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INFORMATION TRIAGE: DUAL-PROCESS THEORY IN CREDIBILITY JUDGMENTS OF WEB-BASED RESOURCES

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INFORMATION TRIAGE: DUAL-PROCESS THEORY IN CREDIBILITY JUDGMENTS OF WEB-BASED RESOURCES

by

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Dedication

For my keyboard.

It’s been through a lot.

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Information Triage:
Dual-Process Theory in Credibility Judgments of Web-Based Resources

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This dissertation describes the credibility judgment process using social psychological theories of dual-processing, which state that information processing outcomes are the result of an interaction "between a fast, associative information-processing mode based on low-effort heuristics, and a slow, rule-based information processing mode based on high-effort systematic reasoning" (Chaiken & Trope, 1999, p. ix). Further, this interaction is illustrated by describing credibility judgments as a choice between examining easily identified peripheral cues (the messenger) and content (the message), leading to different evaluations in different settings.

The focus here is on the domain of the Web, where ambiguous authorship, peer-produced content, and the lack of gatekeepers create an environment where credibility judgments are a necessary routine in triaging information. It reviews the relevant literature on existing credibility frameworks and the component factors that affect credibility judgments. The online encyclopedia (instantiated as Wikipedia and

Encyclopedia Britannica) is then proposed as a canonical form to examine the credibility judgment process.

The two main claims advanced here are (1) that information sources are composed of both message (the content) and messenger (the way the message is delivered), and that the messenger impacts perceived credibility; and (2) that perceived credibility is tempered by information need (individual engagement). These claims were framed by the models proposed by Wathen & Burkell (2002) and Chaiken (1980) to forward a composite dual process theory of credibility judgments, which was tested by two experimental studies. The independent variables of interest were: media format (print or electronic); reputation of source (Wikipedia or Britannica); and the participant's individual involvement in the research task (high or low).

The results of these studies encourage a more nuanced understanding of the credibility judgment process by framing it as a dual-process model, and showing that certain mediating variables can affect the relative use of low-effort evaluation and high-effort reasoning when forming a perception of credibility. Finally, the results support the importance of messenger effects on perceived credibility, implying that credibility judgments, especially in the online environment, and especially in cases of low individual engagement, are based on peripheral cues rather than an informed evaluation of content.

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Chapter 1: Introduction

What is a credibility judgment? Intuitively, it is the act of deciding whether to place trust in a new piece of information and its author(s). In order to function in an information-rich environment, we implicitly and explicitly sort the constant barrage of information we are presented with through a series of credibility judgments. These credibility judgments do not determine what we know, but rather what we believe—in some sense they are the buffer that structures our understanding of the world around us.

The credibility judgment process is defined herein as an individualized process, where a person sorts and categorizes a wealth of information sources into a hierarchy of plausibility—e.g., Wilson's (1983) cognitive authority approach adopted by Rieh & Belkin (1998), or the contextual information literacy described by Lloyd (2007). A credibility judgment, then, is the outcome of this process. Framing this as a process of pattern matching and selection, where a person judges the credibility of a new source of information by comparing it against his/her preexisting knowledge and beliefs, emphasizes the primacy of the individual making the credibility judgment rather than the particular aspects of the information source being evaluated; this approach highlights how credibility is a perceived quality that varies between individuals, dependent upon (but sometimes in spite of) the impartial qualia[1] of information sources. This constructionist (Papert, 1986) approach differs from more mathematical research in the area of document relevance that focuses primarily on the attributes of documents that influence credibility (see, e.g., Cooper, 1971; Kochen, 1974). In general, this dissertation adopts this contextual perspective when talking about credibility judgments because of its focus on the unique and situated nature of the process (Dervin, 1992; 1997). Because of this approach's focus on perception and perceived qualities of information sources, much

[1] Quale (pl. qualia) is defined as a property that is considered independently from things having the property.

of the document qualia emphasized in mathematical definitions can be seen in terms of the perceptions of the individual making the credibility judgment. In the constructionist perspective, the credibility judgment is conceptualized as a process occurring within the mind of the information receiver. The same components of the information source are analyzed (e.g., authorship, presentation, and content), but rather than being seen as fixed elements of the information source, they are instead perceived qualities—there is no claim that they represent concrete truths. In other words, this perspective echoes Rees and Saracevic's (1966) observation that relevance judgments are subjective and not inherent to a document. By broadening the discussion of credibility beyond its representation as a quale of information objects that individuals must tease out, we can more clearly focus on the individual and situated nature of credibility judgments.

Information seeking is by its nature a process of selection and consumption; individuals are bombarded, either through senses or thoughts, with new information, and whether they digest that information, whether they decide to treat it as worthwhile and credible, relies on an intricate and multifaceted process of triage: the act of organizing information upon a hierarchy of plausibility. How can this complicated process of information triage be evaluated and understood? How do new, more interactive networked environments (e.g., the Web) change individuals' behavior and expectations of the information they deal with? Further, what effect do supporting factors (such as poorly designed interfaces and the reputation of information sources) have on the interpretation of the credibility of actual contents? And what about individual factors, such as an individual's engagement, affective state, level of self-efficacy, tolerance of ambiguity, and level of expertise?

IMPORTANCE OF EXAMINING MESSENGER EFFECTS

Wathen & Burkell (2002) identify the understudied impacts of messenger on message evaluation and thus provide a motivation for research that examines the effects of messenger/medium on credibility assessment:

> The impact of delivery medium (which can be construed as an aspect of message source) on credibility assessment has not been explored to the same degree [as other aspects of message source]. Research that does examine media effects on credibility tends simply to compare the credibility of messages in different media (Johnson & Kaye, 1998) without exploring how these credibility differences arise. Thus, there [is] little data on questions such as the impact of personalized messages versus broadcast delivery, or the impact of channel fidelity (high vs. low) on credibility assessment. One important question is whether new media introduce new factors into credibility assessment. For example, as we move from face to face to television as a communication medium, does image size become important in the determination of message credibility? (p. 135)

Further, they posit that "[a]ccording to persuasion theories, a user who has a high need for information will overlook weak peripheral cues. If the information seeking episode is more casual, surface characteristics will have more influence" (p. 141). These two claims (i.e., that the medium impacts credibility judgments, and that credibility judgments based on surface characteristics of the medium are tempered by information need) are central to the research proposed in this dissertation, both because of the dearth of research on the impact of medium and the importance of information need on credibility judgments, and of the highly varied nature of information need that exists in individual information seeking episodes on the Web.

RESEARCH AGENDA

As will be discussed in Chapter 2, much of the past research into the perceived credibility of information sources is either of a qualitative nature or highly theoretical, but not experimental (with the exception of a focused research agenda performed by communications scholars on the perceived credibility of newspaper articles—e.g., West, 1994; Newhagen & Nass, 1989). The qualitative data that exists provides instrumental insight into the information seeking behaviors of individuals but lacks the generalizability that appropriate quantitative research offers by creating a reproducible experimental setting. Because of this disproportionate balance in the literature, a quantitative methodology examining Web-based media is proposed in this dissertation to explore the factors that affect the credibility judgment process.

Wathen & Burkell (2002) propose a theory of the credibility judgment process that separates the evaluation into distinct segments. In the theory, the process begins with low-effort examinations of peripheral cues (e.g., appearance, design, organization, and source reputation) before continuing on to a more high-effort analysis of the actual content of the information source (see Figure 1, p. 13, for more detail).

The proposed research also draws on social psychological theories of dual-processing[2] which state that information processing outcomes are the result of an interaction "between a fast, associative information-processing mode based on low-effort heuristics, and a slow, rule-based information processing mode based on high-effort systematic reasoning" (Chaiken & Trope, 1999, p. ix). A specific dual-process theory, Chaiken's (1980) heuristic-systematic model (HSM), is utilized in this research to describe the credibility judgment process.

The aim of this dissertation is to better understand the complex process of information triage that occurs during the credibility judgment process by combining the theories proposed by Wathen & Burkell (2002) and Chaiken (1980) to explain the effects of peripheral cues (of the information source being evaluated) and level of engagement (of the individual performing the evaluation) on credibility judgments. Specifically, this dissertation proposes two studies to examine the effect of individual engagement in the information seeking process on the perceived credibility of the information sources retrieved during the process. By examining how level of engagement (e.g., high or low) interacts with low-effort examinations of peripheral cues like source reputation (Study 1) and media format (Study 2), the complex and multifaceted process of credibility judgment can be described in a more nuanced fashion.

[2] Note that dual-process theories in social psychology differ somewhat from those in cognitive psychology (e.g., Paivio, 2007). In the latter the focus is on the cognitive processing of images and language, whereas in the former the focus is on affective modes of processing. Both, however, rely on the same low- and high-effort distinction described above. See Chaiken & Trope, 1999, particularly the preface, for a broader discussion.

