments for documents. There are also many hybrid situations and individual payment plans in which subscribers to a hard copy publication may receive some free information from the publication's website. This question is designed to elicit the use of subscriptions by individuals.

Current Behavior Patterns-Monetary/individual purchases

This variable completes the data collection on monetary behavior by eliciting how often participants have paid for a document on an individual basis. Certain information suppliers, particularly in the scholarly field, employ this method of exchange.

Current Behavior Patterns-Time

Since the primary way that publishers elicit time from their users is by the use of mandatory ads as a gatekeeper to content, this question is designed to determine how often users spend time watching advertisements to obtain content.

Current Behavior Patterns-Time/Attention

There is an inherent difficulty in separating time and attention; a deeper examination of which appears in Section 3.4. This variable is constructed to capture an understanding of both time and attention by asking how frequently participants watched

over the required minimum length of an advertisement based on the understanding that this behavior would represent attention being paid, rather than simply time spent.

Current Behavior Patterns-Personal Data Protection

Because it is understood that a certain number of information consumers maintain alternate emails to use in situations in which they do not want to reveal their primary email, this variable is created to understand how many participants might use this strategy.

Current Behavior Patterns-Personal Data Use Frequency

This variable is designed to quantify how often participants using alternate email addresses use them in order to gain access to information.

Current Behavior Patterns-Personal Data Use Frequency-2

This variable is designed to quantify how often participants using their real email use them in order to gain access to information.

Current Behavior Patterns-Personal Data Use Breadth

This variable is designed to elicit information on how often participants supplied additional personal data, such as cell phone number or zip code, beyond email address, in order to gain access to information.

Knowledge of Topic

This variable is an assessment of how much people know about the topic being used in the research. It was posed to explore further if the intensity of the knowledge would have an impact on document selection, building on Saracevic's previously discussed contention that subject knowledge is the most important factor in relevance judgments.

Interest in Topic

This variable is an assessment of how much interest participants have in the topic of the research. It is supplemented with an assessment of their personal consumption of caffeine in

order to better understand how personal this topic is to them and how that might impact their document selection.

Current Consumption Patterns-Caffeine

This variable is designed to solicit actual behavior as it relates to the topic being studied. One could posit that those who are heavy consumers of caffeine would have more interest and knowledge in this topic as the personal impact would prove greater for them than for others who are lighter users.

Number of Hours Online Weekly

This variable will assess how much time participants spend online outside of work each week. The purpose is to provide an indicator of how sophisticated an individual may be in regard to their use of online information with the underlying assumption being that those who spend more time online outside work may be more sophisticated users.

3.4 Experimental Groups

The experiment called for participants to be placed in one of four different groups: a control group in which no expenditure was required to select documents and three groups in which different expenditures were given to participants to be used as an exchange mechanism for the documents supplied. Krathwohl (2009) states the importance of “functionally equivalent groups” in experimental design (p. 478) and cites Reifman’s rule that “Everything Equal Except Essential Elements” will result in solid design. This was achieved in the study by using 400 participants from the same source (Mechanical Turk) and then employing the randomizer in the survey software to assign each participant to a group. The creation of these groups is based on the following concepts.

Control Group-Free

The participants who were placed in this group were not required to exchange any type

of expenditure when selecting documents. This is the most natural setting for current information consumers using a web search engines to search for a general topic.

Group One-Money

The participants who were placed in this group were told they had a defined budget to spend to select documents. The difficulties inherent in the Willingness To Pay (WTP) measure as described in Section 2.5 were deemed significant enough to forego its use in favor of a hypothetical budget of \$15.00. Each of the ten individual documents priced at \$1.50 so that selection of all documents would deplete their budget. The price of \$1.50 is based on the Principal Investigator's understanding of the past and current environment on the Web. Publishers' attempts to find satisfactory pricing for their online offerings have involved many different elements and combinations. The primary factors used in determining the \$1.50 price for this experiment included:

- The most recent plan available to those accessing the Dow Jones Factiva online database would require an individual to pay \$2.95 for an individual document
- Academic publishers may charge one price to purchase a document and one price to rent it for a short period. As an example, Wiley Online Library currently posts a price of \$38.00 for the full text of an academic article and \$6 to rent it for 48 hours
- Some publishers give away a set number of free documents per month and then begin to charge fees for documents that exceed the set limit.
- Some publishers do not charge for their online content

For the sake of clarity and to avoid potential confusion on the part of participants, all documents were given the same price despite their differences in format, source and appearance.

To increase the sense that participants might feel as if they were spending their own money in this experimental condition, they were told that if they had any money left at the end of the selection process, the money would either be returned to them along with their stipend for participating in the research or it would be contributed to a charity of their choice. They were told that one of the two options would be randomly assigned at the end of the research study. The charity alternative was created to reduce any tendency for participants to try to hoard money if they felt it was definitely going to be returned to them if unspent. It is always possible that participants would attempt to maximize their own monetary gain which would result in few documents being selected.

The attributes of money which make it suitable as an exchange mechanism for information are obvious and many. Its history and continued use provide familiarity to those participants placed in this setting.

The physical nature of money means it is the most tangible of expenditures. This tangibility provides low barriers to measurement and provides a cognitive ease not found with intangible measures.

There is high variability in the spending patterns of individuals which makes it suitable in this experiment.

Group Two-Time

Participants in this group were told that they would be required to watch a 60 second advertisement for each document they selected. This could total 10 minutes total if all documents were selected. Although 60 seconds might represent a time commitment slightly longer than is currently usual in the Web environment, it was felt that it created better parity with the other treatment measures being used. As discussed in Section 2.5, there is difficulty in

separating time and attention as separate measures. Davenport & Beck (2001) note that “in the absence of precise attention currency, we often use the proxy of time...you measure what you can in this world” (p. 11). Attention, not merely time, is clearly what advertisers seek when using it as an exchange mechanism.

Although advertising has appeared in published content for centuries, it has evolved and adapted to new platforms along with technology. Web advertisements come in various forms, including broad based banner ads and ads that are personalized to an individual based on their searching history and preferences. The use of mandatory viewing of advertisements is increasingly apparent on the Web and is most often used with video content. Google, the owner of the highly used video service YouTube, terms this type of advertising “non-skippable in-stream ads” and explains that “Non-skippable in-stream ads are video ads that may appear pre-, mid-, or post-roll while viewing partner content. They can be up to 15-30 seconds long and viewers must watch the ad before they're able to watch the selected video. A companion 300x60-pixel ad unit may be usually displayed alongside YouTube videos that show in-stream ads on desktop.” (<https://support.google.com/youtube/answer/188038?hl=en>).

Three of the important attributes that make time suitable as expenditure in this study, are its close relationship to attention, its ability to be measured, and its highly individual use.

Group Three-Personal Data

Participants in this group were told that they would need to supply their email address in order to select an individual document. The instructions indicated that the email address would be used only within the context of this research study to better understand research issues and that participants could be contacted in the future about such research.

Personal data, including email addresses, represents the newest type of expenditure of

those used in the study. Chairman John D. (Jay) Rockefeller IV conducted a recent Senate Commerce Committee investigation of the data broker industry and how it affects consumers. In introducing a bill to regulate the industry, Law360.com reported that Rockefeller stated “In 2012, the data broker industry generated \$150 billion in revenue. That’s twice the size of the entire intelligence budget of the United States government—all generated by the effort to detail and sell information about our private lives” (p. 1.) Every time a consumer willingly supplies personal information to a website in order to gain access to information or other benefits, there is a potential monetary gain for the organization that collects it.

Many consumers are aware of the difficulties of maintaining privacy online and marketers are sensitive to this awareness. SDL Marketing, as reported by the website Marketing Pilgrim, produced the following infographic to highlight what is valuable to consumers:



Figure 9. SDL Marketing Chart on Consumers and Personal Data

Email address was selected for this study as a representative of personal data because it is one of the most commonly used measures as an exchange for information. SDL has placed it on the “less sacred” side of the personal data continuum they studied. Email address is understandably easy for producers to use and benefit from; they can add those providing it to an email distribution list and attempt to develop a relationship using it. The other types of personal data studied by SDL are relatively harder to obtain and several of them, such as ISP and location, may be passively collected. In this study, it was necessary to use a measure of personal data that the consumer knowingly contributed so that the exchange was palpable.

Consumers may attempt to reduce the privacy issues created when expending personal data by creating alternate identifiers, such as email addresses, to use in online transactions. This behavior reveals that consumers are willing to put effort into trying to protect something they view as valuable. This behavior was operationalized in the creation of the variable described in Section 3.3.

Three of the attributes of personal data that make it suitable and useful as expenditure for information as it is positioned in this study are the increased consumer awareness of its value, its ability to be made tangible and the variations in individual use.

In summation, this study uses three expenditures that are commonly accepted on the Web between information producers and information consumers. The salient characteristics for which they were chosen is illustrated below:

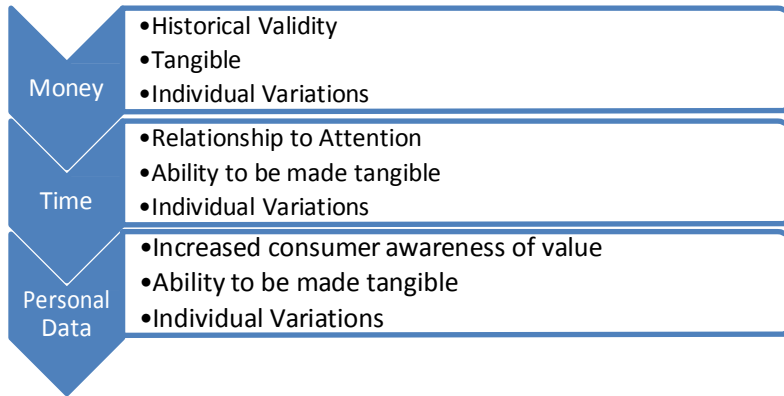


Figure 10 Salient Characteristics of the Three Expenditures used in this study

3.5 Demographic Variables

Several of the most noted studies in document selection behavior have used relatively small and homogenous samples and little collection of demographic data was completed. Bruce (1994), Barry (1994) and Wang & Soergel (1998) all used students and faculty members at academic institutions as their samples. The sample sizes in these studies ranged from 6 to 30 participants. The sample used in this study is much larger and presumably more diverse than those earlier studies.

Age

The study requires participants to be at least 18 years of age. Due to the knowledge about the demographics of Mechanical Turk workers, the expected age range is 25-35.

Gender

This question will ask if male or female or if this is information they chose not to supply. It seems unlikely to yield correlations to information behavior but will give a fuller demographic profile of the participant base.

Perceived Annual Income Worth

This variable requires participants to state how much they realistically believe they should receive in annual compensation based on their education, skill level and experience. It is being used as a proxy for the standard question of how much income people actually have because it is known that a direct question of this type often provides faulty data. The question as posed is also designed to get an understanding of how people may value the corresponding resource of time as Kingma and others have used hourly wage rates to calculate return on investment studies in the information sphere. For example, if information users report that access to certain information saved them two hours of time, the return could be calculated using the hourly rate of the individual in terms of savings.

Geographic Location

The study will include participants from the United States and Canada as the content is deemed to be the most familiar to the residents of these countries.

Who Pays for Internet Access

This variable will determine if the participant personally pays for internet access as opposed to using public spaces or having it supplied by others. It is designed to contribute greater understanding to those who may have a passionate belief in the model of free information.

3.6 Research Variables Research Interest

This variable asks participants to indicate how interesting they felt the research was. It is designed to explore how level of engagement in the research might impact results.

Research Relevance

This variable asks participants to indicate how relevant they felt the research was. It is designed to find out more about how the relevance of the research impacts results.

Research Realism

This variable is designed to solicit feedback on how realistic the research setting appeared compared to a real life situation. Although all participants are undoubtedly familiar with web searching and with the treatments applied, it is impossible to duplicate their own reality. This variable is a measure of how successful that effort was.

Research Care

This variable was designed to solicit feedback on the speed and care they took with the questions. Although obviously it would be easy to provide a false answer, it is used to provide another in the series of motivation checks as described in Section 3.4.

Research Feedback

A text box was designed to solicit feedback on the research in general.

A summary of all variables and measures used appears below:

Table 7 Variables with Summary Descriptions and Measurement Scales

| Variable Type | Name | Summary Description | Measure |
|---------------|-------------------|----------------------------|---|
| Consumer | Spending Habits 1 | Spendthrift/Tightwad Scale | 11 point Likert scale with extremes being "Spend too freely" and "Have Difficulty Spending" |
| Consumer | Spending Habits 2 | Saving vs Spending Scale | 11 point Likert scale with extremes being |

| | | | |
|----------|----------------------------------|---|--|
| | | | "Spend too much" and "Usually Save" |
| Consumer | Time | Always Hurried or Plenty of Time | 11 point Likert scale with extremes being "Have Enough Time" and "Feel Rushed" |
| Consumer | Privacy | Concerns about online privacy | 11 point Likert scale with extremes being "Don't Worry about Privacy" and "Very Concerned about Privacy" |
| Consumer | Pay for Subscriptions | Pay for online subscriptions; may include print subscriptions bundled | Yes/No |
| Consumer | Pay for Individual Documents | Frequency with which they have Paid for individual documents | Open ended answer for number of times, including zero |
| Consumer | How Often Watch Ads | How often watch ads (as opposed to forfeiting access to content) | 11 point Likert scale with extremes being "Never" and "Very Frequently" |
| Consumer | How Often Watch Ads Over Minimum | How often does ad capture their attention so that they watch over minimum | Three choices: Never Sometimes Frequently |
| Consumer | Alternate Email Y/N | Use of Alternate Email to shield real email | Yes/No |
| Consumer | How Often Supply Alternate Email | If maintained, how often supplied in last year | 11 point Likert scale with extremes being "Never" to "Frequently" |
| Consumer | How Often Supply Real Email | How often supplied in last year | 11 point Likert scale with extremes being "Never" to "Frequently" |

| | | | |
|-------------|--|--|--|
| Consumer | How Often Supply Other Personal Data | How often other data such as cellphone or zip code supplied in last year | 11 point Likert scale with extremes being “Never” to “Frequently” |
| Consumer | Knowledge of Health Impacts of Caffeine | Self-assessment of their own knowledge of topic | 11 point Likert scale with extremes being “Minimal Knowledge” to “Very Knowledgeable” |
| Consumer | Interest in Health Impacts of Caffeine | Self-assessment of their interest in topic | 11 point Likert scale with extremes being “Not at all Interested” to “Very Interested” |
| Consumer | Amount of Caffeine Consumed Yesterday | Behavior relating to topic | Nominal with any number including zero acceptable |
| Consumer | Number of Hours Spent Daily Online Outside Work | How much time (considered possible proxy for online sophistication and knowledge) online | Nominal with any number including zero acceptable |
| Demographic | Highest Level of Education Attained | Education Level | Six choices from “Some Middle or High School” to “Doctoral or Professional Degree” |
| Demographic | Highest Level of Education Attained by Head of Household | Aimed at younger participants; trying to establish socio-economic status | Seven choices from “Am Head of Household” to “Doctoral or Professional Degree” |
| Demographic | Age | To build full demographic profile | Nominal with any number from 18 to 99 acceptable |
| Demographic | Gender | To build full demographic profile | Three options: Male Female Prefer not to state |
| Demographic | Net Income | To indicate how they | Open ended |

| | | | |
|-------------|--|---|---|
| | Estimate | may value their time (see full description) | |
| Demographic | US or Canada | To build full demographic profile | Two choices |
| Demographic | Who Pays for Internet Outside Work | To assess if paying/no paying may impact behavior as it relates to free information | 7 Choices including Self/Spouse, Parents, 3 types of Institutions, Other and Don't Know |
| Research | How Interesting Research | To explore correlations between interest and other variables | 11 point Likert scale with extremes being "Not at Interesting" to "Very Interesting" |
| Research | How Relevant Research | To explore correlations between feelings of relevance and other variables | 11 point Likert scale with extremes being "Not at all relevant" and "Very relevant" |
| Research | How Realistic Research | To explore correlations between feelings of how realistic study was and other variables | 11 point Likert scale with extremes being "Not Like Real Life" and "Very Much Like Real Life Situation" |
| Research | Fast or Careful | To assess motivation | 11 point Likert scale with extremes being "Went as fast as I could" to "Answered Questions Carefully" |
| Research | Anything Unclear | Implications for Further Research in this area | Open Ended Question |

3.7 Participant Recruitment and Sample Size

Participant Recruitment

A study of this type requires a large participant pool in order to yield the best results; more detail is provided below in the discussion of sample size. The introduction of Amazon's Mechanical Turk in 2005 has proved to be an effective venue for recruiting large

numbers of research participants. Paolacci, Chander & Ipeirotis (2010) discuss the advantages and disadvantages of using the service for running experiments. They examined the demographics of 1,000 Mechanical Turk users and found that “there are significantly more females (64.85%) than males (35.15%) and...the educational level of US [Mechanical Turk] workers is higher than the general population” (p. 3) They state that “despite the differences with the general population, on all of these demographic variables, Internet subject populations tend to be closer to the US population as a whole than subjects recruited from traditional university subject pools” (p. 3). Schneider (2015) notes that “though Turkers come from all over the world, they live predominately in the United States and India, the two countries where Amazon pays them with actual money; others can receive only gift cards to Amazon.com” (p. A22). Schneider also states that “while newer crowd-work platforms continue to proliferate—Crowd-Flower, Clickworker, Cloud-Crowd, and so on, Mechanical Turk remains the standard, especially for researchers looking for a large and diverse pool of subjects” (p. A22).

Paolacci, Chander & Ipeirotis concluded that “Workers in Mechanical Turk exhibit the classic heuristics and biases and pay attention to directions at least as much as subjects from traditional sources. Furthermore, Mechanical Turk offers many practical advantages that reduce costs and make recruitment easier, while also reducing threats to internal validity” (p. 11).

Sample Size

It should be noted that while Mechanical Turk was the platform from which participants were recruited, due to the relatively lengthy response required for this study, participants were directed to a survey on Qualtrics for the actual research. The instrument used for recruitment on Mechanical Turk is shown in Appendix A.

This research was tested at the probability level of .05 which assumes that 95 out of 100 times the results would not occur by chance. To maximize mean differences between groups and allow similar dispersion within each group, a sample size of 400 was chosen to produce a reasonable assessment of the treatment effect of the dependent variables. The control group and each experimental group was set at 100 participants. Each participant was paid \$3.00 to complete the survey. The payment mechanism exists through Amazon.com.

The 400 participants were randomly assigned to the control and treatment groups by use of the Randomizer element in Qualtrics.

3.7 Research Motivation

It is possible that any given participant's motives may be influenced by outside factors such as trying to complete the research quickly rather than to get the best answers as they were instructed. These concerns are mitigated by collecting data about each participant that might indicate their usual search habits, including their interest in and knowledge of the search topic, and by querying them at the conclusion of the research about their method of completion. The survey instrument also includes an "Attention Check" question designed to ensure that participants are carefully reading instructions. This was recommended by Qualtrics as a method for helping to ensure valid responses. The participant recruiting tool, Mechanical Turk, also captures the time that each participant spent on the study for additional insight.

3.8 Query Subject and Selection of the Documents

The selection of a subject query and the decisions about which documents should be displayed was an important consideration in the design of the research. The goal was to use a subject query that would be of wide and general interest. The decision to use the

health impacts of caffeine was made easier by the fact that the same query had been successfully used in a very small study on document selection completed for a class project by the author in May 2012. The decision about which documents to use was made on the need to have variety in terms of sources, type, timeliness and content. There was a need to provide a realistic feel to the document set which was accomplished by using the search string “health impacts of caffeine” into Google Search in November 2014. Several searches were done and documents were selected from four different sets of search results. The document attributes appear in the Table 8 as shown below:

Table 8 Document Attributes

| Document Number | Type | Date | Source | Unusual Features |
|------------------------|-----------------------------|----------------|--------------------------------|---|
| 1 | Scholarly | December 2010 | Journal of Alzheimer's Disease | --- |
| 2 | YouTube Video | September 2012 | TYT University | Video with large picture; many viewer comments |
| 3 | Scholarly/Popular | September 2004 | The Psychologist | UK Based |
| 4 | Popular Access to Scholarly | April 2013 | Medline Plus | --- |
| 5 | Popular | Undated | The National Geographic | Color logo of NG and illustration from article included |
| 6 | Popular | Undated | Drugs.com | Advertising shown |
| 7 | Popular | Undated | CaffeineInformer | Survey on page |
| 8 | Popular | Undated | US Food & Drug Administration | --- |
| 9 | Addiction | December 1994 | Addiction | Focus on commercial interests |
| 10 | Popular | Undated | LifeHacker | Graphics on page |

Eisenberg & Barry (1988) found that “relevance judgments are affected by the order of presentation of items to be judged” (p. 297). Their study did not allow for users to go back and change ratings once the entire document set had been seen. In order to ameliorate order effects, participants in this study were told (and were able) to go back and forth between documents when making selections. Florance & Marchionini (1995)

identified the “recursive” and “additive” information strategies. They found that while some users may use an additive strategy to build an answer sequentially, others use a recursive strategy which is non-sequential and may involve passing up “information as irrelevant: and the return to it later because a “new information makes it seem more valuable.” (p. 160). A random document order was generated for the set by the author but the study was designed so that all participants would see the documents in the same order to reduce any power of document order.

3.8 Instrument

The survey was developed on Qualtrics. The final survey is attached as Appendix B.

3.9 Pilot Study

It was decided that a staged pilot study would help to ensure high quality results. The three stages included:

Stage One: This stage involved the solicitation of four participants to take the study on paper as a check for wording, usability and understandability. This was accomplished by use of 2 females and 2 males in the author’s personal circle varying in age from 25-62. All comments were reviewed and those with helpful suggestions were included in the next round of the survey. An interesting issue arose regarding the use of personal data. One participant noted that she maintained an alternate email address to use with websites and producers with whom she did not want to have an ongoing relationship. This resulted in the addition of the questions about alternate email addresses. The rest of the comments tended to be minor and focused on grammar. No one had a problem understanding how to complete the survey or the purpose of the research.

Stage Two: This stage involved the creation of a small dataset. It was decided that the primary researcher would create 16 dummy cases in order to test the instrument and

to ensure that the data being generated was the correct data to answer the research questions. This dataset was also used to ensure that the data could be properly generated on Qualtrics and moved to SPSS which was selected as the statistical software package for the final analysis of the data. In order to create the dummy cases, the author used the “contacts” list in her cellphone and randomly selected 16 people. Since she has knowledge of these individual’s attitudes and habits, she was able to complete the research in a more life-like manner than if it had been random generation of responses.