Chapter 2: Literature Review

DESCRIPTION OF DOMAIN

The semi-anonymous, self-publishing aspects of the Web challenge our inherited methods of establishing trust by reputation and authority (Eagleton & Dobler, 2006). In the pre-Web environment (referred to hereafter as the print environment), individuals consumed information in a centralized and hierarchical framework that created a clear dichotomy between content producers and content consumers[3] with published works facing substantial barriers to entry. It is this framework which has customarily guided individuals' perceptions of trustworthiness. In short, we placed our trust in "experts" whose expertise was vetted by publishers and authorities (Metzger, 2007, p. 2078). In a qualitative study examining the searching behavior and perception of information quality by analyzing the think-aloud behaviors and interview transcripts of 15 participants (faculty and doctoral students) performing various search tasks, Rieh (2002) claimed that in a networked world where information sources are far more varied and numerous, individuals are less able to rely on authorities to appraise sources for them, and must increasingly decide for themselves who the experts truly are (by applying a much more complex set of rules to evaluate the content). Previous research has provided evidence that many individuals are underprepared to judge the credibility of online information sources that lack gatekeepers (see, e.g., Amsbary & Powell, 2003; Meola, 2004; Scholz-Crane, 1998). While not all online sources lack gatekeepers (e.g., online journals and research literature), Burbules (1998) claimed that novice users treat the Web as a singular, hypertextual source, and so may assume that all information found online is suspect (or, conversely, that all information found online is reputable).[4] In a similar vein,

[3] Note that this discussion of traditional information sources refers to "authoritative" information sources, such as news media, scholarly research, and published works. It does not refer to information acquired from friends, word-of-mouth, or gossip, which is decidedly not centralized nor hierarchical.

[4] The lesser claim, that users treat certain swaths of the Web as a singular source (e.g., first-page Google results), is more easily defended and leads to the same conclusion.

Gordon & Alexander (2005) claim that reading electronic text undermines an individual's ability to comprehend narrative, and Eagleton & Dobler (2006) posit a distinct difference between print literacy and Web literacy. In much the same way that a poorly written chapter in a book composed by contributed authors affects the perception of the book as a whole, one deceitful or untrustworthy Website can damage an individual's perception of other Web-based resources, especially those that share common features with the untrustworthy sites.[5] In fact, most phishing[6] sites rely on this phenomenon: by mimicking the design of the reputable site, they hope to deceive visitors into revealing their personal information. Whereas traditional publishing methods (e.g., print media) rely on an infrastructure of editorial review and monetary publishing restrictions, the Web, as a whole, lacks such gatekeepers; it is therefore more susceptible to a unique set of credibility pitfalls, such as misrepresentation, plagiarism, and utter falsehoods (see, e.g., Fritch & Cromwell, 2001; Johnson & Kaye, 2004). As information consumers, deciding what to trust is an increasingly important literacy skill.

INFORMATION OVERLOAD AND FILTERING

The difference in reliability between online information sources and traditional media is often due to the existence of gatekeepers, who act as filters. The high costs (both monetary and in the amount of time and human resources required to produce a document) associated with publishing in traditional media outlets has led publishers to construct their own information filtering system to ensure their profitability and survival. Five-hundred years ago, when the moving type printing press was a new invention, the very existence of a printed book implied that it was valuable and credible; today, the written word is everywhere, and most individuals can make their own contributions to the

[5] As an example of this overreaching distrust of the Web in general, Selnow (2000) decries that since "the Web has no editors, censors, or arbiters of truth, [it is] a swampland of false and deceitful communications" (p. 206).

[6] Phishing is defined as a fraudulent attempt to impersonate a legitimate Web site (e.g., a bank, credit card, or Web-based email service) in order to trick visitors into revealing personal information, financial information, or passwords.

growing multitude with little regard to cost. As claimed by Amsbary & Powell (2003), the credibility judgments made in a mindset of information scarcity simply cannot be carried over into an environment of information overload. In their study, 226 participants from Alabama were surveyed via telephone using stratified random sampling, and were asked to judge the relative credibility of news presented on the Internet, on television, and in newspapers. Results indicated that television news was seen as significantly more credible ($F=5.25$, $p<.05$) than news on the Internet, but that the most-used credibility cues on the Internet were the inclusion of quotations from a Ph.D. (indicating a heavy reliance on reputation and authority, which provides little reassurance in an environment that lacks strong editorial control).

Because of the massive amounts of available information with questionable authority, individuals must exact a process of information triage upon the barrage of materials available to them. Rieh & Hilligoss (2007) provide exploratory evidence that credibility judgments made on the Web are both more frequent and more perfunctory. Twenty-four undergraduates from a variety of majors and institutions in the Midwest journaled about one information seeking episode per day for 10 days and participated in a follow-up interview. The diaries and interviews were analyzed and coded with respect to (among other things) information seeking strategies and time spent accessing and evaluating credibility. The researchers noted that participants would commonly choose a fast method for retrieving information (e.g., searching Google) rather than spend the time searching for a more reliable source, because the immediacy of the information trumped the increased potential for retrieving misinformation. From this exploratory analysis, the researchers claimed that an individual will not spend a great deal of time evaluating each source s/he is presented with and, because of this, more flippant and extemporaneous techniques (such as evaluation based on interface design) are being used to determine credibility.

EXISTING THEORETICAL FRAMEWORKS OF CREDIBILITY JUDGMENTS

Before discussing the specific factors involved in the credibility judgment process, it is useful to examine how current researchers in the field conceptualize credibility. To that end, three theoretical frameworks of credibility proposed in recent literature reviews are examined below (see Table 1). These theoretical frameworks describe the primary components that an individual might use to determine the credibility of information found on the Web.

Factors Influencing Credibility Judgments in Three Existing Theoretical Frameworks

Fogg's Taxonomy of Credibility	*Metzger's Five Criteria of Credibility*	*Wathen & Burkell's Three-Stage Model*
• Presumed (e.g., prior experiences) • Surface (e.g., interface design) • Reputed (e.g., 3rd-party endorse) • Earned (e.g., familiarity)	• Accuracy (e.g., verifiability) • Authority (e.g., author's credentials) • Objectivity (e.g., political intent) • Currency (e.g., timeliness) • Coverage (e.g., comprehensiveness)	• Surface (e.g., interface design) • Message (e.g., author's credentials) • Content (e.g., individual relevance)

Table 1. Factors influencing credibility judgments in three established theories.

Fogg's Taxonomy of Credibility

Fogg (2003a) claims that credibility is essentially believability. When an individual compares two information resources (e.g., a health assessment delivered by a doctor compared to one found on a Web site), s/he is primarily determining which resource is the most believable. In making these judgments, a fundamental aspect of credibility is that it is an aspect that does not exist within the information—it is an external label, a translation that we as people apply to the information. As Fogg says, "credibility is a perceived quality; it doesn't reside in an object, a person, or a piece of

information" (p. 122). By framing credibility as a belief/perception, Fogg emphasizes its uniqueness to the individual making the judgment.

Fogg divides this perception of credibility of an information source into two components: perceived trustworthiness and perceived expertise (also in Self, 1996). In this theory, a trustworthiness judgment is akin to a morality judgment[7] (e.g., is a Web site trying to intentionally deceive for monetary gain, like many phishing scams?) or a political judgment (e.g., as in Johnson, Kaye, Bichard, & Wong, 2008—does a blog have obvious political leanings?). People trust doctors because they are expected to be unbiased, truthful, and bound by a strict moral code (the Hippocratic Oath). Once again, trust is a perceived quality; individuals can revise their trustworthiness judgments based on further information about a source, even though the original information does not change (e.g., if it is learned that a doctor on a television commercial is actually an actor wearing a white lab coat).

Perceived expertise relies on the knowledge, skill, and experience of the information source. With the example of the doctor, there is an assumed background that goes with the title of doctor: years of schooling and experience that only the capable can achieve. Once again, expertise is a perceived quality based on incomplete information: an individual may not know the details of a doctor's years of education, and his/her judgment of perceived expertise can change based on further information about the source.

Fogg's focus on perception leads him to develop a taxonomy of credibility types. He perceives a gap in the research literature when it comes to outlining different types of credibility.[8] Fogg's theory, while drawing heavily on social psychological research, is

[7] Bandura's (1991) social cognitive theory of moral thought and action lends credence to the notion that credibility and moral judgment are related; his research has shown that morally discrepant information is more likely to affect cognitive change if an individual perceives the source as credible (also supported by Bergin, 1962; McGuire, 1985).

[8] A contestable stance, since several scholars before him have established theories of credibility types, e.g., Brajnik, Mizzaro, & Tasso, 1996; Mizzaro, 1997

thus conjectural and not based on specific empirical data. The four types of credibility proposed are Presumed, Surface, Reputed, and Earned.

Presumed credibility relies on previously held beliefs and assumptions in the mind of the individual making the credibility judgment (e.g., previous experiences with doctors, good or bad). Surface credibility is an abrupt judgment based on initial exposure to an information source, and is often the type of credibility that is associated with exposure to interface design, where a poorly designed interface can lead an individual to mistrust an information source. Reputed credibility relies on third-party comments, endorsements, or referrals. This type of credibility is at play when someone says, "I went to see doctor x because my family doctor recommended her." Finally, earned credibility is the most deliberate type of credibility, in that it relies on continued use of and exposure to an information source. Earned credibility is strengthened over time, and tempers the effects of surface credibility by repeated exposure. However, while earned credibility is arguably the most robust judgment of credibility, in an information-rich and attention-poor environment it is also the least likely to be evaluated because of the amount of time required (and thus reserved for information sources that are frequently visited and familiar). Especially in the experimental setting of a scientific study, where the novelty of the situation can override any sense of earned credibility, researchers must be wary of sweeping claims about judgments based on earned credibility.

More succinctly, Fogg's taxonomy states that credibility is composed of perceived trustworthiness and expertise, and individuals form this perception based on an examination of an information source's presumed, surface, reputed, and earned credibility.