Stage Three: This stage involved a collection of 40 live responses for further analysis and confirmation that the survey was working and answering the research questions. Forty participants were recruited via Mechanical Turk and offered \$5.00 for completion of the survey. The data was collected in less than one hour. Payment was made after the answers were reviewed. Only one participant failed the attention check question so that case needed to be deleted from the data set. Extensive testing was able to be conducted on this data set and a plan for analysis of the larger data set was created after this stage of the pilot test. This stage also provided the necessary information to pay participants in the final study \$3.00 as the higher amount used in it resulted in such rapid and high quality results that it was deemed able to be reduced for the larger test group.

3.10 Analysis

The analysis planned for each research question is shown below:

Table 9 Hypotheses with Proposed Data Analysis Method

| Research Question | Research Hypothesis | Null Hypothesis | Variables | Unit of Analysis | Applicable Statistical Test | Expected Finding | What to Look For |
|--|---|---|---|-------------------|-----------------------------|--|--|
| RQ1 What impact on document selection behavior occurs when information consumers are faced with expenditures of money, time or personal to select documents compared to document selection when all documents are free? | H1: Users will select a different total number of documents when documents are free than when they must expend money, time or personal data to select | Null: There will be no difference in the total number of documents selected when documents are free than when users are required to expend money, time or personal data to select | Create New Variable which is Total Number Selected for each individual and another new variable which is number selected by group | Individual/ Group | ANOVA | Users will select more documents when documents are free | Null hypothesis can be rejected if F ratio is less .05 (level of significance) |

| | | | | | | | |
|---|---|--|---|------------|-----------------------|--|--|
| RQ2 Do consumer variables, including attitudes about money, time and privacy, impact document selection when the expenditures of money, time and personal data collection are placed on documents? | H2: Consumer Variables will have an impact on the total number of documents selected by members of each group | Null: Consumer Variables will not have an impact on the total number of documents selected by participants . | Use Total Number selected by Individual and All Consumer Variables (See Appendix A) | Individual | Pearson's Correlation | <p>There will be high correlations between some of the IVs and the DV</p> <p>Some of the Consumer Variables are going to be good predictors of DV</p> <p>(Example: There will be a high correlation between people who spend money easily and the number of docs they select</p> | Looking for a correlation coefficient between 1 and zero Possible Multicollinearity issues |
|---|---|--|---|------------|-----------------------|--|--|

| | | | | | | | |
|--|--|---|---|------------|-----------------------|---|---|
| RQ3 Do Demographic variables, including age, gender and educational level, impact document selection when the expenditures of money, time and personal data collection are placed on documents? | H3: Demographic Variables will have an impact on the total number of documents selected by members of each group | Null: Demographic variables will not have an impact on the total number of documents selected by participants . | Use Total Number selected by Individual and Demographic Variables | Individual | Pearson's Correlation | <p>There will be high correlations between some of the IVs and the DV</p> <p>Some of the Demographic Variables are going to be good predictors of DV</p> <p>(Example: There will be a high correlation between people who are not always rushed for time and the number of documents they select.</p> | <p>Looking for a statistically significant coefficient</p> <p>Possible Multicollinearity issues</p> |
|--|--|---|---|------------|-----------------------|---|---|

| | | | | | | | |
|--|--|---|---|-------------------|------------------------------|---|--|
| <p>RQ4 Do the variables involved in assessment of the research study impact document selection when the expenditures of money, time and personal data collection are placed on documents?</p> | <p>H4: Research variables will have an impact on the total number of documents selected by members of each group</p> | <p>Null: Research variables will not have an impact on the total number of documents selected by participants</p> | <p>Use Total Number selected by Individual and Research Variables</p> | <p>Individual</p> | <p>Pearson's Correlation</p> | <p>There will be a significant correlations between some of the IVs and the DV</p> <p>Some of the Research are going to be good predictors of DV</p> <p>(Example: There will be a high correlation between those who found the research relevant and the number of documents they select)</p> | |
|--|--|---|---|-------------------|------------------------------|---|--|

| | | | | | | | |
|--|--|---|---|---------------------------------------|-------|---|--|
| RQ5 Does the selection of a “best document” from a document set vary when the expenditures of money, time and personal data collection are placed on documents? | H5: The document selected as best will vary from group to group. | Null: There will not be a difference in the document selected as best. It will be standard across groups | Calculate what is chosen as best document by individual | Individual Choice/Group/Entire Sample | ANOVA | Stronger documents will stand out regardless of group | |
| RQ6 Does the reason individuals provide when asked to select one “best document” from a document set vary when the expenditures of money, | H6: Users will give different reasons for selecting best document depending on group | Null : There will not be a difference in the reasons given for selecting the best document depending on group | Code and calculate reason for selecting best document | Individual/Group/Entire Sample | ANOVA | Users reasons for selected documents will cluster around source (authority) and content | |

Chapter 4 Results and Findings

4.1 Introduction

This chapter presents the results and findings of the research. Discussed here are the mechanics of the posting of the survey, payment of participants, a demographic profile of the participants and reviews the findings using each of the research questions as posed in Chapter 1. Variable Tables have been created to summarize the results for all variables and appear at the end of this chapter. The variables appear in these tables (numbers 21-24) by type of variable. Table 21 shows results for scale variables; Table 22 show the results for nominal variables; Table 23 shows the results for ranked variables and Table 24 shows the results for the qualitative research variable. More discussion of the findings appears in Chapter 5.

4.2 Data Gathering Process

The link to the Qualtrics survey was posted on Mechanical Turk on Thursday, February 5, 2015 in the mid-afternoon. There was a 100 participant limit set on each treatment group. The goal of having 400 participants was met in about one hour of having the HIT live. At that point, the survey was closed. All survey responses were subsequently reviewed for accuracy before payment. Two participants failed the attention check so received no payment. The survey completed with 401 total responses of which 399 were valid. Information about the survey participation was received from both Mechanical Turk and Qualtrics.

From Mechanical Turk, the following was learned:

- Average Time Per Assignment: 17 minutes, 36 seconds
- Effective Hourly Rate: \$10.22 (This rate is calculated by taking the average time per assignment and extrapolating that across 60 minutes with a \$3.00

payment.)

Qualtrics generates Survey Durations, as shown below for this study. The shortest time shown was 2 minutes, the longest time was 44 minutes.

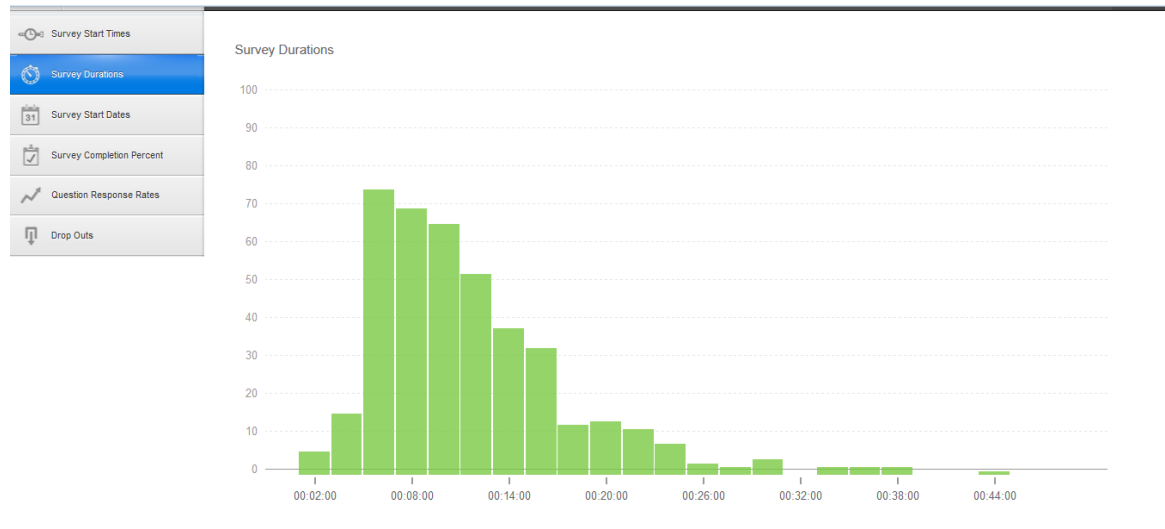


Figure 11 Survey Durations Graph

(Y axis is number of participants)

4.3 Participant Profile

The demographic variables provide insight into the participants. By utilizing descriptive statistics, the following profile of the participants can be drawn:

Table 10 Participant Profile

| Variable | Measurement | Result | | | |
|--|---|--------------------------|-----------|--------|----------------|
| Highest Level of Education Attained | Six choices from “Some Middle or High School” to “Doctoral or Professional Degree” | Highest Level | Frequency | % | |
| | | High School or less | 46 | 12.0 | |
| | | College or College Grad | 311 | 77.0 | |
| | | Master or Doctoral Level | 42 | 11.0 | |
| Highest Level of Education Attained by Head of Household | Seven choices from “Am Head of Household” to “Doctoral or Professional Degree” | Highest Level | Frequency | % | |
| | | Am HOH | 101 | 25.2 | |
| | | High School or less | 39 | 9.9 | |
| | | College or College Grad | 213 | 53.2 | |
| | | Master or Doctoral Level | 46 | 11.4 | |
| Age | Nominal with any | Mean | Median | Mode | Range |
| | number from 18 to 99 acceptable | 33.5 | 31 | 25 | 19-69 |
| Gender | Three options: Male Female Prefer not to state | Gender | Frequency | % | |
| | | Male | 234 | 6 | |
| | | Female | 164 | 41.1 | |
| | | Prefer Not to State | 1 | .2 | |
| Net Income Estimate | Open ended | Mean | Median | Mode | Range |
| | | 54,336 | 50,000 | 50,000 | 10,000-250,000 |
| US or Canada | 1 (US), 2 (Canada) | 410 US/0 Canada | | | 100% US |
| Who Pays for Internet Outside Work | Seven choices including Self/Spouse, Parents, School, Commercial Institutions, Public Libraries, Other, Don't Know (<i>See note on p. x about the measurement of this variable</i>) | Source | Frequency | % | |
| | | Self | 344 | 85.8 | |

A summary of the participant demographic shows the following:

- Average Age: 33.5 years of age
- Gender: Male (60%), Female (40%)
- All were residents of the United States
- Approximately 77% have some college education or hold a college degree
- When asked to provide an estimate of how much annual income they believe

they should be receiving, the median figure generated by participants was \$50,000. (Note: The US Bureau of Labor Statistics reports that median annual income for those with some college and college degrees in 2013 was \$45,274 so the figure supplied by the participants appears to be realistic: Source: http://www.bls.gov/emp/ep_chart_001.htm

4.4 Hypothesis Testing and Results

Research Hypothesis One: Users will make different total document selections from a set of documents when expenditures are required compared with a set in which no expenditure is required.

This hypothesis represents the primary focus of the study. A new variable, Total Selected, needed to be created in order to do the analysis. To accomplish this, the number selected by each participant was totaled and added to the available variables.

It was decided that an ANOVA would be the best test to determine if there were significant differences in the means of the various groups. The six assumptions needed for a successful ANOVA, as listed below, were all met.

Hypothesis One was tested with the use of a boxplot, as shown below:

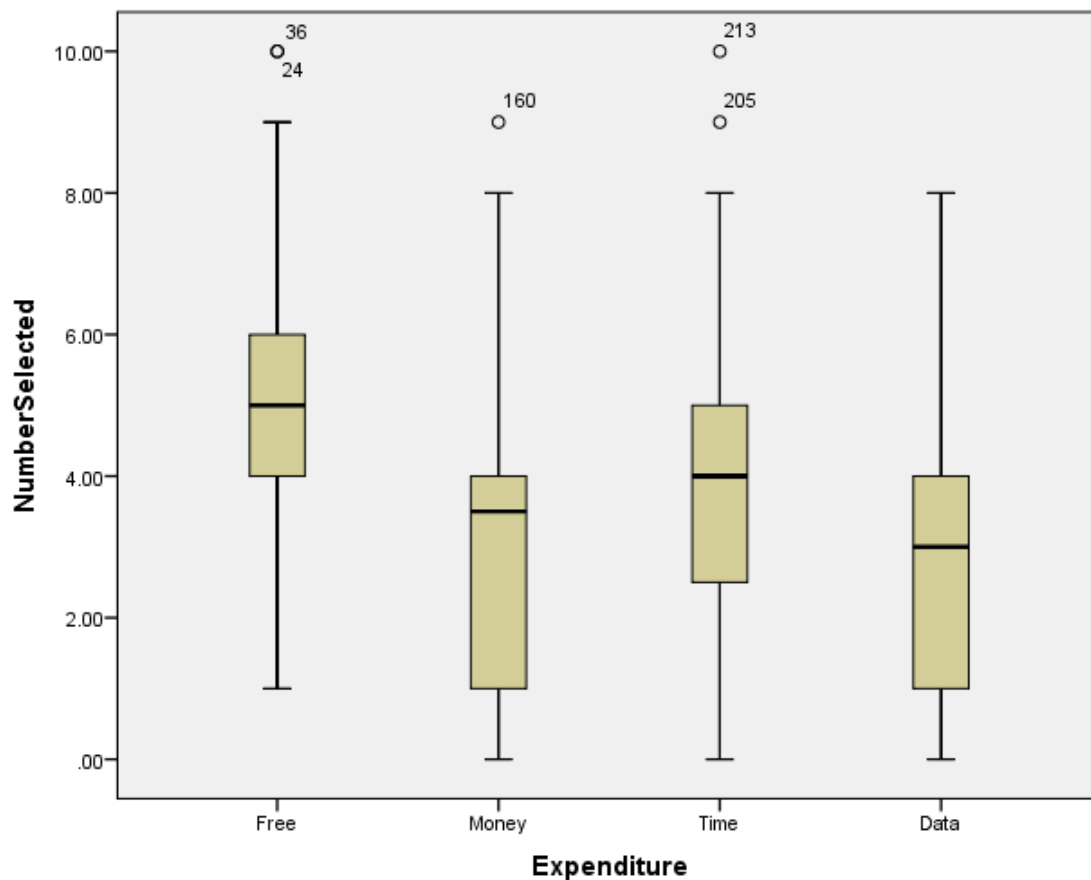


Figure 12
Box plot of four treatment groups with Mean Number of Documents Selected

Outliers

The boxplot shows five outliers: cases 24, 36, 160, 205 and 213. Case 160 was one of the participants who failed the attention check and was not paid for participation in the study. The results from this case were not used in other analyses.

There were two outliers in the control group, case 24 and 36. Case 24 reported very high ratings for Privacy and Spending Habits yet only selected five documents. The remaining four outliers showed a similar propensity for selection of a large number of documents with all of them selecting either 9 or the total set of 10 documents as compared to an overall mean of 3.8. All cases also showed well above mean responses are questions relating to Spending Habits and three out of four showed well above mean responses on the question relating to privacy concerns. Two of

the four reported estimated annual incomes well below the mean (\$20,000 and \$25,000) while two were close to the mean of \$50,000 per year. Two were male and two were female. Their ages were within the mid-range of those reported at 21, 24, 38 and 40. None described themselves as head of household.

Box Plot Analysis

- The boxplot generated shows that the median value for the Free condition is well above that of the other conditions.
- The boxplot also reveals that the median values for money and personal data are similar.
- The boxplot reveals that the median value for time is in between the values of Free and those of Money and Personal Data.
- It should be noted that any constraints on document selection results in greater selectivity.

Determining Normal Distribution

To determine if the distributions were normal, QQ Plots for all four groups were created. It was discovered that all four conditions showed normal distribution with the 45 degree line representing expected distribution and the circles selected from the dataset corresponding quite closely. This confirmed that there was no systematic error in the data. QQ plots appear in Appendix C.

Homogeneity of Variances

It is necessary to run a test to determine that the homogeneity of variances is not violated.

Test of Homogeneity of Variances

NumberSelected

| Levene Statistic | df1 | df2 | Sig. |
|---------------------|-----|-----|------|
| .454 | 3 | 397 | .714 |

Table 11 Levene Test Results

The Levene Statistic reveals the Tukey test is the correct test to use because it shows that the variances of the number of documents selected are equal across the expenditure condition.

As a final step, descriptive statistics were reviewed and the following observations made:

Descriptives

Number Selected

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|-----|--------|-------------------|---------------|-------------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| Free | 98 | 5.0000 | 2.03576 | .20564 | 4.5919 | 5.4081 | 1.00 | 10.00 |
| Money | 102 | 3.2647 | 1.96467 | .19453 | 2.8788 | 3.6506 | .00 | 9.00 |
| Time | 100 | 3.9500 | 2.10519 | .21052 | 3.5323 | 4.3677 | .00 | 10.00 |
| Data | 101 | 3.1584 | 2.02846 | .20184 | 2.7580 | 3.5589 | .00 | 8.00 |
| Total | 401 | 3.8329 | 2.15395 | .10756 | 3.6215 | 4.0444 | .00 | 10.00 |

Table 12

Descriptive Statistics, Group Means, Total Documents Selected

Data as presented here as mean \pm standard deviation. The total number of documents selected was highest in the Free group (5.0 ± 2.0), followed by Time (4.0 ± 2.1), followed by Money (3.3 ± 2.0) and then very closely by the lowest group being Data (3.2 ± 2.0). The Means vary from 3.2 to 5 but the standard deviations only vary from 2.0 to 2.1, a very small range.

One Way ANOVA Results

Table 13
One way ANOVA Results

ANOVA

Number Selected

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|--------|------|
| Between Groups | 213.737 | 3 | 71.246 | 17.225 | .000 |
| Within Groups | 1642.068 | 397 | 4.136 | | |
| Total | 1855.805 | 400 | | | |

The sig value shown in the final column means that the average number of documents selected is **significantly different** between expenditure conditions. The effect size (η^2) was then calculated as follows:

$$\eta^2 = \frac{SS_B}{SS_T} = \frac{213.7}{1855.8} = 11.5\%$$

This means that 11/5% of the variability in the number of documents selected was to due to the treatment effects.

The significance value of .000 indicates that only 1 in 1000 times would this finding occur by chance alone, indicating strong results.

More discussion of these findings will appear in Chapter 5.

POST HOC Tests—Tukey

The Tukey post hoc test was selected because of the results of the Levene's Statistic as discussed above. Results of the Tukey test are shown in the table below:

Table 14 Tukey HSD Results
Multiple Comparisons-Tukey HSD

Dependent Variable: Number Selected

| (I) Expenditure | (J) Expenditure | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|-----------------|-----------------|-----------------------|------------|------|-------------------------|-------------|
| | | | | | Lower Bound | Upper Bound |
| Free | Money | 1.73529* | .28768 | .000 | .9931 | 2.4775 |
| | Time | 1.05000* | .28908 | .002 | .3042 | 1.7958 |
| | Data | 1.84158* | .28837 | .000 | 1.0976 | 2.5856 |
| Money | Free | -1.73529* | .28768 | .000 | -2.4775 | -.9931 |
| | Time | -.68529 | .28620 | .080 | -1.4237 | .0531 |
| | Data | .10629 | .28549 | .982 | -.6303 | .8428 |
| Time | Free | -1.05000* | .28908 | .002 | -1.7958 | -.3042 |
| | Money | .68529 | .28620 | .080 | -.0531 | 1.4237 |
| | Data | .79158* | .28690 | .031 | .0514 | 1.5318 |
| Data | Free | -1.84158* | .28837 | .000 | -2.5856 | -1.0976 |
| | Money | -.10629 | .28549 | .982 | -.8428 | .6303 |
| | Time | -.79158* | .28690 | .031 | -1.5318 | -.0514 |

The Tukey test reveals that:

- The average number of documents chosen in the Free condition is significantly higher than in the Money condition.
- The average number of documents chosen in the Free condition is significantly higher than in the Time condition.
- The average number of documents chosen in the Free condition is significantly higher than in the Personal Data condition.
- The Money condition and the Personal Data condition are not significantly different with respect to average number of documents selected.
- The Money condition and the Time conditions are marginally different with respect to the average number of documents selected with the average number being less for Money than for Time.

- The Personal Data condition and the Time condition provide significant differences in number of documents selected with the average number of documents being less for the Data condition than for the Time condition

H1 FINDINGS: These results are interesting with perhaps the most surprising finding being that the boxplot results were confirmed with the similarity of Money and Personal Data in their ability to impact document selection behavior. The following findings can be stated:

- **Participants in the Free group selected a significantly higher mean number of documents than those in any other group.**
- **Participants are reacting/valuing the same information differently depending on the condition they are in.**
- **Participants selected the similar mean number of documents in the Money and Personal Data groups.**
- **Participants in the Time condition selected a mean higher number of documents than in the Money or Personal Data groups.**

Research Hypothesis Two: Consumer Variables will have an impact on the total number of documents selected by participants.

Scatterplots for selected variables were run initially to check for linearity. The variables chosen were expected to have a significant correlation with total number selected. Those chosen were:

- How Often Real Email Supplied
- How Often Alternate Email Supplied
- Knowledge of the Health Impacts of Caffeine

These were anticipated as variables that might provide correlation to the dependent

variable.

The scatterplots appear in Appendix D. No apparent linearity can be seen in these plots.

Since it seemed puzzling that linearity could not be established, it was decided to run the Pearson's correlation for more data. This test confirmed that there were not significant correlations between the Consumer Variables selected and the Total Number Selected. All Correlation tables appear in Appendix E.

H2 Findings: There were no significant correlations between the Consumer Variables and the Mean Number of Documents selected.

This was surprising as it was expected that behaviors and attitudes would impact the ultimate selection of documents. The variables that were created to assess participant's attitudes about spending might have been correlated to their spending in the Money condition along with attitudes and actions about privacy and time having correlations there. The fact that there were no correlations points to the overarching importance of the expenditure in determining their document selection behavior.

Research Hypothesis Three: Demographic variables will have an impact on the total number of documents selected by participants.

Scatterplots for selected variables were run initially to check for linearity. The variables chosen were expected to have a significant correlation with total number selected. Those chosen were:

- Age
- Perceived Annual Income Worth

The scatterplots appear in Appendix C. No apparent linearity can be seen in these plots.

Since it seemed puzzling that linearity could not be established, it was decided to run the

Pearson's correlation for more data. This test confirmed that there were no significant correlations between the Demographic Variables and the Total Number Selected. All Correlation tables appear in Appendix D.

H3 Findings: There were no significant correlations between the Demographic Variables and the Mean Number of Documents selected.