Metzger's Five Criteria of Credibility

Metzger (2007) combines and summarizes much of the historical data concerning credibility research of online sources. Twenty-five factors that have been proposed to influence the credibility judgments in prior literature (adapted from Alexander & Tate,

1999; Eysenbach & Kohler, 2002; Fogg et al., 2003; Freeman & Spyridakis, 2004; Metzger et al., 2003a; Metzger et al., 2003b; Rieh & Belkin, 1998; Rieh, 2002; Wathen & Burkell, 2002) are discussed in their applicability to online sources. Metzger identifies five criteria that individuals employ when making credibility judgments: Accuracy, Authority, Objectivity, Currency, and Coverage/Scope (these criteria are developed in Alexander & Tate, 1996, and further explored in speculative, experimental, and survey research in Alexander & Tate, 1999; Brandt, 1996; Fritch & Cromwell, 2001; Kapoun, 1998; Meola, 2004; Scholz-Crane, 1998; Smith, 1997). See Table 2 for a description of these criteria.

Credibility Criterion	**Description**
Accuracy	The number of errors in a document, the verifiability of the information by third-parties, and the general reliability of the information
Authority	Knowledge and verifiability of the author (and whether author information is included in the source) and the qualifications and credentials of the author(s); also includes whether the source is recommended by a third-party that is also authoritative.
Objectivity	Whether the information is composed of fact or opinion, has commercial objectives, whether the author has a potential conflict of interest in composing the material.
Currency	How recent the information is.
Coverage/Scope	Exhaustiveness or comprehensiveness of the information (e.g., an encyclopedia summary has less coverage than a book dedicated to a topic).

Table 2. Description of Metzger's five criteria of credibility

Metzger's five criteria and Fogg's taxonomy cover different aspects of credibility. Fogg provides us with a contextual view of credibility, where the perception of the individual making the credibility judgment figures prominently into the taxonomy, and this perception is as important to the outcome as the putative credibility of the information being evaluated. Metzger's criteria, on the other hand, are all features of the

information object being evaluated, and are only contextual insofar as they must be determined by the individual making the credibility judgment. One explanation for this is that Metzger is approaching the topic of credibility from an information literacy standpoint, which encourages the appropriate evaluation of online materials and thus tries to minimize the effect that individuals have on the credibility judgment process. Fogg, on the other hand, is approaching credibility as a psychologist, and is thus focusing on individual differences that affect credibility judgments. Metzger's five criteria are thus less contextual than Fogg's types; there is an implicit assumption that her criteria (e.g., accuracy and objectivity) are components of the information source itself rather than perceived notions on behalf of the individual making the judgment. Further, the absence of the idea of perception accounts for the avoidance of how a credibility judgment can change over time (which Fogg's taxonomy addresses with Earned credibility): if credibility is a component of an information source, once it is "happened upon," an individual knows the real credibility of a source, and can be satisfied that it is unchangeable. This notion is appealing from an information literacy standpoint, since it implies that the credibility judgment process can be distilled into a checklist that individuals can step through to ultimately determine credibility. The research conducted in this dissertation challenges this assumption by demonstrating how individual factors (such as level of engagement) can impact the credibility judgment process even when the information source being evaluated is the same (and hence the credibility criteria that Metzger reviewed are fixed).

Wathen & Burkell's Three-Stage Model

Wathen & Burkell (2002) posit a three-stage theoretical model of the credibility judgment process, highlighting the effects of surface credibility (the impact of the messenger), message credibility (composed of source and message credibility), and finally the impact of the cognitive state of the individual making the credibility judgment (see Wathen & Burkell, 2002, Fig. 1, p. 141 for a flowchart representing the model; the

figure is also reproduced below for convenience). Note that Wathen & Burkell present this as "a possible model of how credibility assessment may occur on-line, based on our interpretation of the available evidence" (p. 141), and as such is currently untested.

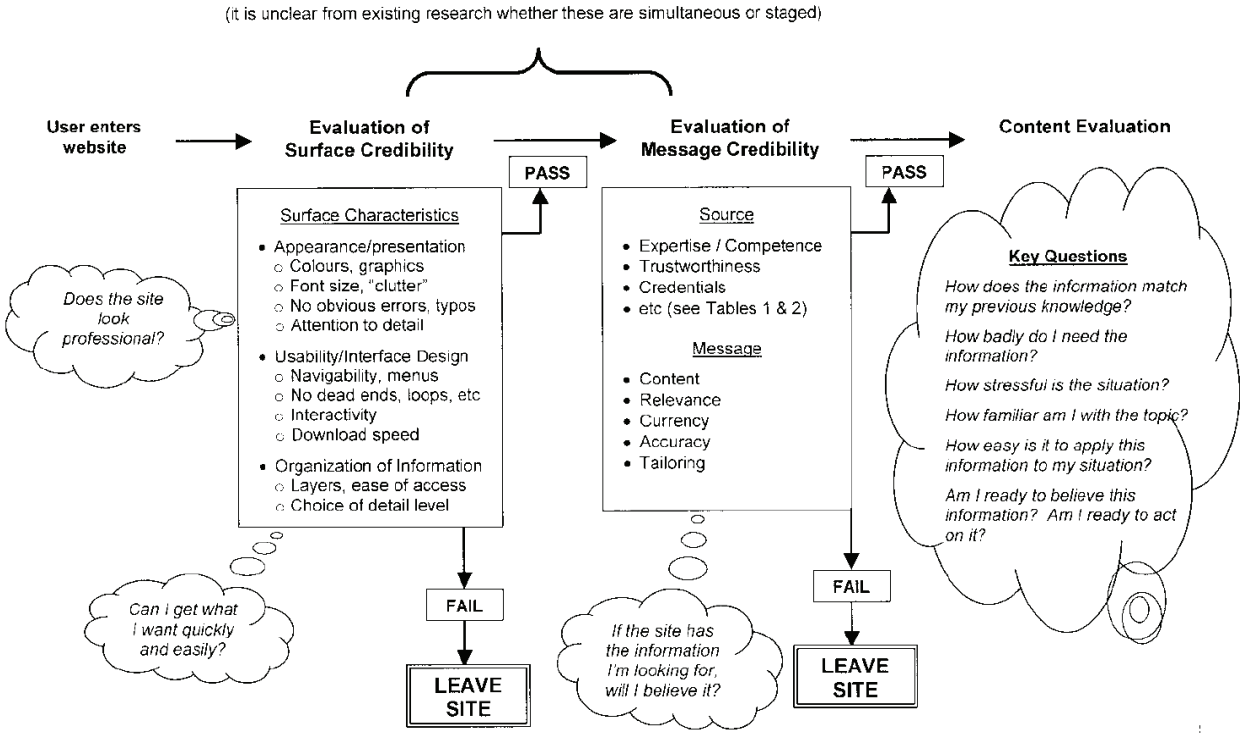

Figure 1. Proposed theoretical model for how users judge the credibility of on-line information (reproduced from Wathen & Burkell, 2002).

The first stage, the evaluation of surface credibility, relies on an examination of surface characteristics such as appearance/presentation, interface design, and organization of information. This stage answers these implicit questions: "Does the source appear professional? Can I find what I want quickly and easily?" The evaluation of surface credibility is the quickest of the three stages, in that it relies on heuristic judgments of visual cues that can be made without a thorough reading of the material in question.

The second stage, the evaluation of message credibility, assumes that some amount of reading of the content has occurred, and relies on an examination of source characteristics (e.g., expertise, trustworthiness, and credentials) and message

characteristics (e.g., content, relevance, currency, and accuracy). This stage is most concerned with perceived trustworthiness and expertise (e.g., Fogg, 2003a), and answers this implicit question: "If the site has the information I'm looking for, will I believe it?" The evaluation of message credibility is a more in-depth process than the evaluation of surface credibility, but still does not require a thorough reading of the material; source and message cues can be determined by, for example, a past familiarity with the author of the material, an examination of the date of publication, or the overall relevance to the individual's information needs.

The third and final stage, the evaluation of content, is the most situated (i.e., situationally-specific) of the three stages, in that it places paramount importance on the cognitive state of the individual making the credibility judgment and how that state interacts with both surface and message credibility. The evaluation of content relies on questions such as: "How important is this to me? How familiar am I with the topic? Am I ready to believe this information? Am I ready to act on it?" While we may expect individuals performing the first two stages of the credibility judgment process to exhibit some similarity in their judgments (since aspects of the information source in question, such as a lack of organization, tend to be consistently perceived across individuals), credibility judgments reached in the third stage are primarily dependent on the cognitive state of the individual, and are thus very much dependent on that individual's specific context.[9] Further, this final stage is the most time-intensive of the three stages, since it requires a thorough understanding of the material to address the questions asked.

Content evaluation is a more involved process that may not occur if an individual is deterred by, for example, a source's unfavorable design. Wathen & Burkell's model implies that an individual's cognitive and affective state is most important for the judgments made at this third stage, but it is argued here that they are factors that

[9] Because of the primacy of context and cognitive state, we can classify Wathen & Burkell's three-stage model as a dual-processing model (discussed in detail below).

influences each of the three stages. Thus the third stage is defined as a thorough analysis of the material in question, with the analysis reliant on an individual's cognitive and affective state.