This was surprising as it was expected that demographic variables might have some impact on document selection behavior. The strongest variable was expected to be the participants' estimate of how much they believed they should earn annually as it would seem that a relationship could exist between high income individuals and spending money for information. It was posited that age might influence document selection behavior with younger participants being more likely to provide an email address than older ones. The fact that such correlations do not exist again points to the impact of the treatment and potentially to the power and validity of the statement that "information wants to be free."

Research Hypothesis Four: Research variables will have an impact on the total number of documents selected by participants.

Scatterplots for selected variables were run initially to check for linearity. The variables chosen were expected to have a significant correlation with total number selected. Those chosen were:

- Research Interest
- Research Relevance

The scatterplots appear in Appendix C. No apparent linearity can be seen in these plots. Since it seemed puzzling that linearity could not be established, it was decided to run the Pearson's correlation for more data. This test confirmed that there were no significant correlations between the Research Variables and the Total Number Selected. All Correlation tables appear in Appendix D.

H4 Findings: There were no significant correlations between the Research Variables and the Mean Number of Documents selected.

Although correlations with these variables were not expected to be as strong as those with Consumer or Demographic variables, it is interesting that no correlations existed at all. This may be related to the participant pool.

Other Relationships Tested

The lack of correlation between any of the Consumer, Demographic and Research (non-treatment) variables with the Pearson's Correlation test discovered that there was no linear relationship between them as discussed above.

To determine whether curvilinear relationships or non-linear relationships might be found, all permutations of the non-treatment variables were also tested against the dependent measure, the total number of documents selected, in regression models. None of these regression models produced meaningful results and thereby confirmed that none of the non-treatment variables were responsible for explaining variability in the total number of documents selected.

Research Hypothesis Five: The document selected as best will vary from group to group.

Note: A summary of the documents appears in Chapter 3, section 3.9.

In order to analyze this hypothesis, it was necessary to determine what was chosen as best by each group. The following was determined:

Table 15 Summary of Best Document Selected by Group

| Group | N= | Best Doc | # of participants who selected as best document (out of total group sample) | # of participants who selected second most popular document | Mean # of documents selected by Group |
|-------------------|-----|-------------|---|---|---------------------------------------|
| 1 (Free) | 99 | 8 | 33 | 11 (#1) | 5 |
| 2 (Money) | 100 | 8 | 23 | 16 (#4) | 3.3 |
| 3 (Time) | 99 | 10, 2 (tie) | 18 | tie | 4 |
| 4 (Personal Data) | 100 | 5 | 24 | 21(#8) | 3.2 |

When viewed by document, best document selections appear as follows:

Table 16 Summary of Best Document by Document

| Document Number | Group One | Group Two | Group Three | Group Four | Total Selecting |
|-----------------|-----------|-----------|-------------|------------|-----------------|
| 1 | 11 | 12 | 10 | 10 | 43 |
| 2 | 3 | 6 | 18 | 4 | 32 |
| 3 | 16 | 11 | 11 | 6 | 44 |
| 4 | 7 | 16 | 8 | 9 | 40 |
| 5 | 8 | 13 | 11 | 24 | 55 |
| 6 | 9 | 4 | 3 | 6 | 22 |
| 7 | 1 | 1 | 2 | 2 | 6 |
| 8 | 33 | 23 | 17 | 21 | 94 |
| 9 | 1 | 2 | 2 | 3 | 8 |
| 10 | 9 | 13 | 18 | 14 | 55 |
| | | | | | 399 |

A graphic depiction of Table 16 on the following page reveals more information.

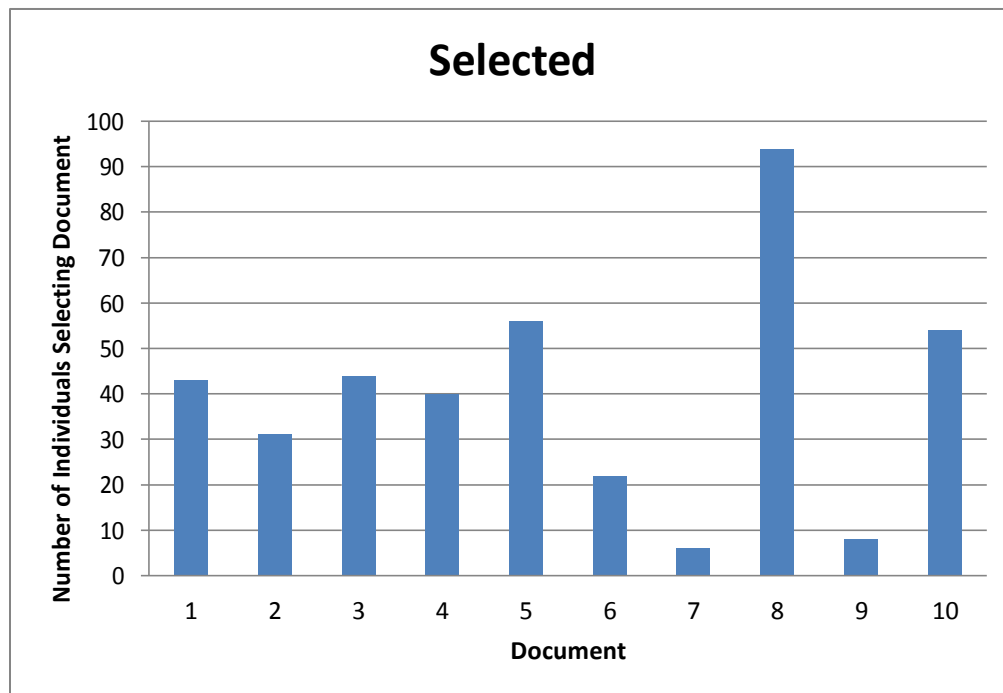


Figure 13 Most Selected Documents

It can be seen that the documents that varied most from the norm are documents 7, 8 and 9. The characteristics of these reveal that the most popular is Document 8. Characteristics of this document include that it was from a popular source, the US Food and Drug Administration. No date was given on the document representation, although participants may have assumed that a website as supplied by the US Government, is very up to date.

The least selected as best document were Document 7, also from a popular source a, The CaffeineInformer, although this source is not as widely known as the US Food and Drug Administration. No date was available for the document. Document 9, which was also well below midrange in terms of number of participants selecting, was from Addiction, which appears to be a mix of scholarly and popular content. The date listed was December 1994, and it was the oldest document in the document set made available. This document took an unusual approach to the discussion of caffeine by focusing on the commercial interests that

may benefit financially from having people become addicted to caffeine and would provide seemingly little value to those seeking information about the health impacts of caffeine.

H5 Findings: There was a slight variation in what was selected as best document depending on treatment group. The data does not lend itself to further statistical testing. Deeper analysis across groups revealed one document was by far the most selected and several were well below average in the number of those who selected.

Research Hypothesis Six: There will be a difference in the reasons given for selecting the best document depending on group.

This hypothesis can be tested by coding the qualitative data provided by participants and then determining the most important factor in the participants' selection. Participants were told they were to provide a reason for selecting the document as best document in 4-20 words. In order to do so, it was necessary to develop a codebook that represented all possible answers. This required examination of past research to discern the reasons participants have given for document selection. A traditional measure used in document selection is information quality.

Belkin & Rieh (2002) compiled a table showing definitions of quality as shown below:

Table 17 Comparison of Dimensions of Quality in Five Studies by Belkin & Rieh

| Marchand (1990) | Fox et al. (1996) | Taylor (1986) | Klobas (1995) | Olaisen (1990) |
|--|---|--|--|---|
| Quality Management | Data Values in Data Quality | Quality in the Value-add Model | Information Quality | Information Quality |
| Actual Value Aesthetics Features Meaning over time Perceived Value Relevance Reliability Validity | Accuracy Completeness Consistency Currency | Accuracy Comprehensiveness Currency Reliability Validity | Accuracy Authority Currency Novelty | Accessibility Actual Value Completeness Credibility Flexibility Form Meaning over time Relevance Reliability Selectivity Validity |

An analysis of the quality dimensions revealed in the studies above revealed similarities among and between them, and provided a useful basis for the codes needed in this study. It was decided that it would be beneficial to minimize the number of possible codes while providing enough flexibility to handle the majority of responses.

The following codes were created:

Table 18 Codes Used for Qualitative Coding

| Code Number | Code Name | Description of Code |
|-------------|--------------------|---|
| 1 | Source | Authority, Credibility, Reliability, Trust |
| 2 | Personal Relevance | Aspect of topic impacting personal situation |
| 3 | Timeliness | Currency |
| 4 | Content | Comprehensiveness, Completeness, Breadth, Validity, Balance |
| 5 | Other | Format, Aesthetics, Novelty, Form |

An analysis of the reasons by group appears as follows:

Table 19 Reasons for Selection of Best Document By Group

| # of participants using that reason (out of total group sample) | Group | N= | Best Doc | Top Reason Selected | # Selecting in Each Group |
|---|-------------------|-----|-------------|---------------------|---------------------------|
| | 1 (Free) | 99 | 8 | 4 (Content) | 47 |
| | 2 (Money) | 100 | 8 | 1 (Source) | 41 |
| | 3 (Time) | 99 | 10, 2 (tie) | 4 (Content) | 41 |
| | 4 (Personal Data) | 100 | 5 | 4 (Content) | 35 |

Content was the most given reason for naming a document “best document”. Some of the comments given by those using this code included:

Content-Sample Responses

- “It has the most solid, scientific evidence”
- “It seems pretty scientific and it presents pros and cons on the issue”
- “It seems the most unbiased and, and seems to just be providing the facts”
- “It gets to the heart of the matter which is how caffeine affects the brain”
- “It gives me enough details and lists the main things about caffeine”

Sample responses for the other codes are as follows:

Relevance—Sample Responses

- “It is relevant to me as I have a child of that age”
- “My father has Alzheimer’s”

- “Alzheimer’s disease runs in my family, so I am interested most in this article”
- “I am interested in this specific research area”
- “I’m not really good at reading and retaining information that way so a video form would help me to understand the subject better”

Timeliness—Sample Responses

- “Most current research available amongst research papers”
- “It is one of the most current and seems to be very in depth”
- “It’s the most recent, comprehensive study I can see”
- “This is a recent document and seems to outline everything I want to know”
- “This is the most up to date piece of info by something that could be considered proper science”

Source—Sample Responses

- “The document comes from a fairly unbiased source. The source doesn’t receive funding from paid sources”
- “The Food and Drug Administration is a government organization”
- “I trust the FDA to provide thorough, accurate and useful information”
- “It’s coming from a trusted source, one I am quite familiar with”
- “I have been a longtime fan of Lifehacker and trust their hacks”

Other-Sample Responses

- “It has video. Who really reads LOOONG articles nowadays? It is 2015 already. Give me the visual representation”
- “Makes it easy to read in a fun format.”
- “It looks the most likely to hold my attention”

- “I didn't want to choose any, since I don't want to give away my email address”
- “If I am paying for something, I would rather watch a video”

Coding reliability was confirmed by having the data coded by another individual after the initial coding was completed by the researcher. The individual selected was a fellow MLIS graduate and information professional. The instructions provided were to read each comment and code it with the appropriate numeric code. In the case of a comment where more than one reason was included, the instructions indicate that the code should be applied for the first reason given.

Cohen's kappa was run in SPSS to determine intercoder reliability. There was good agreement with the kappa=.663, with $p < .0005$.

Table 20 Cohen's Kappa for Intercoder Reliability

| Symmetric Measures | | | | | |
|----------------------|-------|-------|-----------------------------------|------------------------|--------------|
| | | Value | Asymp. Std. Error ^a | Approx. T ^b | Approx. Sig. |
| Measure of Agreement | Kappa | .663 | .030 | 19.482 | .000 |
| N of Valid Cases | | 395 | | | |

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

H6 Findings: Content was given as the primary reason for selecting a document as best document in Group One (Free). Content was given as the primary reason for selecting a document as best document in Groups Two, Three and Four. Although these data is not able to provide an in-depth statistical analysis of the reasons given, the conclusions do give weight to those currently positing that the source of a document, once a primary indicator of authority and value, may be waning. Dede's description of a shift in epistemology from the classical in which 'Premier reference sources, such as the *Encyclopedia Britannica*, and curricular materials, such as textbooks, embody "authenticated" knowledge as compiled by experts and transmitted to learners" (p. 80) to an epistemology which is more collaborative and less dependent on experts may be reflected here with more participants choosing content over source as the primary reason for their best document selection. This result also reflects the finding of Wang & Soergel (1998) that documents with epistemic and functional value were most often selected.

Variable Result Tables

Table 21 Results for Scale Variables

| Variable Name | Description and Measurement Scale | Mean | Median | Mode | Standard Deviation | Minimum | Maximum | Skewness | Kurtosis |
|------------------|--|------|--------|------|--------------------|---------|---------|----------|----------|
| Spending Habits1 | 11 Point Likert with “spend too freely” as 1 and “Have difficulty spending” as 11 | 7 | 8 | 9 | 2.5 | 1 | 11 | -.437 | --.597 |
| Spending Habits2 | 11 point Likert scale with extremes being “Spend too much” and “Usually Save | 7 | 7 | 9 | 2.66 | 1 | 11 | -.806 | .243 |
| Time | 11 point Likert scale with extremes being “Have Enough Time” and “Feel Rushed” | 5.88 | 6.00 | 4 | 2.699 | 1 | 11 | .034 | -.806 |
| Privacy | 11 point Likert scale with extremes being “Don’t Worry about Privacy” and “Very Concerned about Privacy” | 7.43 | 8 | 11 | 2.810 | 1 | 11 | -.524 | -.983 |

| | | | | | | | | | |
|--------------------------------------|---|------|---|---|-------|---|----|-------|--------|
| How Often Watch Ads | 11 point Likert scale with extremes being "Never" and "Very Frequently" | 6.85 | 7 | 8 | 2.863 | 1 | 11 | -.353 | -.911 |
| How Often Supply Alternate Email | 11 point Likert scale with extremes being "Never" to "Frequently" | 6.52 | 7 | 1 | .418 | 1 | 11 | -.134 | -1.311 |
| How Often Supply Real Email | 11 point Likert scale with extremes being "Never" to "Frequently" | 3.54 | 3 | 1 | 2.615 | 1 | 11 | 1.014 | .147 |
| How Often Supply Other Personal Data | 11 point Likert scale with extremes being "Never" to "Frequently" | 3.32 | 2 | 1 | 2.568 | 1 | 11 | 1.036 | .219 |

| | | | | | | | | | |
|---|--|------|---|----|-------|---|----|--------|-------|
| Knowledge of Health Impacts of Caffeine | 11 point Likert scale with extremes being "Minimal Knowledge" to "Very Knowledgeable" | 6.45 | 7 | 8 | 2.255 | 1 | 11 | -.359 | -.384 |
| Interest in Health Impacts | 11 point Likert scale with extremes being "Not at all Interested" to "Very Interested" | 6.79 | 7 | 8 | 2.945 | 1 | 11 | -.384 | -.856 |
| How Interesting Research | 11 point Likert scale with extremes being "Not at Interesting" to "Very Interesting" | 8.84 | 9 | 9 | 1.967 | 1 | 11 | -1.288 | 2.294 |
| How Relevant Research | 11 point Likert scale with extremes being "Not at all relevant" and "Very relevant" | 8.85 | 9 | 11 | 2.013 | 1 | 11 | -1.141 | 1.285 |

| | | | | | | | | | |
|------------------------|---|------|----|----|-------|---|----|--------|-------|
| How Realistic Research | 11 point Likert scale with extremes being "Not Like Real Life" and "Very Much Like Real Life Situation" | 8.78 | 9 | 11 | 2.137 | 1 | 11 | -1.121 | 1.188 |
| Fast or Careful | 11 point Likert scale with extremes being "Went as fast as I could" to "Answered Questions Carefully" | 9.81 | 11 | 11 | 1.674 | 1 | 11 | -1.627 | 2.401 |

Table 22 Results for Nominal Variables

| Variable Name | Measurement | Frequency | % |
|-----------------------|--------------------|-----------------|-------------------|
| Pay for Subscriptions | Yes/No | 90 Yes/309 No | 23% YES 77% NO |
| Alternate Email Y/N | Yes/No | 310 Yes/89No | 78% YES 22% NO |
| US or Canada | 1 (US), 2 (Canada) | 399 US/0 Canada | 100% US |

Table 23 Results for Ranked Variables

| Name | Measurement | Results | | | |
|--|--|--------------------------|-----------|------|-------|
| Pay for Individual Documents | Open ended answer for number of times, including zero | # of Ind Doc | Frequency | % | |
| | | 0 | 318 | 79 | |
| | | 1 | 28 | 7 | |
| | | 2 | 19 | 4.5 | |
| | | 3 | 15 | 3.5 | |
| | | 4 | 4 | 1.0 | |
| | | 5 | 12 | 3.0 | |
| | | 6 or more | 3 | 1.0 | |
| How Often Watch Ads Over Minimum | Three choices: Never Sometimes Frequently | Never/Sometimes/Freq | Frequency | % | |
| | | Never | 156 | 39 | |
| | | Sometimes | 228 | 57 | |
| | | Never | 15 | 4 | |
| Number of cups of Caffeine Consumed Yesterday | Nominal with any number including zero acceptable | # of cups | Frequency | % | |
| | | 0 | 88 | 20.7 | |
| | | 1 | 80 | 18.7 | |
| | | 2 | 106 | 25.2 | |
| | | 3 | 68 | 15.5 | |
| | | 4,5,6,8,12 | 57 | 19.9 | |
| Number of Hours Spent Daily Online Outside Work | Nominal with any number including zero acceptable | # of hours | Frequency | % | |
| | | 1 or less | 96 | 23.9 | |
| | | 1.5-4 | 213 | 53.7 | |
| | | 5-10 | 85 | 15.1 | |
| | | 12-20 | 5 | 1.2 | |
| Highest Level of Education Attained | Six choices from "Some Middle or High School" to "Doctoral or Professional Degree" | Highest Level | Frequency | % | |
| | | High School or less | 46 | 12.0 | |
| | | College or College Grad | 309 | 77.0 | |
| | | Master or Doctoral Level | 44 | 11.0 | |
| Highest Level of Education Attained by Head of Household | Seven choices from "Am Head of Household" to "Doctoral or Professional Degree" | Highest Level | Frequency | % | |
| | | Am HOH | 100 | 25.2 | |
| | | High School or less | 40 | 9.9 | |
| | | College or College Grad | 213 | 53.2 | |
| | | Master or Doctoral Level | 46 | 11.4 | |
| Age | Nominal with any number from 18 to 99 acceptable | Mean | Median | Mode | Range |
| | | 33.5 | 31 | 25 | 19-69 |
| Gender | Three options: Male Female Prefer not to state | Gender | Frequency | % | |
| | | Male | 234 | 58.6 | |
| | | Female | 164 | 41.1 | |

| | | | | | |
|------------------------------------|--|---------------------|------------------|----------------|-------------------------|
| | .2 | Prefer Not to State | 1 | .2 | |
| Net Income Estimate | Open ended | Mean 54,336 | Median 50,000 | Mode 50,000 | Range 10,000-250,000 |
| Who Pays for Internet Outside Work | Seven choices including Self/Spouse, Parents, School, Commercial Institutions, Public Libraries, Other, Don't Know | Source Self | Frequency 344 | % 85.8 | |

Table 24 Results for Qualitative Research Variable

| Variable Name | | | |
|------------------|---------------------|---|--|
| Anything Unclear | Open Ended Question | Summary: There were 28 comments. Nine participants commented that the study was very clear. selected comments appear below. | |

Selected Comments Responding to Statement "Please note any areas in which you found the research unclear or confusing."

- "None, I found it interesting because the way people search also affects my career as a librarian as well"
- "Information need and desirability would certainly depend on a baseline-- and, yes, you did ask how much I knew about caffeine--so I likely selected a much different article than if I had a lot less experience with caffeine. The article I selected I felt would give me the most info that I would not have already seen, as it seemed to indicate that there was some squelching of info due to lobbying by the industry"

- “I really enjoyed this survey! I can tell that you, as the requester, put thought into your layout and surveying techniques. As a full-time worker on MTurk, I greatly appreciate your efforts. Thank you!”
- “This was very straightforward. I was a bit confused as to why there was less of a summary on document eight as opposed to others “
- “None, but some of the articles presented looked extremely boring and plain”
- “I would have maybe wanted a little more of a directed purpose statement for my research. Is this for personal knowledge? A report? It might have influenced my ranking of the documents, perhaps”
- “It’s difficult because its information overload...and then I latch onto the FDA which may or may not be the best source as these agency’s tend to be behind the curve”
- “I was apprehensive about being truthful in the document selection, as I felt that I wouldn't have provided my email address to access any of them -- I'd have just searched for the info elsewhere on the 'net”

Chapter 5 Discussion and Conclusions

5.1 Overview

This objective of this study was to gain more understanding of how, and in what ways, consumers of digital information are willing to pay for, and thus express their finding of value in, general interest information. Four groups were studied: those who were required to make no overt expenditure, those required to spend a stated monetary budget, those who were required to expend time and those who were required to expend personal data.

An analysis of the data collected by the survey instrument, as outlined in Chapter 4, indicated that the study generated some significant findings. These findings, and their implications, are discussed in context of the research questions posed in Chapter 1.

5.2 Discussion of Findings related to Research Questions

RQ1 What impact on document selection behavior occurs when users are faced with expenditures of money, time or personal to select documents compared to document selection when all documents are free?

As discussed in Chapter 4, the statistical analysis of the results of the total number of documents selected by those in each of the four groups, conducted by a one-way ANOVA, found that the average number of documents selected is **significantly different** between expenditure conditions. This means that different required expenditures required of information consumers will cause them to select a different mean number of documents. A further statistical test, Tukey HSD (Honestly Significant Difference) was used to explore which groups differ. As shown in Chapter 4, the effect size calculation revealed that 11/5% of the variability in the number of documents selected was due to the treatment effect. As effect size is a measure of strength, this was a satisfactory result.

The Tukey test determined that the average number of documents chosen in the Free condition was significantly higher than in all three other conditions, those being money, time and personal data expenditure. While not surprising given the extant empirical evidence, it does provide a basis to explore what free actually means to consumers. Shampanier, Mazar & Ariely (2007) discuss the tendency of consumers to “overreact” to the price of free (p. 743) and in some cases increase how much they value products offered free. Their research on “zero as a special price” explores the significance of zero with three possible mechanisms and finds that the “zero-price effect might be better accounted for by affective evaluations than by social norms or mapping difficulty” p. 754). While the work of Shampanier et al. focusses on products that individuals are not accustomed to paying zero for, as may not be the case with information, their examination of the power of zero could provide illumination on the power of free with information.

The finding also raises questions about the culture and norms of the Internet as a distribution system that may contribute to the change in consumer behavior. Ghosh (1998) describes the early Internet culture as one of a modified (and hypothetical) “cooking pot model” in which individuals contribute and share resources without compensation (p. 13). Ghosh is specifically addressing those who contribute to the Internet with shared postings, technical expertise and other types of content but his analysis raises the issue of the interactive nature of the Internet which may lend itself to a free distribution model. The influence of the Internet’s early inhabitants may pervade users’ attitudes and behavior and create expectations of free content that have now become rigidified.

The Tukey test also determined that the Money condition and the Personal Data condition were not significantly different with respect to average number of documents selected. This treatment may need specialized research in future studies because a) the cost versus compensation issue previously noted may influence participants in this group to

select fewer documents in order to receive greater personal compensation and b) the financial incentive may work to have participants examine documents more carefully which could result in fewer selected. This is an interesting finding because it places expenditures of money and personal data in a similar category. The use of personal data as an exchange mechanism is growing rapidly and gaining the attention of consumers.

Schwartz's (2003) assertion that personal information is a currency led him to define a new market for personal data and he is viewing it clearly as an exchange mechanism for money.

In this setting, third party organizations may be purchasing personal data from brokers.

Personal data can also be viewed as a currency by those who trade it for more personal data in a social capital context as may be legitimized by the vast array of social media networks currently extant.

The third and final result from the Tukey test showed that the Money condition and the Time condition are marginally different with respect to the average number of documents selected with the average number being less for Money than for Time. This is interesting as money and time are so often given equivalent status in our personal and public discourse yet in this study, they separate, at least to a marginal degree. The higher mean for the time condition may give rise to the conclusion that information consumers are more willing to part with their time than their money in the acquisition process but the finding also needs to be examined in light of the contention by Soman (2001) that "It is possible individuals do not follow conventional 'red and black' accounting systems with time because it is cognitively more difficult" (p. 183). The difficulty in separating time and attention is also an important aspect that should be considered in evaluation of this finding as publishers and consumers may be at odds when publishers seek attention and consumers give them time.

Research Questions 2, 3, 4

RQ2 Do consumer variables impact document selection when the expenditures of money, time and personal data collection are placed on documents?

RQ3 Do demographic variables impact document selection when the expenditures of money, time and personal data collection are placed on documents?

RQ4 Do the variables involved in assessment of the research study impact document selection when the expenditures of money, time and personal data collection are placed on documents?

These Research Questions were formulated to search for correlations between individual characteristics and document selection behavior and no such correlations were found. This finding could be used to strengthen the initial one that the treatment groups were impacted by the treatment and not by any tested attributes of the individual participants. In this study, the treatment effect dominated in providing statistically significant results which explained the mean number of documents selected regardless of personal attributes. It is certainly possible that there are other personal variables outside the scope of this study that could have correlated with the dependent variable but the number of variables tested gives some indication that these types of variables may truly have little impact.

RQ5 Does the selection of a “best document” from a document set vary when the expenditures of money, time and personal data collection are placed on documents?

There were slight differences between groups in the “best document” selected. In both the free and money groups, document 8 (FDA) was selected as best. In the time group, there was a tie between documents 2 and 10 (LifeHacker and Video). In the data group, document 5 (National Geographic) was chosen as best.

When the responses of all groups are merged, however, a best document clearly emerges with almost 25% of the total participants selecting the same document (Document 8). This would seem to indicate that although the differences did exist when viewing by treatment, the expenditures were not strong enough to impact the assessment of this document overall.

It should also be noted that there did not appear to be any strong impact from the presentation order of the documents. There are several explanations for this:

- participants were not given results in the format of search engines where up to ten results can be viewed at a time allowing for a quick scan before making a selection
- the documents were presented in an order determined by the Principal Investigator and not ordered by a search engine and so the order did not necessarily reflect any calculated relevance
- participants did not select the search topic or the search words which created the document set so expectations could be different from a self-directed search

RQ6 Does the reason individuals provide when asked to select one “best document” from a document set vary when the expenditures of money, time and personal data collection are placed on documents?

Participants in the control group (free), and the time and personal data group provided reasons for their best document selection that led to coding their selection as based on content. The content code was designed to cover all aspects of content and was applied to some aspects of document format and presentation as well. The documents presented were written for a wide range of audiences from scholarly to popular although

they were all retrieved from a web search and no library databases were used so the scholarly documents should have been accessible to general readers.

The Money groups' explanations led to coding for Source. Although the data does not lead to in-depth statistical analysis, it points to an interesting trend which could be expressed as a consumer willingness to select documents with known "brands" when paying money for information. Consumers may be using a brand heuristic to make a selection as the brand may signal quality, comprehensiveness and other positives in the consumer's mind.

The study found that the groups did not select the same number of documents. It was also discovered that the independent variables categorized as Consumer, Demographic and Research did not significantly affect the number of documents selected by participants.

The revised research model, shown in Figure 14 reflects the outcome of the study. It can clearly be seen that participants in the money group selected a higher mean number of documents and that money and personal data acted as a higher barrier than time in terms of total number selected. These results appear in the revised model.

The independent variable groups did not have a significant effect on the results and so are deleted from the revised model.

An additional finding, not depicted in the revised model, is that the expenditures did not significantly affect what document participants selected as "best document". The group designation also did not significantly affect the reason they stated for choosing the document.

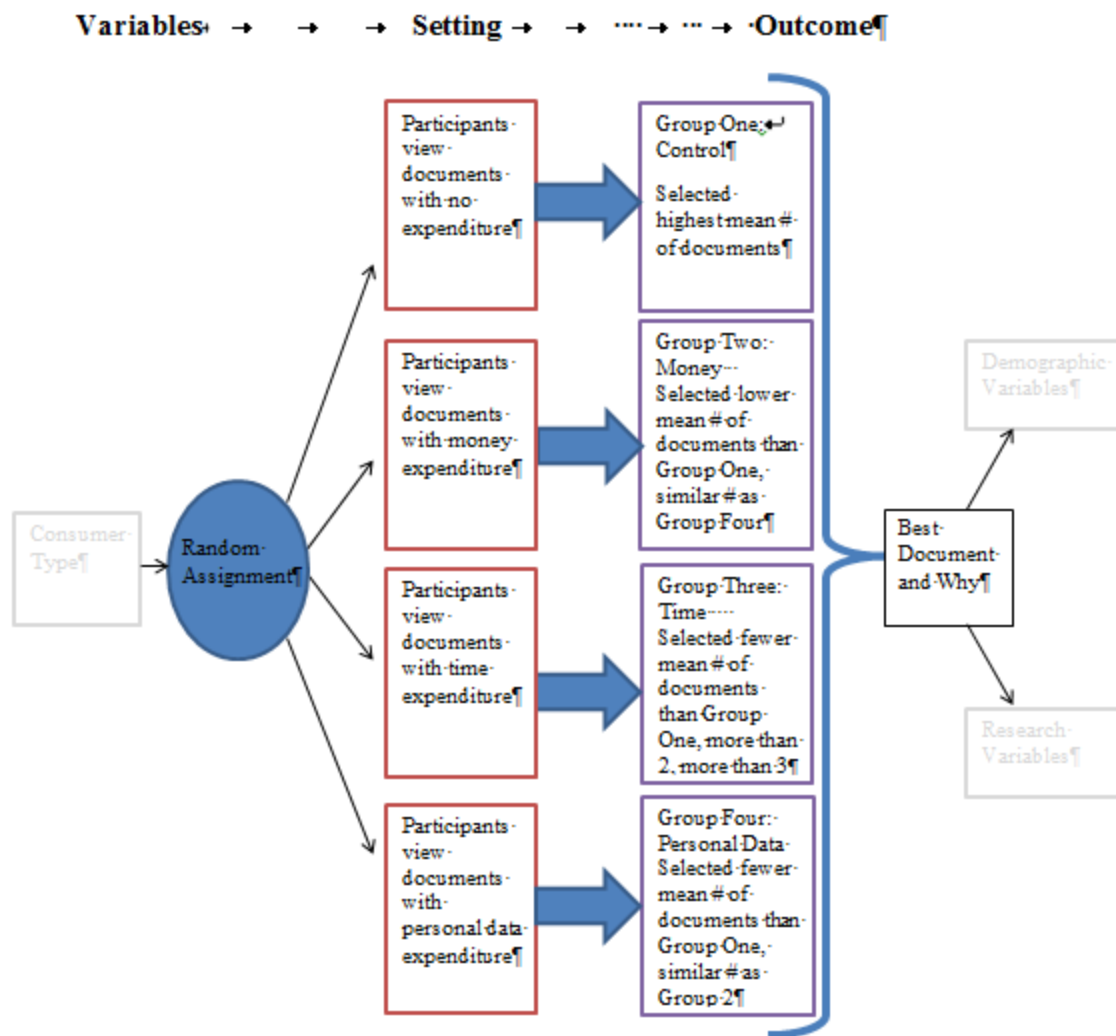


Figure 14 Revised Research Model

5.3 Theoretical Implications

This study was structured on the theoretical underpinnings of a naturalistic, evolutionary theory of human information behavior as developed by Bates (1989), Pirolli & Card (1999) and Spink and Curry (2006). It can reasonably be ascertained that this study both draws strength from and adds to this theoretical underpinning. The results provide evidence to posit that as users move through the information patches as described by Pirolli & Card, they deplete a patch faster if the barriers to entry are low and less quickly if the barriers are high. The changes to Bates' Berry-picking Model, as shown in Figure 5, reflect

this reality. Bates' original model depicted an equal number of documents being extracted from each query/document set but this study reveals that that number will vary depending on the conditions in the patch.

The study was also designed to further the reification of the value of information by using document selection behavior as a representation of the value that the information consumer attributes to any given document. This can be seen most clearly using Griffith's equation, depicted on p. 23, in which $V_a = V_b$ where the value of A is equivalent to the value of B and $A \neq B$, these results can be used to represent the equation as follows:

$$V_{\text{docselected}} = V_{\text{expenditure}}$$

in which a document selected is considered by the information consumer to have equivalent value to the expenditure, whether it be time, money or personal data. Each of the documents selected by each individual user may be considered to have been worth the expenditure to that participant in the context of the experiment and so could be represented as follows:

Table 25 Value of Document and Experimental Values

| | | |
|----------------------------|-------------|-----------------------------|
| Value of Document Selected | Is Equal to | \$1.50 |
| Value of Document Selected | Is Equal to | 60 seconds of personal time |
| Value of Document Selected | Is Equal to | Personal email address |

5.4 Implications

The implications of this study's findings could prove beneficial for all those producing and distributing information to consumers. For the purposes of this discussion, producers will be broken down into two primary sectors: general news and information, and scholarly information. Although one individual may be consuming information as a member of both sectors, the environment and cultural norms of each is different and therefore gives rise to different implications.

For the producers of general news and information, these results confirm and extend other empirical studies that find consumers do not want to pay for information. As participants in the free conditions selected a significantly higher mean number of documents than those in any other treatment, this clearly shows that "free" is established firmly as the preferred exchange value. This confirms previous empirical studies as well as giving enhanced credence to Brand's words. As many are doing in the consumer marketplace, it would seem desirable, if not imperative, to focus on other types of expenditures and others are doing so. Some providers, including the Financial Times, may seek "opinion" as a currency as shown in Figure 15. This type of arrangement is more like a barter situation with the exchange mechanism being intellectual capital on both sides of the equation. This may help reduce the inappropriability of the information asset being offered.

September 6, 2005 5:18 pm

An information explosion

By Andrew Yeh in Hong Kong

FT To read the full article please do one of the following:

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Which of the following, if any, types of damage have you had to your car/vehicle in the **past month**?

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Broken windshield

Broken window

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4-a15a-00144feab7de.html#axzz3UkjypVA9

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Figure 15 Financial Times Expenditure Required to Access Content

The preference for free is also influencing the more traditional world of scholarly publishing and the information behavior of academia. As Open Access models continue to gain momentum, more information consumers will expect free, just as they have learned to do in the consumer sphere. As of this writing, The Registry of Open Access Repositories Mandatory Archiving Policies (ROARMAP) reports that open access mandates have been adopted by over 240 universities and over 90 research funders worldwide. Alternative exchange values are currently rare in the academic sphere but may be utilized if current trends continue.

5.5 Limitations of the Study

The study was designed as an experiment to provide the optimum testing environment for the research questions. The limitations of an experimental design are inherent in the environment; although 8.78 (out of 11) was the mean score when participants were queried about how realistic they found the research. The participants' assessment of their own particular treatment does not provide a measure that would support the external validity of the design. However this does provide for an indication of the face validity of the particular treatments. Only an actual live setting in which users are spending their own money, time and giving up their own personal data can provide results that are of higher caliber. Experimentation also relies on the ability to reproduce results, so another limitation of this study is that it was conducted only once. It would be beneficial to administer the study again at a different time and to a different pool of users to find out if the results could be duplicated.

The sample was not selected randomly and this limits generalization of the research findings. Prior studies conducted in naturalistic settings usually used convenience samples as well although those investigations used far fewer respondents than the present study.

The document set was relatively small which could be considered a limitation but studies on the number of documents actually examined in real searches reveal that individuals rarely go beyond the first page of results, typically ten results, when searching the Web. Thus, the current study capped the number of potential documents that could be selected at ten based so as to best provide the most familiar environment for consumers.

It is always possible that subjects will behave in a cooperative way to please the experimenter. This study did not account for experimenter error that could occur because of this. Note that the control group would be subject to the same level of such error and

thus all four of the groups might be expected to include such error in the same direction.

5.6 Future Research

This study focused on expenditures that information consumers may be called on to use in exchange for information. One of the major findings, that the mean number of documents selected by those in treatment groups using money and personal data as an expenditure was fewer than the number selected in other groups, would appear to be an avenue for additional research to examine further the ways that money and personal data may relate in terms of consumers' behavior and attitudes. The expected relationship between using personal data to acquire information is based on the concern for individual privacy. In further discussion with one of the pilot study participants, it was revealed that privacy was not the main concern but that information filtering was primary. The study participant commented that her major concern with supplying an email address was that her email inbox would become so crowded that she would miss something vital. The reluctance to expend an email address can be situated in personal information management context which would be an interesting and potentially fruitful avenue for future research.

It would also be interesting to use other types of expenditures to evaluate how consumers might use them as exchange mechanisms for information. These types of efforts would most likely come under consideration by organizations in the need of different and new business models to help them work with the new digital information consumer.

This study focused expenditures as an expression of value for information but did not explore the types of value that information may supply and if consumers might use expenditures differently if the types were varied. The use of Holbrook's typology would provide a fascinating research study to determine how consumers might relate these values

(efficiency, play, excellence, aesthetics, status, ethics, esteem and spirituality) to their daily information behavior habits and if consumers attached different value to them. The increasing amount of information that consumers are presented with and its intrusion into all aspects of activity could make for meaningful insights.

In closing, it should be noted that Brand's statement gives an agency to information that is, at its core, somewhat curious. It may certainly be valid that information consumers want information to be free but ascribing a "want" to information gives it a power that may not seem warranted. Enter Floridi, the Philosopher of Information, who has suggested that inanimate things have moral value that may merit them some degree of respect. Floridi discusses the emergence of the infosphere which exists along with our natural world and points to clear biocentrism in terms of our ethical code. Does information or perhaps specific information objects have inherent rights that require them to be treated with dignity and fairness? Future researchers may have the ability and need to explore that question and others in a comparable domain and the answers may not be at all what might be expected or anticipated.

APPENDIX A

Mechanical Turk Recruitment Instrument

Qualifications Required: Masters has been granted

HIT Preview

Instructions

We are conducting an academic survey about how people select documents on the Web. We need to understand more about you and how you decide which documents to select on a popular topic. . Select the link below to complete the survey. At the end of the survey, you will receive a code to paste into the box below to receive credit for taking our survey.

Make sure to leave this window open as you complete the survey. When you are finished, you will return to this page to paste the code into the box.

Survey link:

<http://www.linktomysurvey.com>

Provide the survey code here:

Submit

Appendix B

Qualtrics Survey Instrument

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Intro Questions

You are invited to participate in a research study that is being conducted by Barbara Burton who is a Ph.D candidate in the School of Communication & Information at Rutgers University. The purpose of this research is to better understand how people value documents on the Web.

Approximately 400 subjects over the age of 18 and residents of the United States and Canada will participate in the study and each individual's participation will last approximately 20-30 minutes.
The study procedures include various types of survey questions and the collection of demographic data.

The research is confidential.

The research team and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated. All study data will be kept for three years.

There are no foreseeable risks to participation in this study.

The benefit of taking part in this study is monetary compensation to you. You will receive \$3.00 for completing the entire study.

I understand that I can take this survey only once and I will not violate this.

Participation in this study is voluntary. You may choose not to participate, and you may withdraw at any time during the study procedures without any penalty to you. All questions must be answered to receive compensation for your participation.

If you have any questions about your rights as a research subject, you may contact the IRB Administrator at Rutgers University at:

Rutgers University, the State University of New Jersey
Arts and Sciences, Institutional Review Board for the Protection of Human Subjects
Office of Research and Sponsored Programs
335 George Street, Liberty Plaza, 3rd Floor, Suite 3200
New Brunswick, NJ 08901-8559
Tel: 732-235-6035
Email: humansubjects@orsp.rutgers.edu

Or the Principal Investigator at:

Barbara Burton
School of Communication & Information
Rutgers University
4 Huntington Street
New Brunswick, NJ 08901-1071
burtonb@rci.rutgers.edu

☒ Yes, I agree to participate and I understand the terms

☐ No, I do not agree to participate and will not complete the survey and will not receive payment.

Some people seem to have trouble limiting their spending for consumer items such as clothes, meals, gifts and vacations when they might be better off saving money. Others people do not spend money freely and may feel

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anxious about spending when they might be better off spending money. Please use the scale below to rate your spending habits.

| | Spend too freely | | | | | Have difficulty spending | | | | | |
|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Spending Habits | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

On a scale that characterizes your general ability to live below your income and save money as compared to living chronically above your income and incurring debt, please characterize your current financial situation.

| | Usually spend too much | | | | | Usually save money | | | | | |
|-----------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Spending/Saving | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Some people are always short on time and feel as if they are always rushing while other people appear to feel less rushed and move at a more relaxed pace. Please characterize your own feeling about how much time you have.

| | Have enough time | | | | | Feel rushed most of the time | | | | | |
|------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Time Scale | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Online privacy is an important concern for many while others do not seem to mind supplying an email address or other personal data to get things they want on the Web. Please characterize how you feel about protecting your privacy online.

| | Don't worry too much about online privacy | | | | | Very concerned about online privacy | | | | | |
|----------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Online Privacy | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

I currently subscribe and pay a fee for online information products including newspaper, magazine or academic journal sites on the Web. This may include situations in which you are paying for a print subscription and the online version is included.

☐ Yes

☐ No

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How many times in the last year have you paid for an individual document (such as a news article, web article, report or short video) on the Web? If none, indicate zero.

In certain situations, you must watch an advertisement before being able to view a document or video. Please use the scale to indicate how frequently you have watched an advertisement to get to see a document or video you seek.

| | Never | | | | | | | | | | Very Frequently | |
|----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Video Watching | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |

You are generally required to watch a minimum number of seconds of an advertisement to get to a document or video. Please indicate the frequency with which you watch an advertisement for longer than required.

- ☐ Never
- ☐ Sometimes (1-5 times per viewing)
- ☐ Frequently (6 or more times per viewing)

Some websites ask for an individual's email address in order to gain access to information. Some individuals have an alternate email that they use specifically for this purpose that will not impact their standard email address. Please indicate if you have such an alternate email address.

- ☐ Yes
- ☐ No

If you have an alternate email address, please indicate approximately how often you have supplied your alternate email address to gain access to a document or video in the last year. If you do not have an alternate email address, please select NA.

| | Never | | | | | | | | | | Frequently | |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | NA | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Alternate Email Address | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

If you only use your actual email address or use it sometimes, please indicate approximately how often you have supplied your actual email address to gain access to a document or video in the last year.

| | Never | | | | | | | | | | Frequently | |
|--|-------|--|--|--|--|--|--|--|--|--|------------|--|
|--|-------|--|--|--|--|--|--|--|--|--|------------|--|

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| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Actual Email Address | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Please indicate how often you have supplied additional personal information such as cellphone number or zip code to gain access to a document or video in the last year.

| | Never | | | | | | Frequently | | | | | |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Additional Personal Info | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |

Recent research on decision making shows that choices are affected by context. Time of day, environment, knowledge and experience can all impact what choices individuals make. To help better understand how you might select documents, which is the goal of this research, some information about you to help determine your context is needed. It is necessary to determine how carefully you read instructions. If you are not reading instructions, the data collected here will not be useful in creating meaningful findings. To show that you have read the instructions for this question, please ignore the question below about how you are feeling and instead check only the "none of these" option as your answer.

Please check all words that describe how you are currently feeling.

- ☐ Interested
 ☐ Rushed
 ☐ Excited
 ☐ Happy
 ☐ Nervous
 ☐ Relaxed
 ☐ Anxious
 ☐ Tired
 ☐ Lonely
☐ Enthusiastic
 ☐ Attentive
 ☐ None of these

Please use the following scale to describe your knowledge of the health impacts of caffeine.

| | Minimal Knowledge | | | | | | Very Knowledgeable | | | | | |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Knowledge of Health and Caffeine | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |

Please describe how interested you are in learning more about the health impact of caffeine.

| | Not at all interested | | | | | | Very interested | | | | | |
|---------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Interest in Health and Caffeine | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |

How many cups of coffee or caffeinated drinks (including caffeinated tea and soft drinks with caffeine) did you consume yesterday?

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How many hours do you typically spend online during a workday that are not directly related to your work?

Block One--Free

In this part of the survey, you will be presented with summaries of ten documents and videos on the health impacts of caffeine.

Please use the summaries to decide which documents you feel would supply you with the optimum amount and variety of information needed to understand the issue.

You may review all document summaries first before selecting and you may go back and forth to select or reject.