Wathen & Burkell propose that if an individual determines that an online source does not meet an appropriate level of credibility at any one stage, then s/he will "leave the site" without further evaluation. Further, they speculate that this "easy to discard" behavior is supported by the principle of least effort (Zipf, 1949; Poole, 1985) and is indicative of information-rich environments, where the assumption is that many other potential sources of information exist, and spending too much time on any one source is potentially wasteful. Wathen & Burkell's model is based on this phenomenon, in that it proceeds from the quickest and most general evaluations to the longest and most in-depth evaluations.[10]

Summary

These three theoretical frameworks of credibility provide an overview of how researchers in the field conceptualize the components of credibility. However, in order to have a more robust understanding of how individuals actually perform the credibility judgment process, it is important to examine a set of specific factors that affect this process, and the past research that has examined them. These factors are discussed below.

FACTORS AFFECTING CREDIBILITY JUDGMENTS

A number of factors affect the ways in which individuals make credibility judgments; conceptually, these factors can be seen as belonging to the individual making the credibility judgment (e.g., level of engagement) or as belonging to the information resource being evaluated (e.g., reputation). Metzger (2007, p. 2082) gives an exhaustive overview of many of these factors, but a narrower set will be examined in this dissertation. The factors that follow are split conceptually into the aforementioned groups

[10] This again echoes the notions of the principle of least effort and satisficing, discussed above.

(individual or resource factors) based on the different meanings they have for credibility judgments. Consider that negative credibility judgments based on resource factors (i.e., factors attributed to the information source being evaluated) tend to be seen as correct: in other words, there is an aspect of the information source itself that impacts its credibility (like an author with a poor reputation). On the other hand, negative credibility judgments based on individual factors (i.e., factors attributed to the individual making the judgment) may be seen as incorrect: for example, a novice computer user who determines a research article is not credible because s/he is not invested in the topic and hence does not read beyond the abstract (which contained a minor misspelling) is not actually making an informed judgment of the source. These conceptual differences encourage the examination of credibility factors as either attributes of resources, or attributes of individuals.

Further, several theories of credibility evaluation (see, e.g., Wathen & Burkell, 2002; Fritch & Cromwell, 2001) portray the making of credibility judgments as an interaction between the information source and the individual making the judgment. This is an important distinction because the resource and individual factors must be addressed in different ways: whereas negative credibility caused by resource factors can be corrected by addressing the content or presentation of the source, individual factors—features of individuals that change the ways in which they perceive information—must be understood and dealt with rather than "corrected." The following factors are expected to have a noticeable impact on credibility judgments, and may vary from individual to individual and from situation to situation. See Table 3 for an overview.

Resource Factors	
Interface and Design	The resource's effectiveness and attractiveness of design, and clarity and usability of interface features.
Reputation	The resource's reputation (merit and reliability of the information source and its author(s)).
Individual Factors	
Self-Efficacy	The individual's beliefs about their abilities and knowledge in a certain area (e.g., Internet literacy).
Epistemological Belief Structure and Tolerance of Ambiguity	The individual's treatment of knowledge, ranging from "absolute truth exists" to "knowledge is socially constructed"; also the individual's ability to cope with ambiguity.
Expertise	The individual's level of ability in a certain area (e.g., Internet literacy).
Affective State	The individual's emotional state (at the time of the credibility judgment), expressed in terms of positive and negative affect.
Engagement	The individual's investment in and attention to a particular topic (e.g., evaluation of an information source).

Table 3. Factors affecting credibility judgments.

Factors of Resources that Affect Credibility Judgments

Interface and Design

In much the same way that social psychological research has shown that a person's physical attractiveness has a positive effect on his/her ability to be persuasive (Chaiken, 1986), the method of presentation and design of information sources affects the credibility perceptions of its users (O'Keefe, 2002). The fact that interface design has an impact on credibility judgments has been established by previous research; in a qualitative analysis, Fogg et al. (2003) coded the comments of 2,684 participants that compared the credibility of pairs of Web sites on a similar topic and found that the design/look of the site was the most frequently mentioned factor affecting credibility (it occurred in 46.1% of comments). However, the specifics of this impact and what effect it has in different contexts are somewhat unclear. For example, Wathen & Burkell's (2002)

three-stage model of credibility judgments describes moving from surface characteristics (e.g., design), to source characteristics (e.g., author credentials), and finally to the specifics of the user's context and cognitive state (e.g., how relevant the information is to the individual). In this model, interface and design characteristics affect credibility judgments at the start of the process (much like judging a book by its cover). Two claims can be advanced based on this model: first, at the earliest stage of the credibility judgment process, individuals are prone to invest the least amount of effort possible to determine if an information source lacks credibility (see, e.g., the principle of least effort (Poole, 1985), and satisficing (Simon, 1976), for descriptions of this behavior). A quick perusal of the visual quality of an information source is a fast (though often inaccurate) way to find out if it is worth spending further time with the source. Second, because these judgments are made before other, more invested ones (such as an examination of the credentials of the author) are made, information sources that actually are credible (but which are poorly presented) are at risk of being deemed untrustworthy and worthy of no further examination. For these reasons, the interface/design factor is seen as the most important (since further credibility assessments may not be made if the design implies a lack of credibility).

Robins, Holmes, & Stansbury (2010) demonstrated a relationship between the design of Web sites containing consumer health information and individuals' perceptions of credibility of those sites. Thirty-four participants over the age of 35 reviewed 31 Web pages (presented as a slideshow) and were asked to quickly rate their preference for each page's visual design. Once completed, participants were given a scenario (a friend has been diagnosed with diabetes and you want to learn more about it) and shown the same Web pages again in random order; they were asked to quickly rate their perception of its credibility. Significant positive correlations (ranging from $r = 0.35$ to $r = 0.66$) were found for eight of the 31 Web pages ($p < .05$); further, all 31 of the correlations between visual design preference and perceived credibility were positive.

Reputation

The reputation of an information object can be described in terms of the expertise,[11] credentials, and qualifications of its author(s) or, especially in situations where authorship is unknown or vague, in terms of the institutional associations (e.g., the journal in which a paper is published, the newspaper in which an article is printed, or the domain a Web page is on). Most theories of credibility judgments treat reputed expertise as a primary attribute of the judgment process (e.g., Fogg, 2003a claims credibility is a combination of trustworthiness and reputed expertise; Freeman & Spyridakis, 2004 claim it is a combination of trustworthiness, reputed expertise, and attractiveness).

Reputation has different meanings in different contexts (e.g., academic, commercial, or mass media), and as such it is important not to conflate its meanings (Fogg, 2003b). Whereas a seal of approval or brand recognition is highly important in a commercial context, such overt appeals to credibility may be seen as blatant posturing in other settings. In an online environment, reputation is arguably a more important measure of credibility, because of the lack of gatekeepers whose purpose is essentially to corroborate the reputation of contributing authors (Rieh, 2002). In this dissertation, reputation is specifically defined in the academic context; it refers to the estimation of merit and reliability of the information source and its author(s).

Factors of Individuals that Affect Credibility Judgments

Self-Efficacy

Bandura's (1977; 1997) concept of self-efficacy is defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994). In the context of credibility judgments, a high level of self-efficacy implies that an individual is confident in his/her

[11] We can also define expertise as attribute of an individual—specifically, whether the person making a credibility judgment is an expert or novice in the domain being examined. This form of expertise, however, is better classified as an individual factor of credibility judgments, and is described in that section below.

abilities to appropriately classify an information source as credible or not. It is hypothesized in Rieh, Kim, & Markey (under revision) that self-efficacy has a strong effect on the types of credibility judgments individuals make. In particular, an individual with low self-efficacy may be more likely to blame information seeking difficulties on his/her own (perceived lack of) ability, whereas an individual with high self-efficacy may be more likely to blame the tool or interface s/he is using. Further, an individual with low self-efficacy may have less faith in his/her abilities to adequately find relevant information associated with a certain information need, and will consequently be unable to make informed decisions regarding whether a source is relevant or not. O'Keefe (2002, pp. 113-121) examines this perception of a lack of ability in relation to credibility judgments in her discussion of Ajzen's (1991) theory of planned behavior. Specifically, she relates Ajzen's concept of perceived behavioral control to self-efficacy, and notes that an individual's perceived behavioral control affects that individual's perception of power while engaging in information seeking behavior, and consequently affects his/her confidence that the encountered materials are appropriate.

Epistemological Belief Structure and Tolerance of Ambiguity

Epistemological belief structure (EBS) can be briefly defined as the way in which an individual approaches the veracity of knowledge, often expressed on a continuum ranging from the assumption of the existence of absolute truth to the assumption that all knowledge is socially constructed and neither completely true nor false. Whitmire (2004) has shown that individuals' epistemological belief structures are strongly related to the ways in which they judge the quality of the information they find in an information seeking task. Fifteen first-year undergraduate students performed search tasks specifically designed to elucidate reflective judgment capabilities of the participants; in addition to questionnaires, students' were encouraged to think aloud during the search process, and a video of their computer screen was captured for the duration of the search task. Whitmire asked if undergraduate students at higher stages of epistemological development were

better able to handle conflicting sources and recognize authoritative sources. To test this, Whitmire relied on King & Kitchener's (1994) seven-stage model of epistemological beliefs, which maps an individual's perception of knowledge onto a continuum from "knowledge exists absolutely and concretely" to "knowledge is contextual, determined by the outcome of processes, and subjective." Results showed that pre-reflective thinkers (those on the "knowledge is absolute" end of the spectrum) relied on the authority of search engines (by only viewing top results) and the authority of faculty researchers (who were asked for help in determining authoritative sources), while quasi-reflective thinkers (those in the middle of the spectrum) were more likely to rely on their own criteria to determine the usefulness of sources, by examining authorship and institutional affiliation, and were inclined to include conflicting viewpoints in their synthesis of their readings.[12]

Whitmire concludes that an individual with an epistemological belief structure that posits the existence of absolute truth (i.e., knowledge as fixed, concrete, and either true or false) is more likely to (a) reject information as not credible based on a negative view of the authority of the source, and (b) make these credibility judgments much quicker and with more confidence. Whitmire bases these claims on a textual analysis of participants' think-aloud processes and interview transcripts; a quantitative analysis of judgment speed and level of confidence in credibility judgments is left as future work. An unexamined area in this research is whether epistemological belief structures can vary across situations and subject matter; both Whitmire (2004) and Hjorland (2002) treat epistemological belief as a fixed attribute. Further work is needed that unpacks epistemological belief into content areas (e.g., areas where individuals are more likely to be absolutist, such as mathematics, and areas where they are more likely to see knowledge as constructed, such as politics and philosophy) to examine the specific effects of epistemological belief.

[12] No participants in this study were categorized as reflective thinkers (the "knowledge is contextual" end of the spectrum), and so no conclusions were drawn about this group.

Like epistemological belief structure, ambiguity tolerance (AT) is another way of exploring how beliefs about knowledge affect credibility judgments. Ambiguity tolerance has been defined as a personality variable (Budner, 1962; Furnham & Ribchester, 1995) that refers to the manner in which individuals react to complex, ambiguous, or unfamiliar information. Proponents claim that AT is easier to measure, more consistent across situations, and less reliant on belief structures than EBS. An individual with a low tolerance of ambiguity reacts with stress and avoidance when confronted with ambiguous information, whereas an individual with a high tolerance of ambiguity welcomes ambiguous information as interesting and challenging. Understanding individuals' ambiguity tolerance is especially appropriate when examining the way in which the credibility of Web-based sources (especially semi-anonymous sources or those with distributed authorship, like Wikipedia entries) is determined. Among other things, it may help describe why some novices are more likely than experts to rate Wikipedia entries as not credible (Chesney, 2006).

Expertise[13]

Flanagin & Metzger's (2000) survey research involving undergraduates showed that expertise in the use of a particular medium—for example, the Internet or conventional media—strongly affects individuals' perception of credibility (Internet expertise was positively correlated with credibility ratings of Internet sources).

Previous literature[14] has established a correlation between expertise in a specific content area and self-efficacy (see, e.g., Blair, O'Neil, & Price, 1999). In particular, individuals with a higher mastery of the material in question (e.g., computer skills) also displayed higher self-efficacy.

[13] We can also define expertise as an element of the information source being judged by an individual—specifically, whether the author of the material perceived as an expert. This form of expertise, however, is better classified as an external factor of credibility judgments, similar to reputation, and was treated as such earlier.

[14] Note that the prior research is correlational, so we cannot make any claims about higher self-efficacy causing greater levels of expertise (or vice versa).

Affective State

Measures of affect have been employed to assess many aspects of the user experience, and they can provide insight into how an individual's emotional state can affect the credibility judgment process; emotional state can be affected by many aspects of the process of interacting with information, such as ease-of-use, extraneous cognitive load, satisfaction, and sense of accomplishment (Dillon, 2001). This focus on the individual rather than the information source is heavily influenced by Brenda Dervin's concept of Sense-Making (Dervin & Nilan, 1986; Dervin, 1993; Tidline, 2005), which emphasizes the communicative aspect of the information seeking processes. The active process of triaging information and making sense of it is impacted by the momentary affective state of an individual, which in turn is impacted by the interface (messenger) that communicates the information. By examining the impact of positive and negative affective states on the credibility judgment process, we can better understand how these affective states affect the process. One method of accomplishing this aim is by applying Nahl's affective load theory (James & Nahl, 1996; Nahl, 2005), which provides empirical methods for identifying how affective state impacts information seeking behavior. Affective load is defined as the combined uncertainty and felt time pressure that exists in any information seeking episode, and uncertainty is further defined as the following affects: irritation, frustration, anxiety, and rage. In relation to the credibility judgment process, where uncertainty is paramount,[15] understanding the role of affect is important to gaining a fuller understanding of the complex process.

Engagement

Engagement is defined here as an individual's investment in and attention to a particular topic (Fiske, Lin, & Neuberg, 1999, p. 241), or alternatively as information need: the intensity of an individual's motivation towards a particular topic (Taylor, 1962).

[15] In fact, a credibility judgment can be framed as a method for reducing uncertainty.

Engagement in this context is strongly related to goal-oriented motivation theories such as Bandura's (1977) self-efficacy theory and Klinger's (1977) cognitive-incentive theory. Note that the term "engagement" is used here rather than "motivation" because of the more focused definition that engagement has; whereas most prominent motivational research examines the reasons, causes, and sources of motivation, the primary concern here is with an individual's intensity of attention on a particular topic (i.e., engagement).[16]

The impact that an individual's level of engagement has on the credibility judgment process is relatively understudied in the literature. Metzger (2007) claims that "[t]here is much evidence that user motivation, stemming in part from the information search task, moderates the degree to which users will critically evaluate online information" (p. 2087). Wathen & Burkell (2002) point out the relative influence of presentation characteristics on credibility in different information seeking contexts: "If the information seeking episode is more casual, surface characteristics will have more influence—if they are positive; the user will stay; if not, the user will leave" (p. 141). Fogg et al. (2003) claimed that individuals used a different set of evaluation techniques for different search tasks (e.g., finding vacation information on travel sites compared to finding products on e-commerce sites). Similarly, Rieh (2002) found that users rated the relative importance of credibility factors differently for different Websites (e.g., travel, medical information, or research-oriented Websites). Rieh did not specifically point to motivation as a factor for these differences across types of sites; Fogg et al. implied that it was an important factor but did not justify the claim; and Metzger cited evidence for it but only on a theoretical basis. This gap in the literature, paired with the likelihood that engagement plays a key role in these differences in credibility judgments, suggests that engagement should be studied in future research.

[16] Other authors often use the terms interchangeably.

Because of the putative influence of engagement on information seeking episodes, Rieh & Hilligoss (2007) and Metzger (2007) suggest the use of a dual-process theory for understanding credibility judgments (i.e., individual assessment of online sources can focus either on content or peripheral cues, and the decision to elevate one or the other is dependent upon, for example, engagement, ability, or context). This perspective is adopted and tested in this dissertation in order to expand the understanding of credibility judgments with respect to individual differences.

DUAL-PROCESS THEORIES

Dual-process theories (see, e.g., Chaiken, 1980; 1986; Chen & Chaiken, 1999) focus on the notion that information processing outcomes (e.g., credibility judgments) are the result of an interaction between two qualitatively different processes (Chaiken & Trope, 1999). As emphasized by Chaiken & Trope, "the common distinction in dual-process models is between a fast, associative information-processing mode based on low-effort heuristics, and a slow, rule-based information-processing mode based on high-effort systematic reasoning" (p. ix). These theories are proposed in opposition to single-process theories that highlight the importance of a distinct factor that leads to an outcome, but in so doing ignore the interaction that emerges from interrelated processes.

Hilligoss & Rieh (2008) point to two particular dual-process theories that are well-suited for describing the process of persuasive communication at the base of information evaluation: Petty & Cacioppo's (1986) elaboration likelihood model (ELM) and Chaiken's (1980) heuristic-systematic model (HSM). The ELM describes an individual's attitudinal changes as they evaluate information sources, and shows how these changes lead to the individual focusing on either (1) peripheral cues, or (2) the content itself. The HSM describes how an individual's motivation and ability leads to a focus on either (1) low-effort heuristic processing, or (2) high-effort systematic processing. In both cases, (1) reflects an evaluation of the messenger (e.g., reputation, design), while (2) reflects an evaluation of the content of the message.

Applying Dual-Process Theories to Credibility Judgments

Wathen & Burkell's three-stage model can be viewed as a dual-process model since it involves an interaction between low-effort evaluations (of surface and source) and high-effort evaluations (of content). The first two stages, the evaluation of design features and message features (e.g., reputation), can be categorized as low-effort processes since they are dependent on relatively immediate perceptions of quality rather than on a process of high-effort systematic reasoning. The third stage (evaluation of content), on the other hand, requires a focused effort to understand the information being communicated by an information source, and as such requires a comparatively large amount of effort to arrive at a judgment of credibility.

One important example of the applicability of dual-process theories to online credibility judgments is the effect that engagement (alternatively, investment or motivation) has on these judgments. Casual and directed information seeking episodes can lead to a difference in the amount of importance ascribed to, for example, design evaluation. A single-process theory that examines the effects of poor interface design on credibility judgments may directly conclude that poor design leads to a decrease in perceived credibility (see, e.g., Aumer-Ryan, 2008). But this simple analysis does not take into account highly motivated/invested users who are willing to overlook bad presentation in order to find applicable information. If the credibility judgment process is considered to represent a dual-process model (i.e., individuals determine source credibility via a combination of low-effort heuristic evaluation and high-effort systematic reasoning), then the degree to which an individual is engaged in the process will manipulate the balance between these dual processes.