DOCUMENT ONE

Source: Journal of Alzheimer's Disease

Date: December 2010

Headline: Caffeine and Coffee as Therapeutics Against Alzheimer's Disease

Authors: Gary W. Arendash and Chuanhai Cao of The Florida Alzheimer's Disease Research Center, Tampa, FL, The Department of Cell Biology, Microbiology and Molecular Biology, University of South Florida, Tampa, FL and The Byrd Alzheimer's Center and Research Institute, Tampa, FL

Abstract: Epidemiologic studies have increasingly suggested that caffeine/coffee could be an effective therapeutic against Alzheimer's disease (AD). We have utilized a transgenic mouse model for AD in well-controlled studies to determine if caffeine and/or coffee have beneficial actions to protect against or reverse AD-like cognitive impairment and AD pathology. AD mice given caffeine in their drinking water for young adulthood into older age showed protection against memory impairment and lower brain levels of the abnormal protein (amyloid-beta; A beta) thought to be central to AD pathogenesis. Moreover, "aged" cognitively-impaired AD mice exhibited memory restoration and lower brain A beta levels following only 1-2 months of caffeine treatment. We believe that the cognitive benefits of chronic caffeine administration in AD mice are due to caffeine itself, and not metabolites of caffeine; this, because our long-term administration of theophylline to AD mice provided no cognitive benefits. In acute studies involving AD mice, one oral caffeine treatment quickly reduced both brain and plasma A beta levels - similarly rapid alterations in plasma A beta levels were seen in humans following acute caffeine administration. "Caffeinated" coffee provided to AD mice also quickly decreased plasma A beta levels, but not "decaffeinated" coffee, suggesting that caffeine is critical to decreasing blood A beta levels. Caffeine appears to provide its disease-modifying effects through multiple mechanisms, including a direct reduction of A beta production through suppression of both beta- and secretase levels. These results indicate a surprising ability of moderate caffeine intake (the human equivalent of 500 mg caffeine or 5 cups of coffee per day) to protect against or treat AD in a mouse model for the disease and a therapeutic potential for caffeine against AD in humans.

Keywords: Alzheimer's disease, amyloid-beta, caffeine, coffee, memory

☐ Select Summary/Document

☒ Reject Summary/Document

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DOCUMENT TWO



Coffee: Health Benefits and Risks You Might Not Know!

Published on Sep 4, 2012

Coffee's health benefits and risks - find out in this videos! Coffee is ever present from the classroom to the office, from Starbucks to hipster cafes with no signs - and chances are as a college student, you're going to get to know it pretty well!

But did you know how many health benefits and risks coffee poses? Some of these are shocking! John Iadarola and Lisa Ferguson discuss the razor's edge that is coffee addiction on TYT University.

Are you a coffee addict? Do you ride the ups and downs of caffeine addiction? If you could wipe the slate clean, would you start drinking coffee again? And has it ever had any significant negatives for you? Leave a comment down below!

Comments: 548

☐ Select Summary/Document

☐ Reject Summary/Document

DOCUMENT THREE

Source: The Psychologist, <http://www.thepsychologist.org.uk/>

Date: December 2004, pps 698-701

<https://rutoers.qualtrics.com/ControlPanel/Ajax.php?action=GetSurveyPrintPreview&T=3n.liDvF1wrKnA6PIInRnnS>

R/P/R

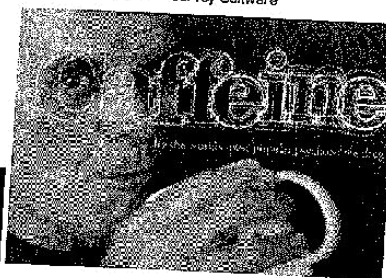
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Headline: The pros and cons of caffeine**Authors:** Dr. Rebecca Thompson for the Care of the Elderly, Bath, and the Department of Psychology, University of Plymouth, UK. Karen Keene, undergraduate student at the University of Bath.**Abstract:** This article discusses the potential health effect of caffeine, particularly for the elderly. Notes that as with any drug, there are concerns about addiction. Explains the physical action of caffeine including facts that it remains in the body for 3-5 hours after ingestion and is metabolized by the liver with less than 5% being recovered unchanged in urine. Discusses highs and lows of caffeine: specifically the indications that it increases mental acuity and the negative physical effects including decreased fine motor movements and increased blood pressure. Outlines addictive properties and symptoms of caffeine withdrawal. Recommends a systematic investigation of whether the benefits outweigh the detrimental health effects of caffeine and that current consumer can continue to enjoy in moderation.**Weblinks:** The Research Institute for the Care of the Elderly: www.rice.org.uk and The Coffee Science Information Center www.cosic.org**Keywords:** Caffeine, Elderly, Addiction, Health Care**User Comments:** 7☐ Select Summary/Document☐ Reject Summary/Document**DOCUMENT FOUR****Source:** MedlinePlus, <http://www.nlm.nih.gov/medlineplus/ency/article/002445.htm>**Date:** Updated as of April 30, 2013**Headline:** Caffeine in the diet**Authors:** Updated by Alison Evert, MS, RD, CDE, Nutritionist, University of Washington Medical Center Diabetes Care Center, Seattle, Washington. Also reviewed by A.D.A.M Health Solutions, Ebix, Inc., Editorial Team: David Zieve, MD, MHA, Bethanne Black, Stephanie Slon, and Nissi Wang.**Abstract:** This article outlines the function of caffeine, noting that there is no nutritional need for it but that it can stimulate the brain and nervous system. Finds food sources for caffeine include tea leaves, kola nuts, coffee and cocoa beans and that it is included in processed foods such as chocolate, colas and many candies and gums. Outlines side effects including fast heart rate and many more. Notes that children's consumption should be monitored for several reasons. Provides the recommendations of the American Medical Association Council on Scientific Affairs for use of caffeine. Notes drug interactions.**References:** Chin, JM et al. Caffeine content of brewed teas. *J Anal Toxicol.* 2008; 32 (8); 702-4
Gagne L, Maizes V. Osteoporosis, in Rakel D, ed. *Integrative Medicine*, 3rd ed. Philadelphia, PA; Saunders Elsevier, 2012, chap 37.**Keywords:** Caffeine, Nutrition, Addiction☐ Select Summary/Document☐ Reject Summary/Document**DOCUMENT FIVE**

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By T. R. Reid Photos by Bob Sacha

It's hardly a coincidence that coffee and tea caught on in Europe just as the first factories were ushering in the industrial revolution. The widespread use of caffeinated drinks—replacing the ubiquitous beer—facilitated the great transformation of human economic endeavor from the farm to the factory. Boiling water to make coffee or tea helped decrease the incidence of disease among workers in crowded cities. And the caffeine in their systems kept them from falling asleep over the machinery. In a sense, caffeine is the drug that made the modern world possible. And the more modern our world gets, the more we seem to need it. Without that useful jolt of coffee—or Diet Coke or Red Bull—to get us out of bed and back to work, the 24-hour society of the developed world couldn't exist.

"For most of human existence, your pattern of sleeping and wakefulness was basically a matter of the sun and the season," explains Charles Czeisler, a neuroscientist and sleep expert at Harvard Medical School. "When the nature of work changed from a schedule built around the sun to an indoor job timed by a clock, humans had to adapt. The widespread use of caffeinated food and drink—in combination with the invention of electric light—allowed people to cope with a work schedule set by the clock, not by daylight or the natural sleep cycle."

Czeisler, who rarely consumes any caffeine, is a bundle of wide-awake energy in his white lab coat, racing around his lab at Boston's Brigham and Women's Hospital, grabbing journal articles from the shelves and digging through charts to find the key data points. "Caffeine is what's called a wake-promoting therapeutic," he says.

☐ Select Summary/Document

☐ Reject Summary/Document

DOCUMENT SIX

Y2016

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The screenshot shows the Drugs.com website. At the top, there's a banner for "unbeatable prices for your style." Below that is the Drugs.com logo and a search bar. A navigation bar includes links like "Drugs A-Z", "All Identifier", "Interactions Checker", "News", "Health professionals", "Q & A", "Medications", and "Apps". The main content area is titled "Caffeine" and includes sections for "Overview", "Side Effects", "Dosage", "Interactions", "For Professionals", and "More". There's also a "Related Information" section with links to "Availability", "Pregnancy", "Drug Safety Category", "Drug Schedule", "Approved Brands", and "Warnings". A "What is Caffeine?" section is visible at the bottom.

This website article provides information about caffeine in 5 categories:

- Overview
- Side Effects
- Dosages
- Interactions
- For Professionals
- More (includes Pregnancy Warnings, Breastfeeding Warnings, User Reviews, Drug Images, Support Group Q&A and Pricing & Coupons)

☐ Select Summary/Document

☐ Reject Summary/Document

DOCUMENT SEVEN

The screenshot shows the caffeineinformer website. The main article is titled "Is Caffeine Addictive? What Research and Experience Says". There are three smaller articles on the left: "Caffeine Addiction: Redd is More Addicted to Energy Drinks than Barofield", "Caffeine Addiction: 10 Awesome Benefits of Quitting Caffeine in Coffee", and "Caffeine Addiction: Have you heard of any of the following YouTube channels? They are all about caffeine addiction". The main article text starts with "It has long been debated whether or not caffeine should be labeled as an addictive substance. Most people who use caffeine regularly can attest that it does cause some level of dependency in that quitting caffeine causes withdrawal." There is a large image of coffee cups in the background of the article.

This website provides headings to more information including:

- What Research Says about the Addictive Nature of Caffeine
- Is Caffeine Addictive? What Research and Experience Says about the Addictive Nature of Caffeine
- Anecdotal Evidence for Caffeine Addiction

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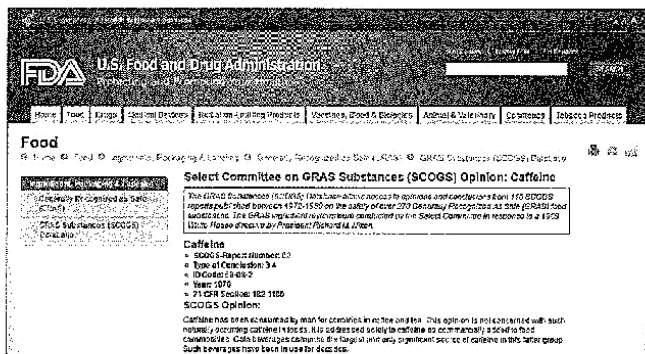
--Understanding Your Level of Addiction

--Comments Section from Readers Discussing their Personal Experiences with Caffeine

☐ Select Summary/Document

☐ Reject Summary/Document

DOCUMENT EIGHT



The website of the US Food and Drug Administration provides access to the Select Committee on GRAS (Generally Recognized as Safe) Substances. This page presents findings on 8 key factors related to caffeine including:

- Levels of Consumption
- History of Consumption
- Mutagenicity
- Teratogenicity
- Carcinogenicity
- Long term feeding studies
- Dose effects in humans
- Behavioral effects on children

☐ Select Summary/Document

☐ Reject Summary/Document

DOCUMENT NINE

Source: Addiction

Date: December 1994, Vol. 89 Issue 12, p1595-1599. 5p.

Headline: Caffeine, Health and Commercial Interests

Authors: Editorial by the Editors of Addiction

Abstract: Comments on the relationship between caffeine use, health and commercial interests. Discusses

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caffeine as a psychoactive substance. Notes that caffeine is present in many soft drinks which may have a particular impact on children. Cites research on health threats including increases in blood pressure and interuterine growth retardation. Insight into caffeine lobby in the United States; Consumption trends; Industry approach to caffeine public awareness programs. States that the Food and Drug Administration (FDA) has threatened to remove caffeine from the list of Generally Recognized as Safe (GRAS) substances but that the International Life Sciences Institute (ILSI), which is an industry organization developed to service commercial interests, has blocked this. Claims that the caffeine industry is having a distorting effect on scientific information.

☒ Select Summary/Document

☐ Reject Summary/Document

DOCUMENT TEN

LOG IN

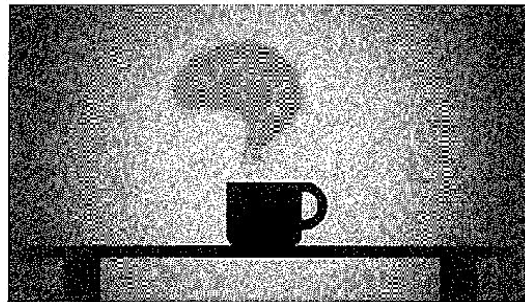
Lifehacker

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What Caffeine Actually Does to Your Brain

Kaden Brady
LIFEHACKER

JAN 15, 2015 11:45 AM



Ads by Google

3 Thyroid Warning Signs
Is Your Thyroid Causing Your Health Problems? Doctor Explains the Signs
medicallife.com

For all of its wild popularity, caffeine is one seriously misunderstood substance. It's not a simple upper, and it works differently on different people with different tolerances—even in different menstrual cycles. But you can make it work better for you.

We've covered all kinds of caffeine "hacks" here at Lifehacker, from taking "[caffeine naps](#)" to [getting "optimally wired."](#) And, of course, we're obsessed with the [perfect cup of coffee](#). But when it comes to why so many of us love our coffee, tea, soda, or energy drink fixes, and what they actually do to our busy brains, we've never really dug in. In this article, we cover:

Caffeine Doesn't Actually Get You Wired

It Boosts Your Speed, But Not Your Skill—Depending On Your Skill Set

Effectiveness, Tolerance and Headaches

Getting Out of the Habit and Learning to Tame Caffeine

That's our attempt at summing up the science and common understanding of caffeine in one post. There is, as you can imagine, a lot more to explore—Braun's *Buzz* is a good starting point, but you'll find your own way from

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there. What's the most interesting thing you've learned about caffeine, either from reading or personal experience? Share the science in the comments.

☐ Select Summary/Document

☐ Reject Summary/Document

You have selected documents that you feel supply the optimum information needed to understand the health impacts of caffeine. In this stage of the research, you are asked to review your selections and choose only one document that is the best in doing so.

Please enter document number

Please describe in 4-20 words why
you feel this is the best document

Block Two--Money

In this part of the survey, you will be presented with summaries of ten documents and videos on the health impacts of caffeine.

Please use the summaries to decide which documents you feel would supply you with the optimum amount and variety of information needed to understand the issue.

All documents are priced at \$1.50. You have a budget of \$15.00 to purchase documents that you feel are needed to understand the issue. (Note: Selecting all documents will deplete the budget). If you have any unspent money at the end of the selection process, it will either be returned to you along with your stipend for participation in the research or contributed to a charity of your choice. One of those options will be randomly assigned to you at the end of the experiment.

You may review all document summaries first before selecting and you may go back and forth to select or reject.

DOCUMENT ONE

Source: Journal of Alzheimer's Disease

Date: December 2010

Headline: Caffeine and Coffee as Therapeutics Against Alzheimer's Disease

Authors: Gary W. Arendash and Chuanhai Cao of The Florida Alzheimer's Disease Research Center, Tampa, FL, The Department of Cell Biology, Microbiology and Molecular Biology, University of South Florida, Tampa, FL and The Byrd Alzheimer's Center and Research Institute, Tampa, FL

Abstract: Epidemiologic studies have increasingly suggested that caffeine/coffee could be an effective therapeutic against Alzheimer's disease (AD). We have utilized a transgenic mouse model for AD in well-controlled studies to determine if caffeine and/or coffee have beneficial actions to protect against or reverse AD-like cognitive impairment and AD pathology. AD mice given caffeine in their drinking water from young adulthood into older age showed protection against memory impairment and lower brain levels of the abnormal protein (amyloid-beta; A beta) thought to be central to AD pathogenesis.

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Moreover, "aged" cognitively-impaired AD mice exhibited memory restoration and lower brain A beta levels following only 1-2 months of caffeine treatment. We believe that the cognitive benefits of chronic caffeine administration in AD mice are due to caffeine itself, and not metabolites of caffeine; this, because our long-term administration of theophylline to AD mice provided no cognitive benefits. In acute studies involving AD mice, one oral caffeine treatment quickly reduced both brain and plasma A beta levels - similarly rapid alterations in plasma A beta levels were seen in humans following acute caffeine administration. "Caffeinated" coffee provided to AD mice also quickly decreased plasma A beta levels, but not "decaffeinated" coffee, suggesting that caffeine is critical to decreasing blood A beta levels. Caffeine appears to provide its disease-modifying effects through multiple mechanisms, including a direct reduction of A beta production through suppression of both beta- and secretase levels. These results indicate a surprising ability of moderate caffeine intake (the human equivalent of 500 mg caffeine or 5 cups of coffee per day) to protect against or treat AD in a mouse model for the disease and a therapeutic potential for caffeine against AD in humans.

Keywords: Alzheimer's disease, amyloid-beta, caffeine, coffee, memory

Price to Access Full Document: \$1.50

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DOCUMENT TWO



Coffee: Health Benefits and Risks You Might Not Know!

Published on Sep 4, 2012

Coffee's health benefits and risks - find out in this videos! Coffee is ever present from the classroom to the office, from Starbucks to hipster cafes with no signs - and chances are as a college student, you're going to get to know it pretty well!

But did you know how many health benefits and risks coffee poses? Some of these are shocking! John Iadarola and Lisa Ferguson discuss the razor's edge that is coffee addiction on TYT University.

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Are you a coffee addict? Do you ride the ups and downs of caffeine addiction? If you could wipe the slate clean, would you start drinking coffee again? And has it ever had any significant negatives for you? Leave a comment down below!

Comments: 548

Price to Access Full Document: \$1.50

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DOCUMENT THREE

Source: The Psychologist, <http://www.thepsychologist.org.uk/>

Date: December 2004, pps 698-701

Headline: The pros and cons of caffeine

Authors: Dr. Rebecca Thompson for the Care of the Elderly, Bath, and the Department of Psychology, University of Plymouth, UK. Karen Keene, undergraduate student at the University of Bath.

Abstract: This article discusses the potential health effect of caffeine, particularly for the elderly. Notes that as with any drug, there are concerns about addiction. Explains the physical action of caffeine including facts that it remains in the body for 3-5 hours after ingestion and is metabolized by the liver with less than 5% being recovered unchanged in urine. Discusses highs and lows of caffeine: specifically the indications that it increases mental acuity and the negative physical effects including decreased fine motor movements and increased blood pressure. Outlines addictive properties and symptoms of caffeine withdrawal. Recommends a systematic investigation of whether the benefits outweigh the detrimental health effects of caffeine and that current consumer can continue to enjoy in moderation.

Weblinks: The Research Institute for the Care of the Elderly: www.rice.org.uk and The Coffee Science Information Center www.cosic.org

Keywords: Caffeine, Elderly, Addiction, Health Care

User Comments: 7

Price to Access Full Document: \$1.50

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DOCUMENT FOUR

Source: MedlinePlus, <http://www.nlm.nih.gov/medlineplus/ency/article/002445.htm>

Date: Updated as of April 30, 2013

Headline: Caffeine in the diet

Authors: Updated by Allison Evert, MS, RD, CDE, Nutritionist, University of Washington Medical Center

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Diabetes Care Center, Seattle, Washington. Also reviewed by A.D.A.M Health Solutions, Ebix, Inc., Editorial Team: David Zieve, MD, MHA, Bethanne Black, Stephanie Slon, and Nissi Wang.

Abstract: This article outlines the function of caffeine, noting that there is no nutritional need for it but that it can stimulate the brain and nervous system. Finds food sources for caffeine include tea leaves, kola nuts, coffee and cocoa beans and that it is included in processed foods such as chocolate, colas and many candies and gums. Outlines side effects including fast heart rate and many more. Notes that children's consumption should be monitored for several reasons. Provides the recommendations of the American Medical Association Council on Scientific Affairs for use of caffeine. Notes drug interactions.

References: Chin, JM et al. Caffeine content of brewed teas. J Anal Toxicol. 2008; 32 (8): 702-4
Gagne L, Maizes V. Osteoporosis, In Rakel D, ed. Integrative Medicine, 3rd ed. Philadelphia, PA; Saunders Elsevier, 2012, chap 37.

Keywords: Caffeine, Nutrition, Addiction

Price to Access Full Document: \$1.50

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DOCUMENT FIVE



By T. R. Reid Photos by Bob Sacha

It's hardly a coincidence that coffee and tea caught on in Europe just as the first factories were ushering in the industrial revolution. The widespread use of caffeinated drinks—replacing the ubiquitous beer—facilitated the great transformation of human economic endeavor from the farm to the factory. Boiling water to make coffee or tea helped decrease the incidence of disease among workers in crowded cities. And the caffeine in their systems kept them from falling asleep over the machinery. In a sense, caffeine is the drug that made the modern world possible. And the more modern our world gets, the more we seem to need it. Without that useful jolt of coffee—or Diet Coke or Red Bull—to get us out of bed and back to work, the 24-hour society of the developed world couldn't exist.

"For most of human existence, your pattern of sleeping and wakefulness was basically a matter of the sun and the season," explains Charles Czeisler, a neuroscientist and sleep expert at Harvard Medical School. "When the nature of work changed from a schedule built around the sun to an indoor job timed by a clock, humans had to adapt. The widespread use of caffeinated food and drink—in combination with the invention of electric light—allowed people to cope with a work schedule set by the clock, not by daylight or the natural sleep cycle."

Czeisler, who rarely consumes any caffeine, is a bundle of wide-awake energy in his white lab coat, racing around his lab at Boston's Brigham and Women's Hospital, grabbing journal articles from the shelves and

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digging through charts to find the key data points. "Caffeine is what's called a wake-promoting therapeutic," he says.

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DOCUMENT SIX

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Drugs.com
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Drugs A-Z | Pill Identifier | International Classification of Diseases | News | Health Professionals | D.A.R. | Mentimeter | Q Apps

Home | My Profile | Caffeine | Sign Up | Log Out

Caffeine

Brand Name: Dolox, Vivarin, Rivalin, Stay Awake, Energize, Lucidex
Generic Name: Caffeine
Companies: various generic manufacturers, Remco Consumer Health, Inc. (generic)
FDA Information: Caffeine (NADA 141-018) (Version)

Overview | Side Effects | Dosage | Interactions | For Professionals | More

Official Site
All trademarks are the property of their respective owners.

What is Caffeine?
Caffeine is a central nervous system stimulant.

Related Information

- Availability: Brand, OTC
- Pregnancy Category: Caffeine will be listed as
- Caffeine Monograph: Caffeine monograph
- Pregnancy Warnings: Pregnancy warnings
- Side Effects: Side effects

Lowest Price with your Advanced Card

This website article provides information about caffeine in 5 categories:

- Overview
- Side Effects
- Dosages
- Interactions
- For Professionals
- More (includes Pregnancy Warnings, Breastfeeding Warnings, User Reviews, Drug Images, Support Group Q&A and Pricing & Coupons)

Price to Access Full Document: \$1.50

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DOCUMENT SEVEN

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caffeineinformer

Caffeine Amounts

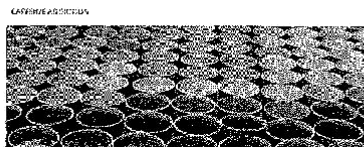
Death by Caffeine

CAFFEINE ADDICTION
 Reddit is More Addicted
 to Energy Drinks than
 BuzzFeed

CAFFEINE ADDICTION
 20 Awesome Benefits of
 Quitting Caffeine or
 Cocaine

CAFFEINE ADDICTION
 Have you heard of any of the
 following YouTube
 channels?