The Heuristic-Systematic Dual-Process Model

Dual-Process theories have yet to be applied to credibility judgments in the research literature, but Rieh & Hilligoss (2007) and Metzger (2007) point to the applicability of their use. This line of inquiry is arguably a fruitful method for

understanding the relationship between aspects of information sources that increase credibility, and the particular characteristics individuals bring to the information seeking context that impact their ability to make informed credibility judgments. Chaiken's (1980) heuristic-systematic model is particularly suited to explaining credibility judgments in an online setting because of its distinction between quick, low-effort heuristic evaluation and involved, high-effort systematic analysis; the theoretical frameworks of credibility reviewed here all describe low- and high-effort components of the judgment process (typically split between messenger and message evaluation, respectively).

Chaiken's original experiment involved university undergraduates (N = 207) expressing their position on an argument they read (either advocating sleeping less than eight hours a night, or moving from a two-semester system to a trimester system at the university in question) in an interview transcript in which an interviewee expressed his opinion on the argument. After the initial session, participants were contacted via phone to assess their agreement with the positions advocated in the original argument. Two independent variables were examined: perceived consequence (i.e., investment in the topic) and communicator likability (i.e., the likability of the individual making the argument in the interview transcript). Perceived consequence was manipulated by telling participants that they would be involved in a discussion session following the reading of the interview; the high engagement group was told that they would be discussing the argument presented in the interview transcript, and the low engagement group was told they would be discussing an unrelated topic. Communicator likability was manipulated by including (in the interview transcript) an opinion of undergraduate students expressed by the individual making the argument; the "likeable" group read that the interviewee had a positive view of undergraduate students, and the "unlikable" group read that the interviewee was disdainful of undergraduates. Results from the experiment showed that high engagement participants were more likely to change their opinion, regardless of

communicator likeability, and low engagement participants were more likely to change their opinion only if presented with a likable communicator. Chaiken concluded that high engagement led to more high-effort, systematic information-processing (i.e., evaluating the persuasive argument for its merits), and thus less susceptible to low-effort, heuristic cues like an unlikeable communicator; and low engagement led to more low-effort, heuristic information-processing (i.e., evaluating the likeability of the communicator).

While not described as such, Chaiken's study can be seen as a credibility study that examines how the likeability (or reputation) of the information source (read: messenger) affects an individual's ability to evaluate the content (read: message) based on its merits. This theoretical framing is the basis for the research conducted in this dissertation.

MESSAGE AND MESSENGER CROSSOVER THEORY

The combination of low- and high-effort information processing described by dual-process theory is ideally suited to describe the process of information evaluation because of the joint effect that message and messenger have in determining information quality. Interface design, format, and the "form" of information (or, alternatively, messenger) can negatively impact the perception of the quality of the "content" of information (the message), especially if an individual is focused on low-effort heuristic information-processing. As discussed earlier, Robins, Holmes, & Stansbury (2010) demonstrated a relationship between the visual design of consumer health Web sites and the perceptions of credibility. Similarly, we might assume that users browsing a poorly designed digital library may in turn perceive the materials they retrieve from this library as amateurish, unscientific, and irrelevant to their search topic. Chesney (2006) found that domain novices (i.e., academics whose area of study was different than that of the articles they examined) were more likely than domain experts to conclude that Wikipedia entries were not credible, implying that Wikipedia's reputation negatively impacted the perception of what was (according to experts) highly credible information. In a sense, this

basic act of information triage by domain novices illuminates one of the methods by which we evaluate new or poorly understood information: by examining its distribution mechanism (and by judging the credibility of its apparent authors).

In particular, Wikipedia as a source of knowledge is particularly suited to an examination of credibility within a dual-process framework. Because of Wikipedia's current popularity and the embedded disdain of referencing it in academic papers as opposed to a more respected and reputable encyclopedia like the Encyclopedia Britannica, they present an ideal pairing to evaluate the effects of reputation on credibility judgments in low engagement and high engagement situations. Before formulating the research agenda, however, a discussion of these encyclopedias as a canonical form is necessary as it relates to their differing quality control mechanisms.

ENCYCLOPEDIA AS CANONICAL FORM

Wikipedia and Encyclopedia Britannica

The online versions of Wikipedia and Encyclopedia Britannica represent two distinct quality control mechanisms of the provenance of the information they contain.[17] The Encyclopedia Britannica is an encyclopedia in the traditional sense of the term, where the articles contained within are written by invited experts on the topic in question, reviewed by an editorial board of professionals, and occasionally revisited with academic debates and collegial discussions among those most likely to have an accurate and informed understanding of the content. Wikipedia, on the other hand, is collaboratively generated by volunteers with no initially verified reputation. According to Wikipedia's (2008a) "about"[18] page:

[17] In fact, a recent comparison performed by the scientific publication *Nature* that showed similar error rates in Wikipedia and Britannica articles raised so much ire on behalf of Britannica that it prompted a series of rebuttals and newspaper advertisements critiquing the study (see Giles, 2005 for an account of the exchange).

[18] Interestingly, Wikipedia's "about" page links directly to a Wikipedia article, which is publicly editable, whereas Britannica has an article on itself that is separate from their corporate "about" page. Is this an indication that Britannica is trying harder to market themselves, or an acknowledgement of its inherent bias?

> Visitors do not need specialized qualifications to contribute, since their primary role is to write articles that cover existing knowledge; this means that people of all ages and cultural and social backgrounds can write Wikipedia articles. Most of the articles can be edited by anyone with access to the Internet, simply by clicking the edit this page link. Anyone is welcome to add information, cross-references or citations, as long as they *do so within Wikipedia's editing policies* and *to an appropriate standard*. (emphasis added)

Wikipedia addresses the inherent likelihood of misinformation or false information in this open framework in its guidelines, which acknowledge the fact that article reliability is dependent on the community's ability to "detect and rapidly remove false or misleading information" (Wikipedia, 2008b). Briefly, the difference here is that Wikipedia does not prevent misinformation by only allowing the "expert" to publish (as in Britannica), but handles it in the same fashion as the rest of the knowledge generation in the encyclopedia (i.e., community involvement).

Perhaps the clearest explication of this popular creation of knowledge comes to us from Benkler (2006). Benkler proposes the term "commons-based peer production" to refer to the copyright-free, publically accessible, collaboratively editable artifacts created within the emerging network society. Wikipedia is thus a prime example of commons-based peer production.

Quality Control Mechanisms

Both models of quality control have benefits and detractions. A review of the most consequential of these is below. For direct comparisons between Wikipedia and Britannica, see Giles (2005).

Timely addition of new content

By some accounts (Fallis, 2008; Sunstein, 2006), Wikipedia beats Britannica in coverage of recent topics. Even daily news content, such as the deaths of famous individuals, quickly makes its way into Wikipedia entries. The breadth of Wikipedia contributors and the simplicity of the editing process both contribute to the speed of updates.

Transparency of controversy

In Wikipedia, knowledge that is identified as contested is shown as such to everyone (by a set of page tags warning readers of, for example, possible bias, frequent vandalism, or unsupported claims). Even the argumentative process is visible on the discussion pages. Further, contributors are encouraged to interact with each other in order to generate a more robust representation of knowledge (see Viégas, Wattenberg & Dave, 2004, for an analysis of these conversations). Britannica, on the other hand, shields the debate process that its editorial board engages in from the public. What emerges is a distilled product that usually gives no indication of the amount of disagreement that occurred during its creation.

Susceptibility to bias, vandalism, and misinformation

Because of Wikipedia's open nature, it does not have the editorial safeguards that a more traditional encyclopedia like Britannica does (i.e., preventing misinformation before it makes it into distribution). Since a page edit, in most cases, is one click away, so is an inappropriate page edit. Wikipedia does implement safeguards (such as protecting high-risk pages and, in general, having a large community that observes changes in content), but the system is not perfect. Several researchers (e.g., Suh, Chi, Kittur, & Pendleton, 2008) have created visualization tools that illuminate frequent modifications and editor disagreements in an attempt to address some of these issues.

Proliferation of misinformation

One of the side effects of peer-produced content is the ability of incorrect information to exist undetected; errors of omission, honest mistakes, or outright fabrications can masquerade as correct information and be viewed by any number of visitors before being discovered. While this is a potential problem in any publishing scheme, it is exacerbated by the distributed authorship and lack of verification of individuals that make Wikipedia so unique.

Reliance on social predictors of expertise

Britannica places a good deal of emphasis on the accomplishments of its advisors, implying that expertise is a positive trait that becomes socially recognized and commended. This is true for the most part, and social indicators (such as publication records, teaching experience, recommendations from colleagues, and personal status) are the primary way we judge the credibility of fellow humans. Whereas Wikipedia relies on self-policing, Britannica stakes much of its reputation on the social standing of its advisors.

Finally, many of these quality control issues are addressed as part of Wikipedia's reliability criteria that is the basis for the acceptance of new content. This criteria is listed below in Table 4.

Wikipedia's reliability criteria
Accuracy of information provided within articles
Comprehensiveness, scope and coverage within articles and in the range of articles
Susceptibility to, and exclusion and removal of, false information (a criterion specific to the Wikipedia process)
Susceptibility to editorial and systemic bias
Identification of reputable third-party sources as citations
Stability of the articles
Whether the articles are well-written
Whether the information provided is uncontroversial and compliant to the standards
Appropriateness of the images provided with the article and their respective copyright status
Appropriateness of the style and focus of the articles

Table 4. Criteria for reliability of Wikipedia articles. Adapted from http://en.wikipedia.org/wiki/Reliability_of_Wikipedia.