Is Caffeine Addictive? What Research and Experience Says



It has long been debated whether or not caffeine should be labeled as an addictive substance.

Most people who use caffeine regularly can attest that it does cause some level of dependency in that quitting caffeine causes obvious

This website provides headings to more information including:

- What Research Says about the Addictive Nature of Caffeine
- Is Caffeine Addictive? What Research and Experience Says about the Addictive Nature of Caffeine
- Anecdotal Evidence for Caffeine Addiction
- Understanding Your Level of Addiction
- Comments Section from Readers Discussing their Personal Experiences with Caffeine

Price to Access Full Document: \$1.50

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DOCUMENT EIGHT

Food

Select Committee on GRAS Substances (SCOGS) Opinion: Caffeine

The GRAS Substances (SCOGS) Committee allows access to reviews and recommendations of SCOGS reports published between 1970 and the end of 1999. The SCOGS process is a voluntary process for GRAS substances. The GRAS report and review are conducted by the SCOGS Committee. The SCOGS process is a voluntary process for GRAS substances. The SCOGS process is a voluntary process for GRAS substances.

Caffeine

- SCOGS Report Number: 16
- Type of Substance: 4
- ID Code: 15-08-0
- Year: 1970
- 21 CFR Section: 101.1100

SCOGS Opinion:

Caffeine has been consumed by man for centuries in coffee and tea. This substance is not so common with such health concerns as caffeine is today. The substance is widely consumed as a stimulant, and is a common ingredient in many beverages, including coffee and tea. The substance is widely consumed as a stimulant, and is a common ingredient in many beverages, including coffee and tea.

The website of the US Food and Drug Administration provides access to the Select Committee on GRAS (Generally Recognized as Safe) Substances. This page presents findings on 8 key factors related to caffeine including:

- Levels of Consumption
- History of Consumption

<https://rutgers.qualtrics.com/ControlPanel/Ajax.php?action=GetSurvey/PrintPreview&T=3nJIDvE1wcknA6PUh3opAS>

17/25

--Mutagenicity
 --Teratogenicity
 --Carcinogenicity
 --Long term feeding studies
 --Dose effects in humans
 --Behavioral effects on children

Price to Access Full Document: \$1.50

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DOCUMENT NINE

Source: Addiction

Date: December 1994, Vol. 89 Issue 12, p1595-1599, 5p.

Headline: Caffeine, Health and Commercial Interests

Authors: Editorial by the Editors of Addiction

Abstract: Comments on the relationship between caffeine use, health and commercial interests. Discusses caffeine as a psychoactive substance. Notes that caffeine is present in many soft drinks which may have a particular impact on children. Cites research on health threats including increases in blood pressure and interuterine growth retardation. Insight into caffeine lobby in the United States; Consumption trends; Industry approach to caffeine public awareness programs. States that the Food and Drug Administration (FDA) has threatened to remove caffeine from the list of Generally Recognized as Safe (GRAS) substances but that the International Life Sciences Institute (ILSI), which is an industry organization developed to service commercial interests, has blocked this. Claims that the caffeine industry is having a distorting effect on scientific information.

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DOCUMENT TEN

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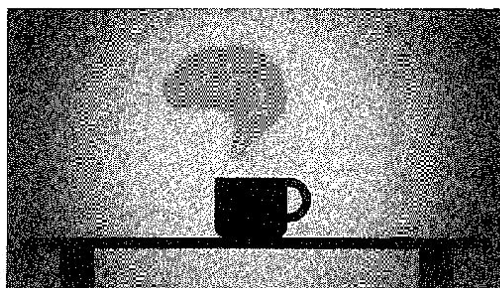
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What Caffeine Actually Does to Your Brain



Kristin Parry
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3 Thyroid Warning Signs
Is Your Thyroid Causing Your Health Problems? Doctor Explains the Signs
nbcnews.com

For all of its wild popularity, caffeine is one seriously misunderstood substance. It's not a simple upper, and it works differently on different people with different tolerances—even in different menstrual cycles. But you can make it work better for you.

We've covered all kinds of caffeine "hacks" here at Lifehacker, from taking "[caffeine naps](#)" to [getting "optimally wired."](#) And, of course, we're obsessed with the [perfect cup of coffee](#). But when it comes to why so many of us love our coffee, tea, soda, or energy drink fixes, and what they actually do to our busy brains, we've never really dug in. In this article, we cover:

Caffeine Doesn't Actually Get You Wired

It Boosts Your Speed, But Not Your Skill—Depending On Your Skill Set

Effectiveness, Tolerance and Headaches

Getting Out of the Habit and Learning to Tame Caffeine

That's our attempt at summing up the science and common understanding of caffeine in one post. There is, as you can imagine, a lot more to explore—Braun's *Buzz* is a good starting point, but you'll find your own way from there. What's the most interesting thing you've learned about caffeine, either from reading or personal experience? Share the science in the comments.

Price to Access Full Document: \$1.50

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You have selected documents that you feel supply the optimum information needed to understand the health impacts of caffeine. In this stage of the research, you are asked to review your selections and choose only one document that is the best in doing so.

Please enter document number

Please describe in 4-20 words why
you feel this is the best document

<https://rutgers.qualtrics.com/ControlPanel/Ajax.php?action=GetSurveyPrintPreview&T=3nJfDvE1wcknA6PUm8onS>

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In this part of the survey, you will be presented with summaries of ten documents, including videos, on the health impacts of caffeine.

Please use the summaries to decide which documents you feel would supply you with the optimum amount and variety of information needed to understand the issue.

All documents and videos require that you watch a 60 second advertisement from various organizations to view them. You will be required to watch the advertisements associated with the documents you select at the end of the document process. If you select all documents, you would be committing 5 minutes to watch advertisements.

You may review all document summaries first before selecting and you may go back and forth to select or reject.

DOCUMENT ONE

Source: Journal of Alzheimer's Disease

Date: December 2010

Headline: Caffeine and Coffee as Therapeutics Against Alzheimer's Disease

Authors: Gary W. Arendash and Chuanhai Cao of The Florida Alzheimer's Disease Research Center, Tampa, FL, The Department of Cell Biology, Microbiology and Molecular Biology, University of South Florida, Tampa, FL and The Byrd Alzheimer's Center and Research Institute, Tampa, FL

Abstract: Epidemiologic studies have increasingly suggested that caffeine/coffee could be an effective therapeutic against Alzheimer's disease (AD). We have utilized a transgenic mouse model for AD in well-controlled studies to determine if caffeine and/or coffee have beneficial actions to protect against or reverse AD-like cognitive impairment and AD pathology. AD mice given caffeine in their drinking water for young adulthood into older age showed protection against memory impairment and lower brain levels of the abnormal protein (amyloid-beta; A beta) thought to be central to AD pathogenesis. Moreover, "aged" cognitively-impaired AD mice exhibited memory restoration and lower brain A beta levels following only 1-2 months of caffeine treatment. We believe that the cognitive benefits of chronic caffeine administration in AD mice are due to caffeine itself, and not metabolites of caffeine; this, because our long-term administration of theophylline to AD mice provided no cognitive benefits. In acute studies involving AD mice, one oral caffeine treatment quickly reduced both brain and plasma A beta levels - similarly rapid alternations in plasma A beta levels were seen in humans following acute caffeine administration. "Caffeinated" coffee provided to AD mice also quickly decreased plasma A beta levels, but not "decaffeinated" coffee, suggesting that caffeine is critical to decreasing blood A beta levels. Caffeine appears to provide its disease-modifying effects through multiple mechanisms, including a direct reduction of A beta production through suppression of both beta- and secretase levels. These results indicate a surprising ability of moderate caffeine intake (the human equivalent of 500 mg caffeine or 5 cups of coffee per day) to protect against or treat AD in a mouse model for the disease and a therapeutic potential for caffeine against AD in humans.

Keywords: Alzheimer's disease, amyloid-beta, caffeine, coffee, memory

Required Viewing of Advertisement from Pharmaceutical Company

Length of Advertisement to Access Full Document: 60 seconds

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DOCUMENT TWO



Coffee: Health Benefits and Risks You Might Not Know!

Published on Sep 4, 2012

Coffee's health benefits and risks - find out in this videos! Coffee is ever present from the classroom to the office, from Starbucks to hipster cafes with no signs - and chances are as a college student, you're going to get to know it pretty well!

But did you know how many health benefits and risks coffee poses? Some of these are shocking! John Iadarola and Lisa Ferguson discuss the razor's edge that is coffee addiction on TYT University.

Are you a coffee addict? Do you ride the ups and downs of caffeine addiction? If you could wipe the slate clean, would you start drinking coffee again? And has it ever had any significant negatives for you? Leave a comment down below!

Comments: 548

Required viewing of advertisement from a company producing Energy Drinks
Length of Advertisement to Access Full Document: 60

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DOCUMENT THREE**Source:** The Psychologist, <http://www.thepsychologist.org.uk/>**Date:** December 2004, pps 698-701**Headline:** The pros and cons of caffeine**Authors:** Dr. Rebecca Thompson for the Care of the Elderly, Bath, and the Department of Psychology, University of Plymouth, UK. Karen Keene, undergraduate student at the University of Bath.**Abstract:** This article discusses the potential health effect of caffeine, particularly for the elderly. Notes that as with any drug, there are concerns about addiction. Explains the physical action of caffeine including facts that it remains in the body for 3-5 hours after ingestion and is metabolized by the liver with less than 5% being recovered unchanged in urine. Discusses highs and lows of caffeine: specifically the indications that it increases mental acuity and the negative physical effects including decreased fine motor movements and increased blood pressure. Outlines addictive properties and symptoms of caffeine withdrawal. Recommends a systematic investigation of whether the benefits outweigh the detrimental health effects of caffeine and that current consumer can continue to enjoy in moderation.**Weblinks:** The Research Institute for the Care of the Elderly: www.rice.org.uk and The Coffee Science Information Center www.cosic.org**Keywords:** Caffeine, Elderly, Addiction, Health Care**User Comments:** 7**Required Viewing of an advertisement from a company providing mental acuity tests****Length of Advertisement to Access Full Document:** 60 seconds☐ Select Summary/Document☐ Reject Summary/Document**DOCUMENT FOUR****Source:** MedlinePlus, <http://www.nlm.nih.gov/medlineplus/ency/article/002445.htm>**Date:** Updated as of April 30, 2013**Headline:** Caffeine in the diet**Authors:** Updated by Alison Evert, MS, RD, CDE, Nutritionist, University of Washington Medical Center Diabetes Care Center, Seattle, Washington. Also reviewed by A.D.A.M Health Solutions, Ebix, Inc., Editorial Team: David Zieve, MD, MHA, Bethanne Black, Stephanie Sion, and Nissi Wang.**Abstract:** This article outlines the function of caffeine, noting that there is no nutritional need for it but that it can stimulate the brain and nervous system. Finds food sources for caffeine include tea leaves, kola nuts, coffee and cocoa beans and that it is included in processed foods such as chocolate, colas and many candies and gums. Outlines side effects including fast heart rate and many more. Notes that children's consumption should be monitored for several reasons. Provides the recommendations of the American Medical Association Council on Scientific Affairs for use of caffeine. Notes drug interactions.**References:** Chin, JM et al. Caffeine content of brewed teas. J Anal Toxicol. 2008; 32 (8); 702-4

Gagne L, Maizes V. Osteoporosis. In Rakel D, ed. Integrative Medicine, 3rd ed. Philadelphia, PA; Saunders Elsevier, 2012, chap 37.

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Keywords: Caffeine, Nutrition, Addiction**Required Viewing of an advertisement from the American Medical Association****Length of Advertisement to Access Full Document:** 60 seconds☐ Select Summary/Document☐ Reject Summary/Document**DOCUMENT FIVE***By T. R. Reid Photos by Bob Sacha*

It's hardly a coincidence that coffee and tea caught on in Europe just as the first factories were ushering in the industrial revolution. The widespread use of caffeinated drinks—replacing the ubiquitous beer—facilitated the great transformation of human economic endeavor from the farm to the factory. Boiling water to make coffee or tea helped decrease the incidence of disease among workers in crowded cities. And the caffeine in their systems kept them from falling asleep over the machinery. In a sense, caffeine is the drug that made the modern world possible. And the more modern our world gets, the more we seem to need it. Without that useful jolt of coffee—or Diet Coke or Red Bull—to get us out of bed and back to work, the 24-hour society of the developed world couldn't exist.

"For most of human existence, your pattern of sleeping and wakefulness was basically a matter of the sun and the season," explains Charles Czeisler, a neuroscientist and sleep expert at Harvard Medical School. "When the nature of work changed from a schedule built around the sun to an indoor job timed by a clock, humans had to adapt. The widespread use of caffeinated food and drink—in combination with the invention of electric light—allowed people to cope with a work schedule set by the clock, not by daylight or the natural sleep cycle."

Czeisler, who rarely consumes any caffeine, is a bundle of wide-awake energy in his white lab coat, racing around his lab at Boston's Brigham and Women's Hospital, grabbing journal articles from the shelves and digging through charts to find the key data points. "Caffeine is what's called a wake-promoting therapeutic," he says.

Required Viewing of an Advertisement from National Geographic Magazine**Length of Advertisement to Access Full Document:** 60 seconds☐ Select Summary/Document☐ Reject Summary/Document

This website article provides information about caffeine in 5 categories:

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- DOCUMENT SEVEN**

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caffeineinformer

Caffeine Amounts

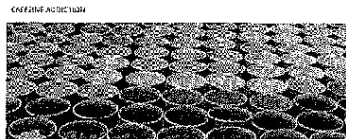
Death by Caffeine

CAFFEINE ADDICTION
Reddit is More Addicted to Energy Drinks than BuzzFeed

CAFFEINE ADDICTION
20 Awesome Benefits of Quitting Caffeine or Coffee

CAFFEINE ADDICTION
Have you heard of any of the following two fiber channels by now?

Is Caffeine Addictive? What Research and Experience Says



It has long been debated whether or not caffeine should be labeled as an addictive substance.

Most people who use caffeine regularly can attest that it does cause some level of dependency in that quitting *causes* *phantom*

This website provides headings to more information including:

- What Research Says about the Addictive Nature of Caffeine
- Is Caffeine Addictive? What Research and Experience Says about the Addictive Nature of Caffeine
- Anecdotal Evidence for Caffeine Addiction
- Understanding Your Level of Addiction
- Comments Section from Readers Discussing their Personal Experiences with Caffeine

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DOCUMENT EIGHT

Food

Select Committee on GRAS Substances (SCOGS) Opinion: Caffeine

Background: Caffeine is a naturally occurring substance found in many foods and beverages. It is a stimulant that can increase alertness and energy. The SCOGS report provides information on the safety of caffeine in food and beverages.

Caffeine

- SCOGS Report Number: 18
- Type of Substance: Food
- GRAS Status: GRAS
- GRAS Reason: 182,180

SCOGS Opinion:

Caffeine is a naturally occurring substance found in many foods and beverages. It is a stimulant that can increase alertness and energy. The SCOGS report provides information on the safety of caffeine in food and beverages.

The website of the US Food and Drug Administration provides access to the Select Committee on GRAS (Generally Recognized as Safe) Substances. This page presents findings on 8 key factors related to caffeine including:

--Levels of Consumption

<https://rulers.qualtrics.com/ControlPanel/Ajax.php?action=GetSurveyPrintPreview&T=3nJIDvE1wck6nABPUn8opaS>

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- History of Consumption
- Mutagenicity
- Teratogenicity
- Carcinogenicity
- Long term feeding studies
- Dose effects in humans
- Behavioral effects on children

Required Viewing of an advertisement from a supplier of medial devices
Length of Advertisement to Access Full Document: 60 seconds

- ☐ Select Summary/Document
- ☒ Reject Summary/Document

DOCUMENT NINE

Source: Addiction

Date: December 1994, Vol. 89 Issue 12, p1595-1599, 5p.

Headline: Caffeine, Health and Commercial Interests

Authors: Editorial by the Editors of Addiction

Abstract: Comments on the relationship between caffeine use, health and commercial interests. Discusses caffeine as a psychoactive substance. Notes that caffeine is present in many soft drinks which may have a particular impact on children. Cites research on health threats including increases in blood pressure and interuterine growth retardation. Insight into caffeine lobby in the United States; Consumption trends; Industry approach to caffeine public awareness programs. States that the Food and Drug Administration (FDA) has threatened to remove caffeine from the list of Generally Recognized as Safe (GRAS) substances but that the International Life Sciences Institute (ILSI), which is an industry organization developed to service commercial interests, has blocked this. Claims that the caffeine industry is having a distorting effect on scientific information.

Required viewing of an advertisement from an organic food provider

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DOCUMENT TEN

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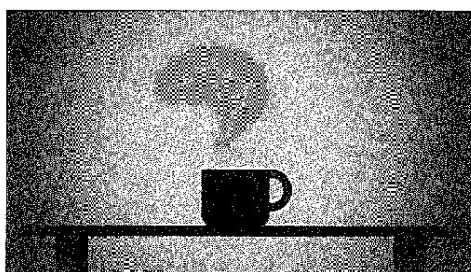
What Caffeine Actually Does to Your Brain



Kevin Purdy

Author of [HACKS](#) and [THE SCIENCE OF](#)

2/22/15 10:00 AM



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3 Thyroid Warning Signs
Is Your Thyroid Causing Your Health Problems? Doctor Explains the Signs
www.earthmatters.com

For all of its wild popularity, caffeine is one seriously misunderstood substance. It's not a simple upper, and it works differently on different people with different tolerances—even in different menstrual cycles. But you can make it work better for you.

We've covered all kinds of caffeine "hacks" here at Lifehacker, from taking "[caffeine naps](#)" to [getting "optimally wired."](#) And, of course, we're obsessed with the [perfect cup of coffee](#). But when it comes to why so many of us love our coffee, tea, soda, or energy drink fixes, and what they actually do to our busy brains, we've never really dug in. In this article, we cover:

Caffeine Doesn't Actually Get You Wired

It Boosts Your Speed, But Not Your Skill—Depending On Your Skill Set

Effectiveness, Tolerance and Headaches

Getting Out of the Habit and Learning to Tame Caffeine

That's our attempt at summing up the science and common understanding of caffeine in one post. There is, as you can imagine, a lot more to explore—Braun's *Buzz* is a good starting point, but you'll find your own way from there. What's the most interesting thing you've learned about caffeine, either from reading or personal experience? Share the science in the comments.

Required Viewing of an advertisement from a major coffee supplier

Length of Advertisement to Access Full Document: 60 seconds

☐ Select Summary/Document

☐ Reject Summary/Document

You have selected documents that you feel supply the optimum information needed to understand the health impacts of caffeine. In this stage of the research, you are asked to review your selections and choose only one document that is the best in doing so.

Please enter document number

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Please describe in 4-20 words why
you feel this is the best document

Block Four--Personal Data

In this part of the survey, you will be presented with summaries of ten documents and videos on the health impacts of caffeine.

Please use the summaries to decide which documents you feel would supply you with the optimum amount and variety of information needed to understand the issue.

You will need to supply your email address to select those documents. Many organizations collect email addresses on the Web and use them to building online mailing lists or sell them to data brokers attempting to reach new customers.

You will be asked for your email address at the end of the survey. Your email address will be used only within the context of this research study to better understand related research issues. You may be contacted in the future about such research.

You may review all document summaries first before selecting and you may go back and forth to select or reject.

DOCUMENT ONE

Source: Journal of Alzheimer's Disease

Date: December 2010

Headline: Caffeine and Coffee as Therapeutics Against Alzheimer's Disease

Authors: Gary W. Arendash and Chuanhai Cao of The Florida Alzheimer's Disease Research Center, Tampa, FL, The Department of Cell Biology, Microbiology and Molecular Biology, University of South Florida, Tampa, FL and The Byrd Alzheimer's Center and Research Institute, Tampa, FL

Abstract: Epidemiologic studies have increasingly suggested that caffeine/coffee could be an effective therapeutic against Alzheimer's disease (AD). We have utilized a transgenic mouse model for AD in well-controlled studies to determine if caffeine and/or coffee have beneficial actions to protect against or reverse AD-like cognitive impairment and AD pathology. AD mice given caffeine in their drinking water for young adulthood into older age showed protection against memory impairment and lower brain levels of the abnormal protein (amyloid-beta; A beta) thought to be central to AD pathogenesis. Moreover, "aged" cognitively-impaired AD mice exhibited memory restoration and lower brain A beta levels following only 1-2 months of caffeine treatment. We believe that the cognitive benefits of chronic caffeine administration in AD mice are due to caffeine itself, and not metabolites of caffeine; this, because our long-term administration of theophylline to AD mice provided no cognitive benefits. In acute studies involving AD mice, one oral caffeine treatment quickly reduced both brain and plasma A beta levels - similarly rapid alterations in plasma A beta levels were seen in humans following acute caffeine administration. "Caffeinated" coffee provided to AD mice also quickly decreased plasma A beta levels, but not "decaffeinated" coffee, suggesting that caffeine is critical to decreasing blood A beta levels. Caffeine appears to provide its disease-modifying effects through multiple mechanisms, including a direct reduction of A beta production through suppression of both beta- and secretase levels. These results indicate a surprising ability of moderate caffeine intake (the human equivalent of 500 mg caffeine or 5 cups of coffee per day) to protect against or treat AD in a mouse model for the disease and a therapeutic potential for caffeine against AD in humans.

Keywords: Alzheimer's disease, amyloid-beta, caffeine, coffee, memory

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DOCUMENT TWO

Published on Sep 4, 2012

Coffee's health benefits and risks - find out in this videos! Coffee is ever present from the classroom to the office, from Starbucks to hipster cafes with no signs - and chances are as a college student, you're going to get to know it pretty well!

But did you know how many health benefits and risks coffee poses? Some of these are shocking! John Iadarola and Lisa Ferguson discuss the razor's edge that is coffee addiction on TYT University.

Are you a coffee addict? Do you ride the ups and downs of caffeine addiction? If you could wipe the slate clean, would you start drinking coffee again? And has it ever had any significant negatives for you? Leave a comment down below!

Comments: 548

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DOCUMENT THREE

Source: The Psychologist, <http://www.thepsychologist.org.uk/>

Date: December 2004, pps 698-701

Headline: The pros and cons of caffeine

Authors: Dr. Rebecca Thompson for the Care of the Elderly, Bath, and the Department of Psychology, University of Plymouth, UK. Karen Keene, undergraduate student at the University of Bath.

Abstract: This article discusses the potential health effect of caffeine, particularly for the elderly. Notes that as with any drug, there are concerns about addiction. Explains the physical action of caffeine including facts that it remains in the body for 3-5 hours after ingestion and is metabolized by the liver with less than 5% being recovered unchanged in urine. Discusses highs and lows of caffeine: specifically the indications that it increases mental acuity and the negative physical effects including decreased fine motor movements and increased blood pressure. Outlines addictive properties and symptoms of caffeine withdrawal. Recommends a systematic investigation of whether the benefits outweigh the detrimental health effects of caffeine and that current consumer can continue to enjoy in moderation.

Weblinks: The Research Institute for the Care of the Elderly: www.rice.org.uk and The Coffee Science Information Center www.cosic.org

Keywords: Caffeine, Elderly, Addiction, Health Care

User Comments: 7

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DOCUMENT FOUR

Source: MedlinePlus, <http://www.nlm.nih.gov/medlineplus/ency/article/002445.htm>

Date: Updated as of April 30, 2013

Headline: Caffeine in the diet

Authors: Updated by Alison Evert, MS, RD, CDE, Nutritionist, University of Washington Medical Center Diabetes Care Center, Seattle, Washington. Also reviewed by A.D.A.M Health Solutions, Ebix, Inc., Editorial Team: David Zieve, MD, MHA, Bethanne Black, Stephanie Slon, and Nissi Wang.

Abstract: This article outlines the function of caffeine, noting that there is no nutritional need for it but that it can stimulate the brain and nervous system. Finds food sources for caffeine include tea leaves, kola nuts, coffee and cocoa beans and that it is included in processed foods such as chocolate, colas and many candies and gums. Outlines side effects including fast heart rate and many more. Notes that children's consumption should be monitored for several reasons. Provides the recommendations of the American Medical Association Council on Scientific Affairs for use of caffeine. Notes drug interactions.

References: Chin, JM et al. Caffeine content of brewed teas. J Anal Toxicol. 2008; 32 (8); 702-4

Gagne L. Maizes V. Osteoporosis. In Rakel D, ed. Integrative Medicine, 3rd ed. Philadelphia, PA; Saunders Elsevier, 2012, chap 37.

Keywords: Caffeine, Nutrition, Addiction

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DOCUMENT FIVE



By T. R. Reid Photos by Bob Sacha

It's hardly a coincidence that coffee and tea caught on in Europe just as the first factories were ushering in the industrial revolution. The widespread use of caffeinated drinks—replacing the ubiquitous beer—facilitated the great transformation of human economic endeavor from the farm to the factory. Boiling water to make coffee or tea helped decrease the incidence of disease among workers in crowded cities. And the caffeine in their systems kept them from falling asleep over the machinery. In a sense, caffeine is the drug that made the modern world possible. And the more modern our world gets, the more we seem to need it. Without that useful jolt of coffee—or Diet Coke or Red Bull—to get us out of bed and back to work, the 24-hour society of the developed world couldn't exist.

"For most of human existence, your pattern of sleeping and wakefulness was basically a matter of the sun and the season," explains Charles Czeisler, a neuroscientist and sleep expert at Harvard Medical School. "When the nature of work changed from a schedule built around the sun to an indoor job timed by a clock, humans had to adapt. The widespread use of caffeinated food and drink—in combination with the invention of electric light—allowed people to cope with a work schedule set by the clock, not by daylight or the natural sleep cycle."

Czeisler, who rarely consumes any caffeine, is a bundle of wide-awake energy in his white lab coat, racing around his lab at Boston's Brigham and Women's Hospital, grabbing journal articles from the shelves and digging through charts to find the key data points. "Caffeine is what's called a wake-promoting therapeutic," he says.

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DOCUMENT SIX

The screenshot shows the Drugs.com website. At the top, there's a banner for "unbeatable prices for your style." Below that is the Drugs.com logo and navigation links. The main content area is titled "Caffeine" and includes a brief description, "Related information" links, and a "What is Caffeine?" section. The "What is Caffeine?" section states: "Caffeine is a central nervous system stimulant." There are also links to "Official Site" and "Side Effects".

This website article provides information about caffeine in 5 categories:

- Overview
- Side Effects
- Dosages
- Interactions
- For Professionals
- More (includes Pregnancy Warnings, Breastfeeding Warnings, User Reviews, Drug Images, Support Group Q&A and Pricing & Coupons)

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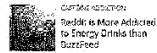
- ☐ Select Summary/Document. I will supply my email address to access the document.
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DOCUMENT SEVEN

caffeineinformer

Caffeine Addictive

Destiny by Caffeine

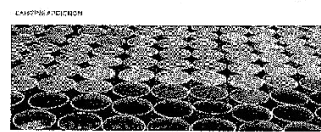


CAFFEINE ADDICTION
 Is Caffeine More Addictive
 to Energy Drinks than
 Coffee?

Is Caffeine Addictive? What Research and Experience Says



CAFFEINE ADDICTION
 23 Awesome Benefits of
 Quitting Caffeine or
 Coffee



It has long been debated whether or not caffeine should be labeled as an addictive substance.

Most people who use caffeine regularly can attest that it does cause some level of dependency in that quitting [causes a crash](#).

This website provides headings to more information including:

- What Research Says about the Addictive Nature of Caffeine
- Is Caffeine Addictive? What Research and Experience Says about the Addictive Nature of Caffeine
- Anecdotal Evidence for Caffeine Addiction
- Understanding Your Level of Addiction
- Comments Section from Readers Discussing their Personal Experiences with Caffeine

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DOCUMENT EIGHT

U.S. Food and Drug Administration
 Select Committee on GRAS Substances (SCOGS) Opinion: Caffeine

The SCOGS Committee (SCOGS) conducted a review of the safety of caffeine and issued its opinion on May 14, 2003. The SCOGS Committee concluded that caffeine is safe for consumption in the amounts typically found in food and beverages. The SCOGS Committee also noted that caffeine is a stimulant and can cause side effects such as insomnia, nervousness, and increased heart rate.

Caffeine

- SCOGS Recommendation: Safe
- Type of Evaluation: GRAS
- Date: 2003
- SCOGS Opinion: Safe

Caffeine has been used by humans for centuries in food and beverages. This opinion is not concerned with such current concerns as the safety of caffeine in energy drinks or in combination with other substances. The SCOGS Committee's opinion is based on the information available at the time of the review.

<https://rulers.qualtrics.com/ControlPanel/Ajax.php?action=GetSurveyPrintPreview&T=3nJIDvEtwcKnA6PUn8opaS>

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The website of the US Food and Drug Administration provides access to the Select Committee on GRAS (Generally Recognized as Safe) Substances. This page presents findings on 8 key factors related to caffeine including:

- Levels of Consumption
- History of Consumption
- Mutagenicity
- Teratogenicity
- Carcinogenicity
- Long term feeding studies
- Dose effects in humans
- Behavioral effects on children

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DOCUMENT NINE

Source: Addiction

Date: December 1994, Vol. 89 Issue 12, p1595-1599, 5p.

Headline: Caffeine, Health and Commercial Interests

Authors: Editorial by the Editors of Addiction

Abstract: Comments on the relationship between caffeine use, health and commercial interests. Discusses caffeine as a psychoactive substance. Notes that caffeine is present in many soft drinks which may have a particular impact on children. Cites research on health threats including increases in blood pressure and interuterine growth retardation. Insight into caffeine lobby in the United States; Consumption trends; Industry approach to caffeine public awareness programs. States that the Food and Drug Administration (FDA) has threatened to remove caffeine from the list of Generally Recognized as Safe (GRAS) substances but that the International Life Sciences Institute (ILSI), which is an industry organization developed to service commercial interests, has blocked this. Claims that the caffeine industry is having a distorting effect on scientific information.

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DOCUMENT TEN

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LOG IN

Lifehacker

FOLLOW

What Caffeine Actually Does to Your Brain



Kevin Purdy

Author, Brain Hacker

JULY 2011



Ads by Google

3 Thyroid Warning Signs
Is Your Thyroid Causing Your Health Problems? Doctor Explains the Signs
medtronic.com

For all of its wild popularity, caffeine is one seriously misunderstood substance. It's not a simple upper, and it works differently on different people with different tolerances—even in different menstrual cycles. But you can make it work better for you.

We've covered all kinds of caffeine "hacks" here at Lifehacker, from taking "caffeine naps" to getting "optimally wired." And, of course, we're obsessed with the [perfect cup of coffee](#). But when it comes to why so many of us love our coffee, tea, soda, or energy drink fixes, and what they actually do to our busy brains, we've never really dug in. In this article, we cover:

Caffeine Doesn't Actually Get You Wired
It Boosts Your Speed, But Not Your Skill—Depending On Your Skill Set
Effectiveness, Tolerance and Headaches
Getting Out of the Habit and Learning to Tame Caffeine

That's our attempt at summing up the science and common understanding of caffeine in one post. There is, as you can imagine, a lot more to explore—Braun's *Buzz* is a good starting point, but you'll find your own way from there. What's the most interesting thing you've learned about caffeine, either from reading or personal experience? Share the science in the comments.

☒ Select Summary/Document. I will supply my email address to access the document.

☐ Reject Summary/Document

You have selected documents that you feel supply the optimum information needed to understand the health impacts of caffeine. In this stage of the research, you are asked to review your selections and choose only one document that is the best in doing so.

Please enter document number

Please describe in 4-20 words why
you feel this is the best document

<https://rulgurs.qualtrics.com/ControlPanel/Ajax.php?action=GetSurveyPrintPreview&T=3nJlDvE1wcl9nA6PUr8opaS>

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Closing Questions

Please indicate the highest level of education you have completed.

- ☐ Some Middle or High School
- ☐ High School Graduate
- ☐ Some College
- ☐ College Graduate (4 year)
- ☐ Master's Degree
- ☐ Doctoral or Professional Degree

Please indicate the highest level of education completed by your head or heads of household if you are not head of your household. If you have two or more people who could be considered head of household, please indicate the highest level of education attained among them.

- ☐ Am Head of Household
- ☐ Some Middle or High School
- ☐ High School Degree
- ☐ Some College
- ☐ College Graduate (4 years)
- ☐ Master's Degree
- ☐ Doctoral or Professional Degree

Please list your age in years.

What is your gender?

- ☐ Male
- ☐ Female
- ☐ Prefer not to state

Please provide a realistic estimate of how much you believe an individual with your education, skills and experience should be compensated on an annual basis.

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Please select your current geographic location.

- ☐ USA
- ☐ Canada

Who pays for your internet access used outside work? Check all that apply.

- ☐ Self/Spouse
- ☐ Parents
- ☐ School
- ☐ Commercial Institutions (including coffee shops)
- ☐ Public Libraries
- ☐ Other
- ☐ Don't Know

Please indicate how interesting you feel the research you just participated in is.

Not at all interesting

Very Interesting

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| ResearchInterest | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Please indicate how relevant you feel the research you just participated in is.

Not at all relevant

Very relevant

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| ResearchRelevance | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Please indicate how much you feel the research represented a real life situation.

Not like real life

Very much like real life situation

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

<https://nutgers.qualtrics.com/ControlPanel/Ajax.php?action=GetSurveyPrintPreview&T=3nJIDvE1wdKnA6PUh6ceS>

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ResearchRealLife

Please give a numeric score from 1-10 to describe if you completed the research as quickly as possible or if you spent time to answer the questions carefully.

| | Went as fast as I could | | | | | | Answered questions carefully | | | | |
|-------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| ResearchTimeSpent | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Please note any areas in which you found the research unclear or confusing. If none, type none.

Block 6

This survey is now concluded.

Please note that any references to refunding money to you or a charity, collecting your personal email address, or requiring you to watch advertisements which you may have seen during the survey (depending on the experimental group you were assigned) were only part of the experiment in order to make it more realistic.

No additional monies will be returned to you or a charity for not selecting documents, your email address will not be used for any communication and you will not be required to watch any advertisements at the conclusion of this research.

All participants who completed the complete survey will receive \$3.00.

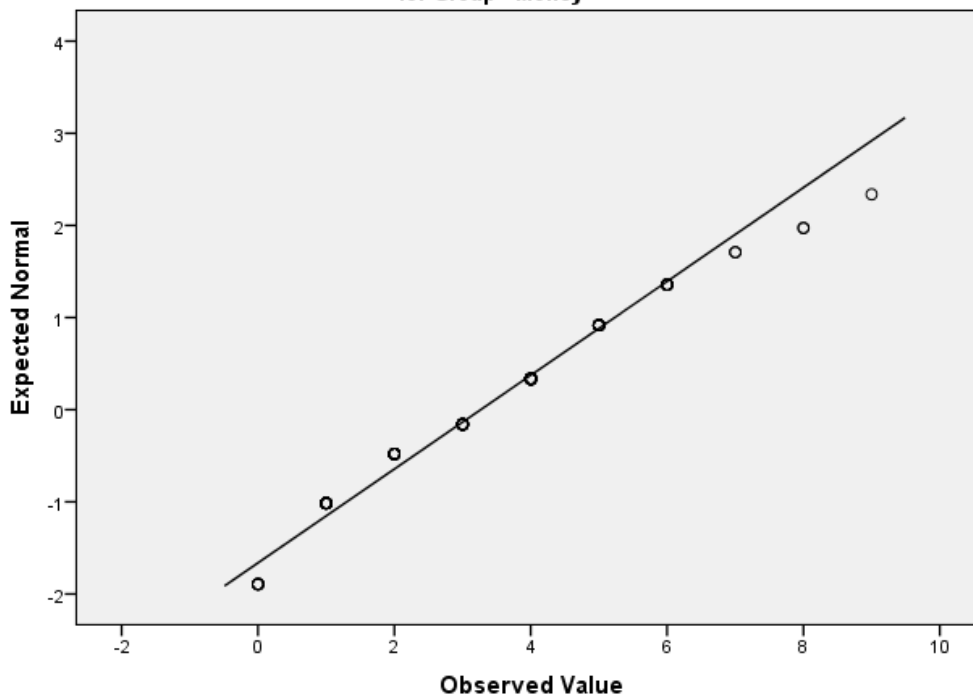
Please indicate that you understand this information.

☐ I understand.

☐ I do not understand and will contact the primary investigator at burlonb@rci.rueters.edu

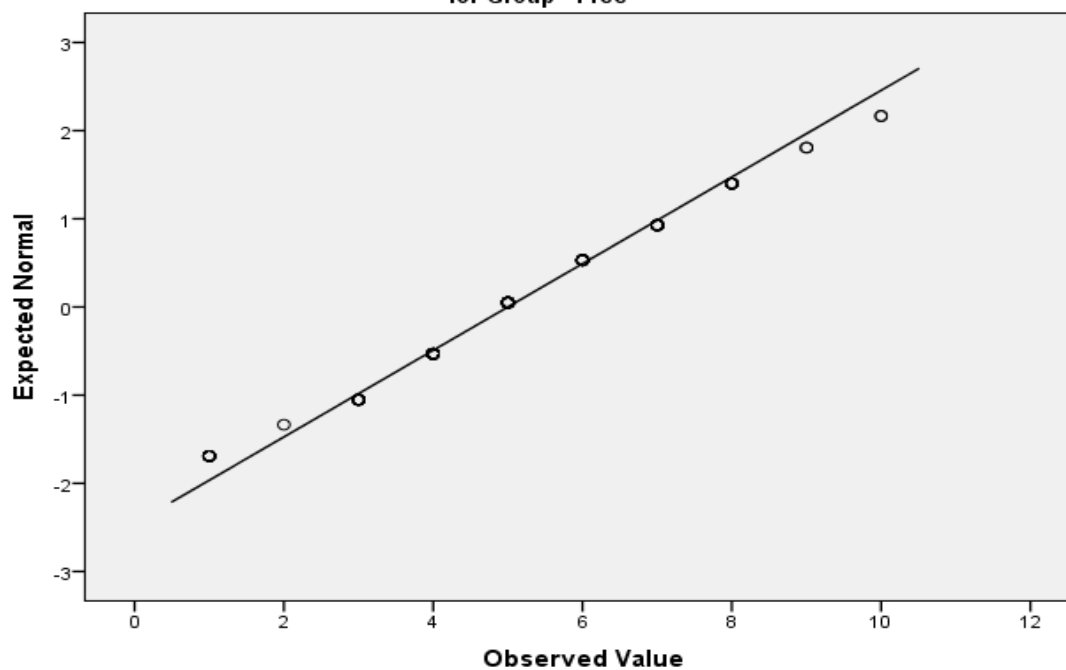
APPENDIX C
QQ Plots for Distribution
Normal Q-Q Plot of NumberSelected

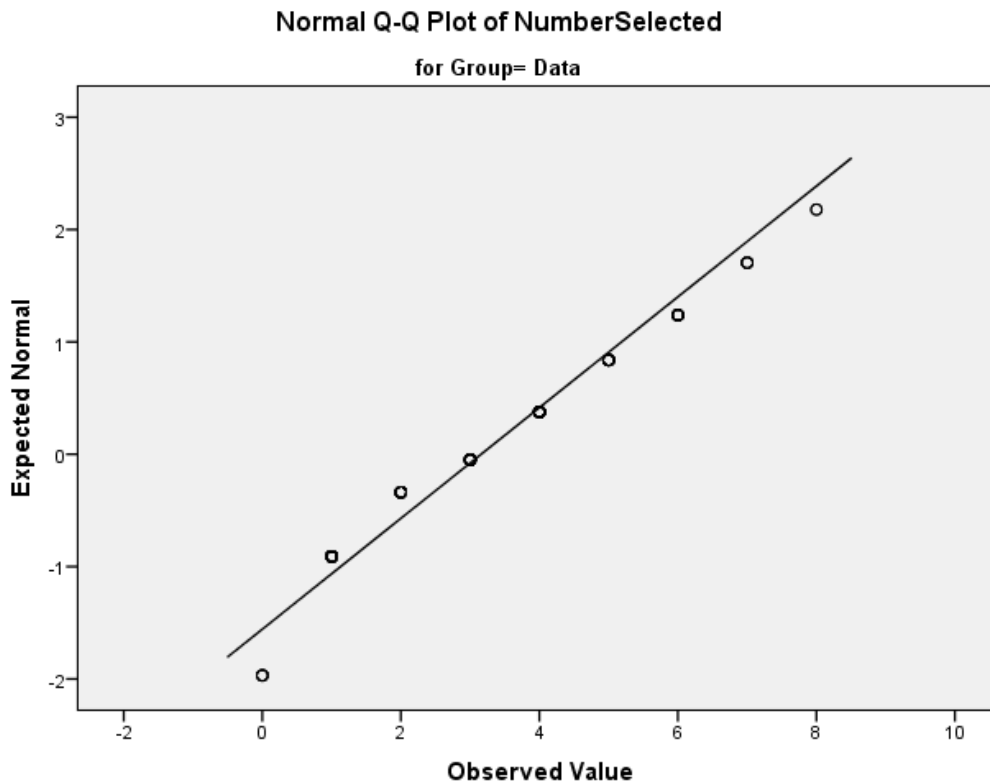
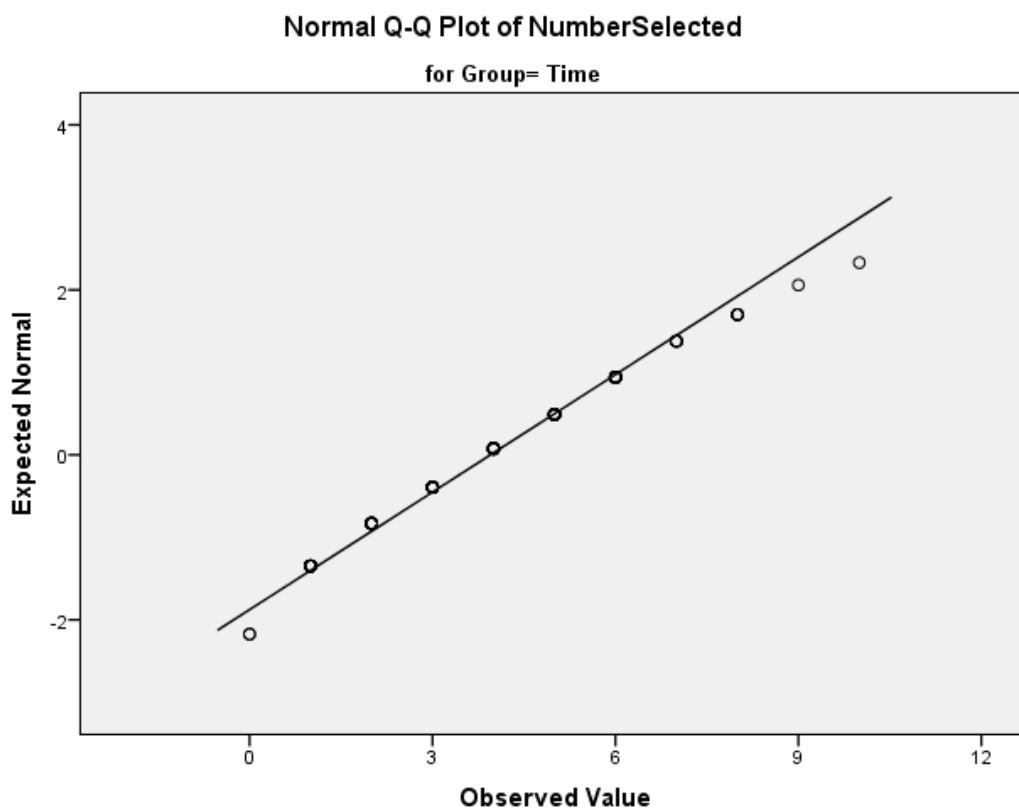
for Group= Money