Relevance to the Research Agenda

The differing reputations that Wikipedia and Britannica hold, especially in academia, are in large part due to the different ways in which they ensure quality control.

Wikipedia relies on community involvement in peer-produced content; Britannica relies on the traditional method of expert contributors. The research presented in this dissertation relies on these divergent reputations to show the relative effect of reputation (separate from actual content) on the perception of credibility.

SUMMARY

This review has focused broadly on the research arena of credibility judgments of online sources. The primary factors affecting credibility judgments (categorized as aspects of the information source and of the individual making the credibility judgment) have been reviewed. Established theories of credibility evaluation (Fogg, 2003a; Metzger, 2007; and Wathen & Burkell, 2002) have been examined to understand current scholars' views of credibility judgments of online sources. Two dual-process theories (ELM and HSM) have been reviewed and their applicability to the information evaluation process has been discussed. Finally, a particular domain—online encyclopedias in the form of Wikipedia and Britannica—has been described because of its strong reputation cues and applicability for study.

Adopting the heuristic-systematic model (HSM) is now proposed as an ideal way to evaluate credibility judgments in order to understand the relative effect of low-effort heuristic processing of peripheral cues (e.g., reputation and media format) in individuals with differing levels of engagement. The research agenda discussed below focuses primarily on this understudied aspect of credibility judgment.

COMPOSITE DUAL-PROCESS THEORY OF CREDIBILITY JUDGMENTS

The research method presented here is intended to determine the effects of individual engagement (reader involvement) on the credibility judgment process, and how level of engagement leads individuals to make judgments primarily based on low-effort heuristics (e.g., reputation, media format) or high-effort systematic reasoning (i.e., evaluation of content). Wathen & Burkell's theory posits that inferring low credibility in

either of the first two stages will result in no further stages being examined. When viewed through the lens of a dual-process theory, this means that individuals with low information need (i.e., low engagement) will not arrive at an examination of content, because they will be basing their credibility determination primarily on a low-effort, heuristic examination of surface characteristics in the first two stages.[19] The primary purpose of the two studies proposed here is to better understand the interaction between the variables of reputation and engagement (Study 1) and media format and engagement (Study 2) on people's perceptions of credibility by comparing participants' credibility judgments across contrasting groups. To date, no empirical support has been provided. The two proposed experiments are intended to test the hypotheses drawn from both Wathen & Burkell's (2002) theory of credibility judgments and Chaiken's (1980) heuristic-systematic dual-process model, specifically that credibility judgments are influenced by media format and reputation in addition to the veracity of the content, and especially so in cases of low individual engagement. The independent variables of interest are: reputation of source (Wikipedia or Britannica); media format (print or electronic, PDF or HTML); and the participant's individual engagement in the research task (high or low). The dependent variable of interest is the perceived credibility of the information source. Two studies are proposed. Individually, these two studies focus on the variables of interest and should provide more precise information concerning the underlying psychological mechanisms and environmental applications of the independent variables (reputation, media format, and engagement). Study 1 aims to provide empirical support for how source reputation (in this case, Wikipedia or Britannica) interacts with participants' level of engagement (high or low) in affecting perceived credibility. Study 2 aims to provide empirical support for how each level of media format (print, PDF, or HTML) interacts with each participant's level of engagement (high or low) in affecting

[19] This combination of Wathen & Burkell's model with a dual-process model places the first two stages (design and reputation) in the low-effort heuristic category and the third stage (content) in the high-effort systematic reasoning category.

perceived credibility. Both studies will provide researchers, librarians, designers, and laypersons a better understanding of how design and reputation in combination with individual engagement can affect the credibility of information sources.

Chapter 3: Method, Study 1: Reputation and Engagement

The aim of this study is to explain the interaction between the variables of source reputation (a peripheral cue) and individual engagement on perceived credibility by comparing participants' credibility judgments across contrasting groups. This study is intended to test the hypotheses drawn from both Wathen & Burkell's (2002) theory of credibility judgments and Chaiken's (1980) heuristic-systematic dual-process model, specifically that credibility judgments are influenced by source reputation in addition to the veracity of content, and especially so in cases of low individual engagement.

PARTICIPANTS

Participants were 100 university undergraduates (59 female, 41 male), ranging from 18 to 26 years old. All participants were students at a large southwestern research university and were from the Educational Psychology subject pool. Subject pool participants came from one of four educational psychology undergraduate courses (Individual Learning Skills, Human Sexuality, Adolescent Development, or Introduction to Statistics) and participated in the research study as part of course credit. According to the most recent subject pool makeup data,[20] 64% were male, 57% were seniors, 52% were white, and 79% came from either the Human Sexuality course or the Introduction to Statistics course.

MATERIALS/INSTRUMENTS

Participants read two texts formatted as encyclopedia articles. The text of the first article, "Safe and secure practices," was retrieved from Wikipedia on September 8, 2008 (see Appendix A). The text of the second article, "Online shopping," was retrieved from Wikipedia on September 8, 2008 (see Appendix B). These articles were chosen in an effort to address a topic familiar and applicable to the majority of subject pool

[20] Subject pool makeup available at: http://www.edb.utexas.edu/education/departments/edp/curriculum/subjetPool/researchers/makeup/

participants; a focus on computer use and online security was deemed relevant to today's undergraduate student.

Credibility judgments were collected using the Meyer subset of the Gaziano-McGrath credibility scale, a five-item scale developed by Meyer (1988) as a subset of the twelve-item Gaziano-McGrath (1986) scale (see Appendix C). West (1994) showed that the Meyer subset had satisfactory reliability (α=.92 and α=.87 in two separate studies) and validity (α=.84). Participants were also asked to rate how interested they were in the topic and how engaged they were when researching the topic (see Appendix D). This also served as a manipulation check: those who were in the high engagement condition should rate themselves as being more engaged in the task than their low engagement peers.

In order to examine the associations of individual factors with the credibility judgments process, the following survey measures were employed: PANAS measure of affective state (Watson, Clark, & Tellegen, 1988), measure of tolerance of ambiguity (Budner, 1962), measure of sharpener vs. leveler cognitive style (Ehrman & Leaver, 2003), measure of Internet self-efficacy (Eastin & LaRose, 2000), and general demographics (see Appendix E for copies of these measures and Appendix F for a copy of the demographic questionnaire). These measures were used as the basis for a series of exploratory analyses examining the relationships between individual factors (e.g., personality variables, cognitive styles, and demographics) and perceived credibility.

TASK

All participants were required to read two articles, which they were told to view as the output of a search for relevant documents on the topic of computer security. After receiving instructions (including mention of focus group participation immediately following the study for those in the high engagement group; see script in Procedure below), each participant was presented with an article (counterbalanced for order and experimental interface) to read for the purpose of formulating a list of end-user computer security strategies. Articles were presented in one of two experimental interfaces:

Wikipedia or Encyclopedia Britannica (see Figure 2 for a sample). These two interfaces conveyed the same textual information (e.g., an article on online shopping) as if it were an encyclopedia article coming from a different source with an arguably different reputation conveyed by its design and layout.

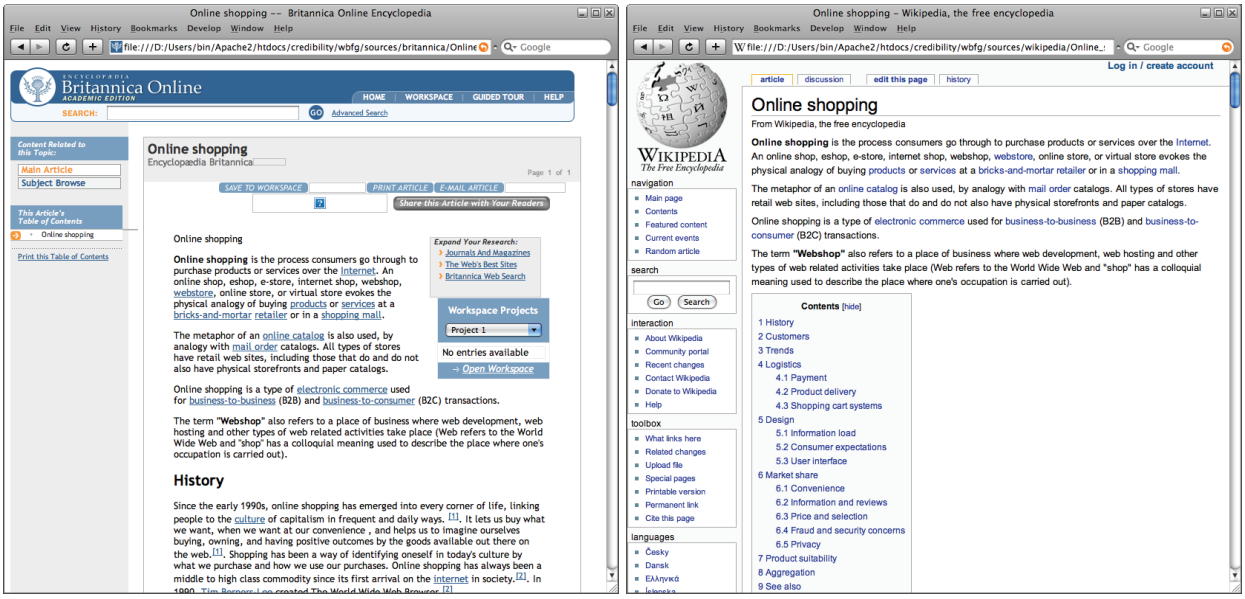

Figure 2. Article as viewed in Britannica and Wikipedia experimental interfaces.