Normal Q-Q Plot of NumberSelected

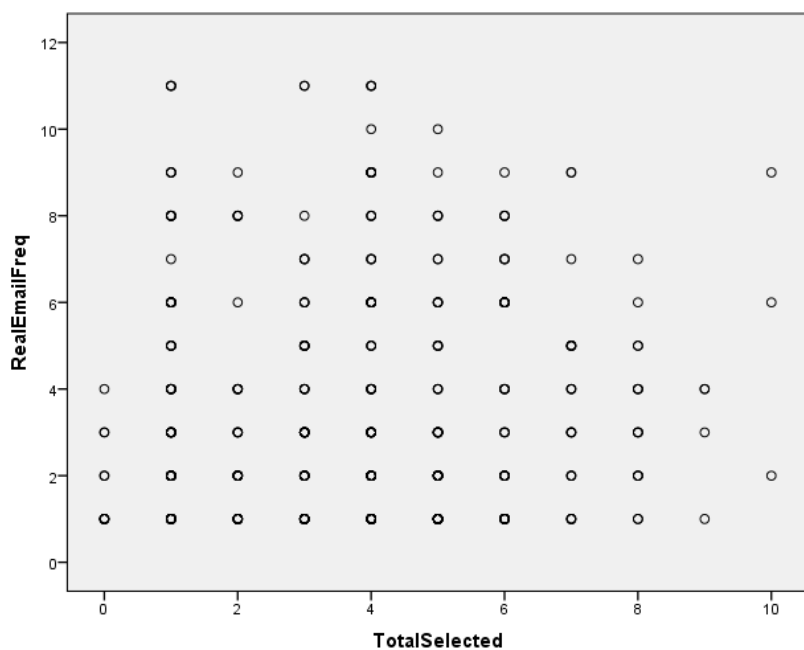
for Group= Free



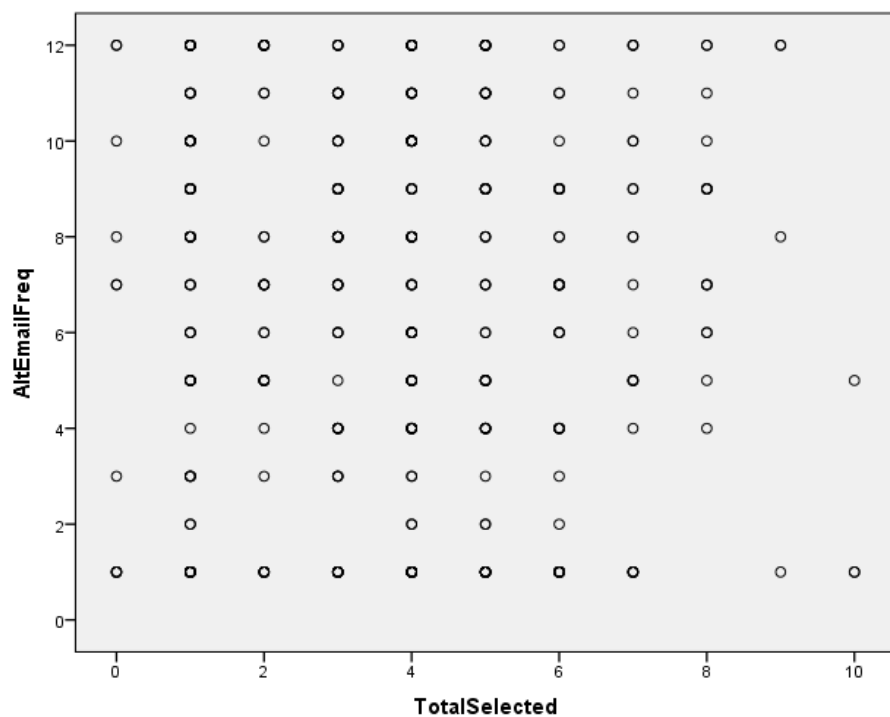


APPENDIX D

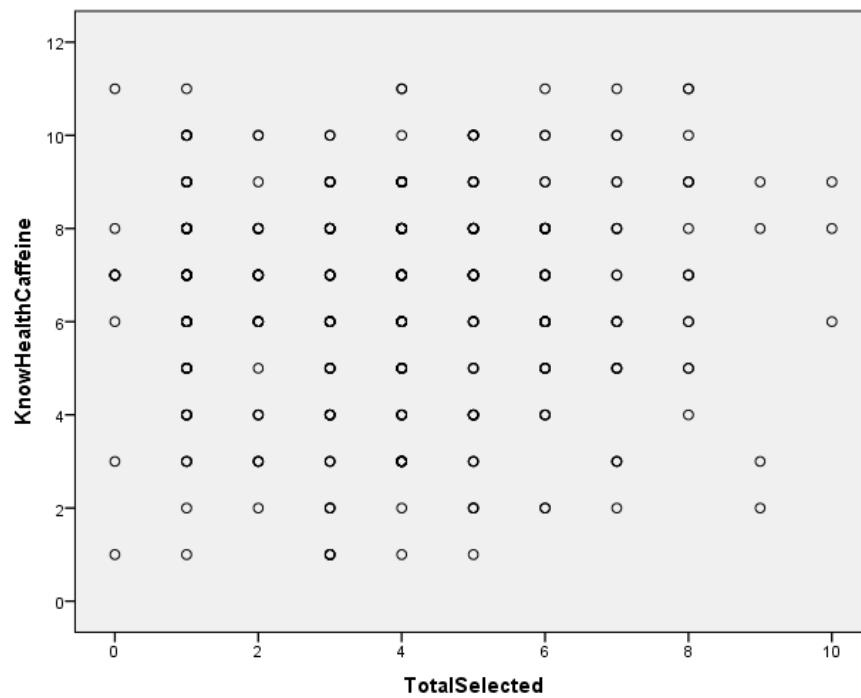
Appendix D Scatterplots for Selected Consumer Variables



1. Scatterplot for How Often Real Email is Used and Total Number Selected



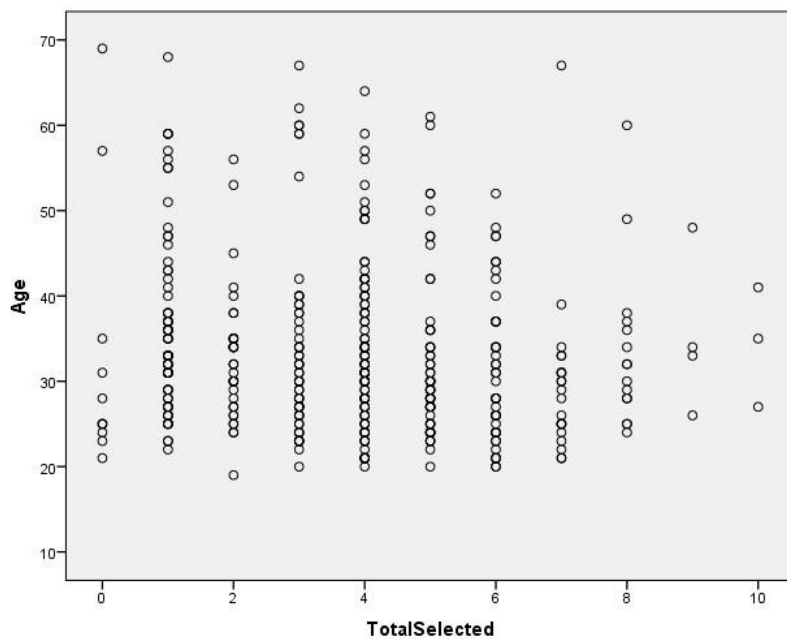
2. Scatterplot for How Often Alternate Email is Used and Total Number Selected



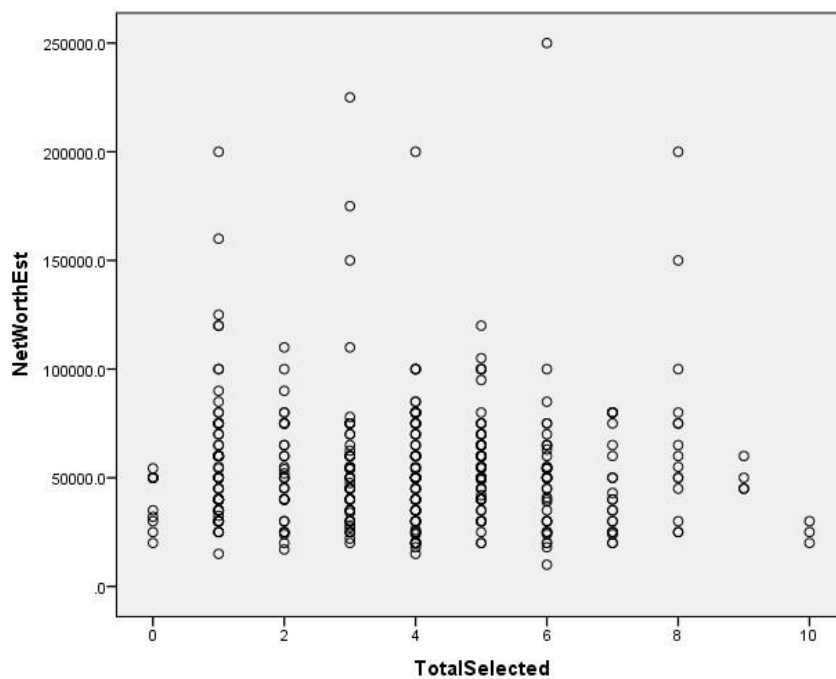
3. Scatterplot for Knowledge of the Health Impacts of Caffeine and Total Number Selected

APPENDIX E

SELECTED SCATTERPLOTS FOR DEMOGRAPHIC VARIABLES



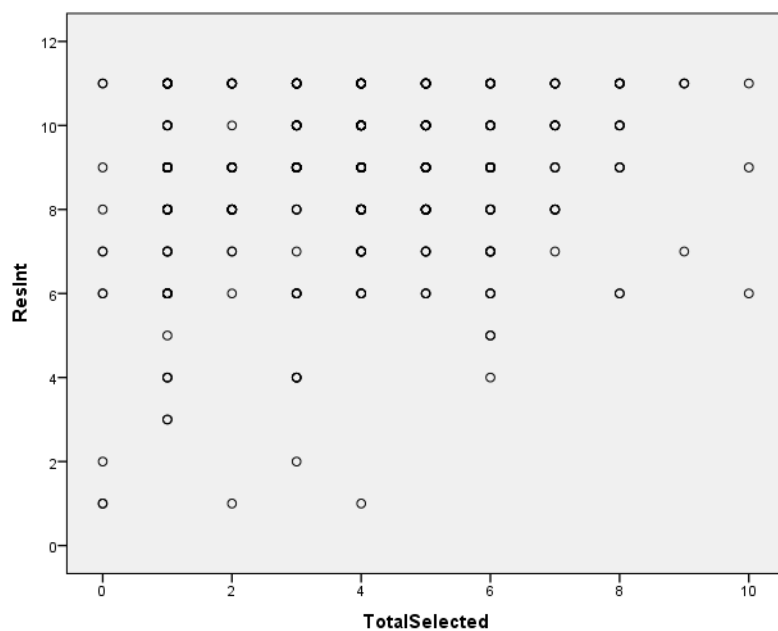
1. Scatterplot for Age and Total Number Selected



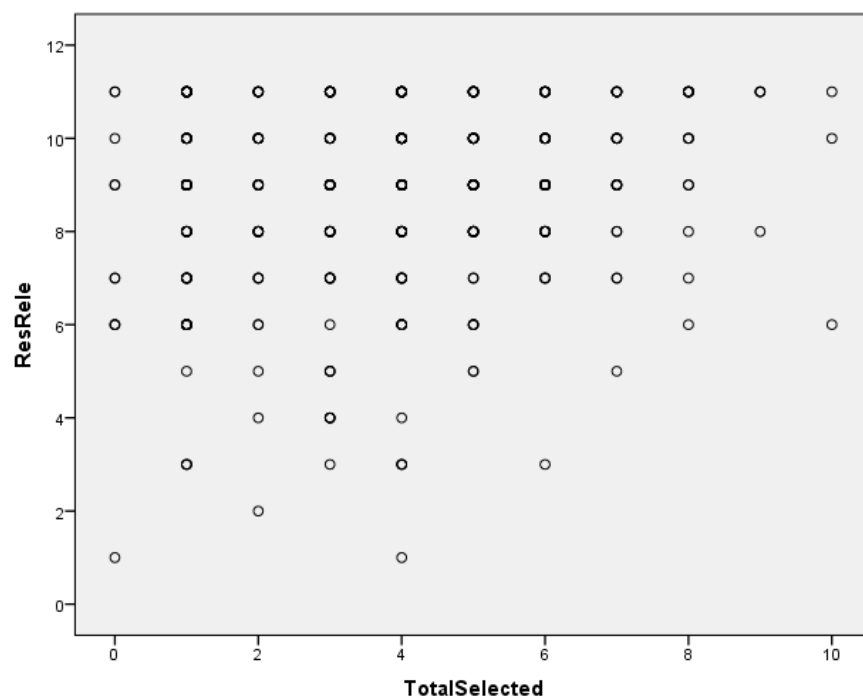
2. Scatterplot for Perceived Annual Income and Total Selected

APPENDIX F

SELECTED SCATTERPLOTS FOR RESEARCH VARIABLES



1. Scatterplot for Interest in Research and Total Number Selected



2. Scatterplot for Relevance of Research and Total Number Selected

APPENDIX G

Correlation Tables

Shown here is Spending Habits, Time and Privacy.

Correlations

| | | SpendHab | SpendHab2 | Time | Privacy | TotalSelected |
|---------------|---------------------|----------|-----------|-------|---------|---------------|
| SpendHab | Pearson Correlation | 1 | .650** | .034 | .234** | .069 |
| | Sig. (2-tailed) | | .000 | .500 | .000 | .167 |
| | N | 401 | 401 | 401 | 401 | 401 |
| SpendHab2 | Pearson Correlation | .650** | 1 | -.086 | .198** | .041 |
| | Sig. (2-tailed) | .000 | | .084 | .000 | .416 |
| | N | 401 | 401 | 401 | 401 | 401 |
| Time | Pearson Correlation | .034 | -.086 | 1 | .227** | -.056 |
| | Sig. (2-tailed) | .500 | .084 | | .000 | .260 |
| | N | 401 | 401 | 401 | 401 | 401 |
| Privacy | Pearson Correlation | .234** | .198** | .227* | 1 | -.057 |
| | Sig. (2-tailed) | .000 | .000 | .000 | | .252 |
| | N | 401 | 401 | 401 | 401 | 401 |
| TotalSelected | Pearson Correlation | .069 | .041 | -.056 | -.057 | 1 |
| | Sig. (2-tailed) | .167 | .416 | .260 | .252 | |
| | N | 401 | 401 | 401 | 401 | 401 |

** . Correlation is significant at the 0.01 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

Shown here is Behavior relating to Payment with Payment for Subs and Pay for Individual Docs

Correlations

| | | PaySubs | IndDoc | TotalSelected |
|---------------|---------------------|---------|---------|---------------|
| PaySubs | Pearson Correlation | 1 | -.445** | -.048 |
| | Sig. (2-tailed) | | .000 | .342 |
| | N | 401 | 401 | 401 |
| IndDoc | Pearson Correlation | -.445** | 1 | -.012 |
| | Sig. (2-tailed) | .000 | | .815 |
| | N | 401 | 401 | 401 |
| TotalSelected | Pearson Correlation | -.048 | -.012 | 1 |
| | Sig. (2-tailed) | .342 | .815 | |
| | N | 401 | 401 | 401 |

** . Correlation is significant at the 0.01 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

Shown here is Advertising variables

Correlations

| | | WatchAd | HowOftOverMin | TotalSelected |
|---------------|---------------------|---------|---------------|---------------|
| WatchAd | Pearson Correlation | 1 | .190** | .141** |
| | Sig. (2-tailed) | | .000 | .005 |
| | N | 401 | 401 | 401 |
| HowOftOverMin | Pearson Correlation | .190** | 1 | .136** |
| | Sig. (2-tailed) | .000 | | .006 |
| | N | 401 | 401 | 401 |
| TotalSelected | Pearson Correlation | .141** | .136** | 1 |
| | Sig. (2-tailed) | .005 | .006 | |
| | N | 401 | 401 | 401 |

** . Correlation is significant at the 0.01 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

Shown here is Email Indicators

Correlations

| | | AltEmailYN | AltEmailFreq | RealEmailFreq | Total Selected |
|---------------|-----------------|------------|--------------|---------------|-------------------|
| AltEmailYN | Pearson | 1 | -.699** | .294** | -.030 |
| | Correlation | | | | |
| | Sig. (2-tailed) | | | | |
| | N | 401 | 401 | 401 | 401 |
| AltEmailFreq | Pearson | -.699** | 1 | -.252** | -.011 |
| | Correlation | | | | |
| | Sig. (2-tailed) | | | | |
| | N | 401 | 401 | 401 | 401 |
| RealEmailFreq | Pearson | .294** | -.252** | 1 | .029 |
| | Correlation | | | | |
| | Sig. (2-tailed) | | | | |
| | N | 401 | 401 | 401 | 401 |
| TotalSelected | Pearson | -.030 | -.011 | .029 | 1 |
| | Correlation | | | | |
| | Sig. (2-tailed) | | | | |
| | N | 401 | 401 | 401 | 401 |

** . Correlation is significant at the 0.01 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

Shown here is other personal data

Correlations

| | | OtherPersDataFreq | TotalSelected |
|-------------------|-----------------|-------------------|---------------|
| OtherPersDataFreq | Pearson | 1 | .118* |
| | Correlation | | |
| | Sig. (2-tailed) | | |
| | N | | |
| TotalSelected | Pearson | .118* | 1 |
| | Correlation | | |
| | Sig. (2-tailed) | | |
| | N | | |
| | | 401 | 401 |
| | | 401 | 401 |

*. Correlation is significant at the 0.05 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

Shown here is Knowledge and Interest in Health Impacts and how many cups consumed

Correlations

| | | KnowHealth Caffeine | Int Health Caffeine | NumCup s | TotalSelected |
|--------------------|---------------------|------------------------|---------------------------|-------------|---------------|
| KnowHealthCaffeine | Pearson Correlation | 1 | .244** | .043 | .045 |
| | Sig. (2-tailed) | | .000 | .385 | .370 |
| | N | 401 | 401 | 401 | 401 |
| IntHealthCaffeine | Pearson Correlation | .244** | 1 | .058 | .102* |
| | Sig. (2-tailed) | .000 | | .243 | .042 |
| | N | 401 | 401 | 401 | 401 |
| NumCups | Pearson Correlation | .043 | .058 | 1 | -.032 |
| | Sig. (2-tailed) | .385 | .243 | | .520 |
| | N | 401 | 401 | 401 | 401 |
| TotalSelected | Pearson Correlation | .045 | .102* | -.032 | 1 |
| | Sig. (2-tailed) | .370 | .042 | .520 | |
| | N | 401 | 401 | 401 | 401 |

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

Shown here is Hours online and Total Selected

Correlations

| FreeHrsOnline | | TotalSelected |
|---------------|---------------------|---------------|
| FreeHrsOnline | Pearson Correlation | 1 |
| | Sig. (2-tailed) | -.030 |
| | N | .556 |
| | | 401 |
| TotalSelected | Pearson Correlation | -.030 |
| | Sig. (2-tailed) | 1 |
| | N | .556 |
| | | 401 |

There were no significant correlations between any of these variables and total selected.

DEMOGRAPHIC VARIABLES

Shown here is Education Correlations

Correlations

| HighLevelEd | | HighLvlEdHO | TotalSelected |
|---------------|---------------------|-------------|---------------|
| HighLevelEd | Pearson Correlation | 1 | .167** |
| | Sig. (2-tailed) | | .015 |
| | N | 401 | .001 |
| | | | .771 |
| | | | 401 |
| HighLvlEdHO | Pearson Correlation | .167** | 1 |
| H | Sig. (2-tailed) | .001 | .014 |
| | N | 401 | .777 |
| | | | 401 |
| TotalSelected | Pearson Correlation | .015 | .014 |
| | Sig. (2-tailed) | .771 | .777 |
| | N | 401 | 401 |

** Correlation is significant at the 0.01 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

Shown here is Demographics: Age and Gender

Correlations

| | | Age | Gender | TotalSelected |
|---------------|-----------------|--------|--------|---------------|
| Age | Pearson | 1 | .175** | -.118* |
| | Correlation | | | |
| | Sig. (2-tailed) | | | |
| | N | | | |
| Gender | Pearson | .175** | 1 | -.075 |
| | Correlation | | | |
| | Sig. (2-tailed) | | | |
| | N | | | |
| TotalSelected | Pearson | -.118* | -.075 | 1 |
| | Correlation | | | |
| | Sig. (2-tailed) | | | |
| | N | | | |

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

Shown here is NetWorthEstimate, WhoPaysfor Internet

Correlations

| | | NetWorthEst t | WhoPays | TotalSelected |
|---------------|-----------------|------------------|---------|---------------|
| NetWorthEst | Pearson | 1 | .028 | -.019 |
| | Correlation | | | |
| | Sig. (2-tailed) | | | |
| | N | | | |
| WhoPays | Pearson | .028 | 1 | .075 |
| | Correlation | | | |
| | Sig. (2-tailed) | | | |
| | N | | | |
| TotalSelected | Pearson | -.019 | .075 | 1 |
| | Correlation | | | |
| | Sig. (2-tailed) | | | |
| | N | | | |

There were no significant correlations between any of these variables and total selected.

RESEARCH VARIABLES

Shown here are the Research Variables showing Interest, Relevance, Realism and How Quickly Completed.

Correlations

| | | ResInt | ResRele | ResReal | ResFastCar | Total Selected |
|---------------|---------------------|--------|---------|---------|------------|-------------------|
| ResInt | Pearson Correlation | 1 | .717** | .524** | .317** | .193** |
| | Sig. (2-tailed) | | .000 | .000 | .000 | .000 |
| | N | 401 | 401 | 401 | 401 | 401 |
| ResRele | Pearson Correlation | .717** | 1 | .551** | .374** | .184** |
| | Sig. (2-tailed) | .000 | | .000 | .000 | .000 |
| | N | 401 | 401 | 401 | 401 | 401 |
| ResReal | Pearson Correlation | .524** | .551** | 1 | .252** | .148** |
| | Sig. (2-tailed) | .000 | .000 | | .000 | .003 |
| | N | 401 | 401 | 401 | 401 | 401 |
| ResFastCar | Pearson Correlation | .317** | .374** | .252** | 1 | -.065 |
| | Sig. (2-tailed) | .000 | .000 | .000 | | .195 |
| | N | 401 | 401 | 401 | 401 | 401 |
| TotalSelected | Pearson Correlation | .193** | .184** | .148** | -.065 | 1 |
| | Sig. (2-tailed) | .000 | .000 | .003 | .195 | |
| | N | 401 | 401 | 401 | 401 | 401 |

** . Correlation is significant at the 0.01 level (2-tailed).

There were no significant correlations between any of these variables and total selected.

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