After reading each article, participants rated their perception of its credibility. After rating both articles, participants answered a series of personality measures and demographic questions (Appendices D, E, F).

DESIGN

This study examined the interaction between source reputation and participant engagement by using a 2x2 between-subjects design[21] (see Figure 3 for the study design). The first independent variable was the source interface, operationalized at two levels

[21] Note that this is a between-subjects design and not a mixed (between- and within-subjects) design. In other words, although each participant is reading two articles, one that appears to come from Britannica and one that appears to come from Wikipedia, the ratings of these articles are never compared with each other. Instead, comparisons are made on all participant ratings of the first article (which half read as a Wikipedia article and half read as a Britannica article) and, in the same fashion, separate comparisons are made for the second article.

(Wikipedia or Encyclopedia Britannica), by presenting the text of an encyclopedia article within the design and page layout of one of these two encyclopedias. The second independent variable was engagement; following the manipulation pioneered by Chaiken (1980), engagement is operationalized at two levels (high or low), through the manipulation of instructions: high engagement participants were told that they would be participating in a focus group immediately following the study where they would be required to summarize the articles they read for their peers, and low engagement participants were not told to expect a focus group.

The dependent variables were perceived credibility (assessed with the Meyer subset measure and a face-valid question, "Would you recommend this article to a friend?") and time spent reading an article (in seconds).

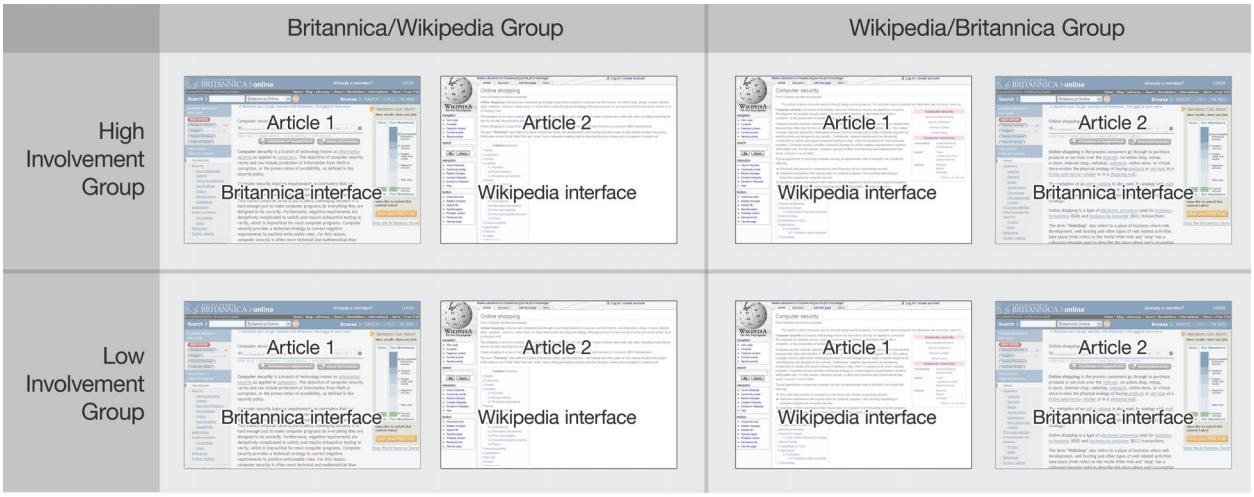

Figure 3. Reputation and engagement study design.

HYPOTHESES

The following research hypotheses were tested by the experimental design (see Table 5 for a summary):

H1: There will be a main effect with respect to perceived credibility (Meyer's scale) for reputation (i.e., participants will rate an article viewed within the Britannica

interface higher in perceived credibility than an article viewed within the Wikipedia interface.

H2: Engagement with the task will interact with the reputation of the media source by affecting participants' ratings of perceived credibility (Meyer's scale) (i.e., credibility ratings of Britannica articles will be higher than Wikipedia for the low engagement condition, and there will be no significant difference for the high engagement condition).

H3: Participants will spend a greater amount of time reading articles in the high engagement condition.

Engagement / **Reputation**	*High*	*Low*
Britannica	Similar to Wikipedia/High	Highest credibility scores
Wikipedia	Similar to Britannica/High	Lowest credibility scores

Table 5. Hypothesized average credibility ratings by level of condition in the Reputation and Engagement Study.

PROCEDURE

Participants were scheduled in groups of 10 to 20 to come into a computer-equipped classroom (see Figure 4 for the lab setting). Participants were welcomed by a researcher and told to take a seat at a computer where consent and survey instruments were located. Participants were told that the researchers are interested in how people study and conduct research in college, and were then asked to give consent to participate. After the experimenter gathered the consent forms, a confederate (a research assistant posing as the focus group facilitator) told the group that some individuals would be randomly selected to participate in a focus group after the study, where they would

summarize the articles they read for their peers and discuss how they determined its credibility. The confederate told participants that these individuals would be notified by a prompt on their screen, and to approach the confederate after they had finished the study to join the focus group. Participants assigned to the high engagement condition read the following script on their computer screens:

> At the end of this study you will be asked to join a few other students who are taking this survey and participate in a focus group. The topic of the focus group will be on how you decided to rate the four articles you read as credible or not. To help the other students in the group, you will also be asked to summarize the content of each article, so keep that in mind while reading them.

After reading about the focus group (that step was omitted for participants in the low engagement condition), participants read the next script on their computer screens:

> Imagine that you have decided to search the Internet for information about computer security. Specifically, a friend has asked you what she can do to make sure her computer isn't compromised, and you want to help by writing down a list of the top three to five things someone can do to protect their computer while online. After using several different search terms, you have narrowed your results down to two encyclopedia articles that look promising. You're now ready to start reading these articles to see if they have what you are looking for.

Participants then examined two encyclopedia articles on the topic (already prepared and of similar length). They were asked to read the articles thoroughly and determine how credible the information was. Reputation was manipulated by formatting the articles to appear to have come from Wikipedia or Encyclopedia Britannica. Articles were counterbalanced across participants to ensure that half of the participants viewed each article within a Wikipedia interface and half of the participants viewed each article within a Britannica interface; article order was counterbalanced to ensure that half of the participants read Article 1 first and half read Article 2 first (see Figure 3 for the study design). Finally, after reading the articles and rating their credibility, participants were asked to complete the survey instruments and demographic questionnaire.

Figure 4. Lab setting and workstation setup.

ANALYSES

The primary design of the study is a 2x2 between-subjects factorial design, with reputation (Wikipedia or Britannica) and engagement (high or low) as the between-subjects independent variables. A series of two-way ANOVAs using each dependent variable was utilized to assess the differences between groups: perceived credibility (using the mean Meyer credibility score of the two articles read by each participant); perceived credibility (using the face-valid question, "Would you recommend this article to a friend?"); and time spent reading the article. A total of six two-way ANOVAs were performed (see Table 6).

Analyses: Two-Way ANOVAs
DV: credibility score (Meyer's) of Article 1 (Safe and secure practices, Appendix A);
DV: credibility score (recommend) of Article 1 (Safe and secure practices, Appendix A);
DV: time spent reading Article 1 (Safe and secure practices, Appendix A);
DV: credibility score (Meyer's) of Article 2 (Online shopping, Appendix B);
DV: credibility score (recommend) of Article 2 (Online shopping, Appendix B);
DV: time spent reading Article 2 (Online shopping, Appendix B).

Table 6. List of two-way ANOVAs performed in Study 1.

Note that each article a participant read was compared with the same article read by other participants (i.e., the same textual content in one of two reputation conditions—Wikipedia or Britannica), rather than performing a within-subjects comparison.

Both main effects (engagement and reputation) as well as their interaction (engagement [high vs. low] and reputation [Wikipedia vs. Britannica]) were assessed for statistical significance. After running exploratory analyses, any heterogeneity in variance was standardized with suggested data transformation techniques.[22]

The analyses of credibility[23] performed here are subject to the more than 50-year-old debate (Lord, 1953) regarding the use of ordinal Likert scale data as the dependent variable in parametric tests (e.g., ANOVA). In this study, in order to detect interactions (between reputation and engagement), a two-way ANOVA was used, followed up by non-parametric analyses used to support any claims of significance.

One of the assumptions for the use of a two-way ANOVA is that the dependent variable scores are interval or ratio scaled Meyer's data types (parametric data). This assumption is technically violated by the use of ordinal Likert scale data (non-parametric data), and affects the normality of the data (thus affecting Type I error rate and power) (Jamieson, 2004). It is also argued that the arithmetic mean is not a suitable measure of central tendency for this data type because it violates the principle of invariance (see Lewis, 1993, for a discussion). However, Stevens (1999) shows that "non-normality only has a slight effect on the Type I error rate even for very skewed or kurtotic distributions," and "lack of normality due to skewness also only has a slight effect on power (a few hundredths)" (p. 75). Further, Rasmussen (1989, in response to Gregoire & Driver, 1987) shows that, for scales of 5 or more points, "Type I and Type II error rates are not seriously compromised by the use of ordinal-scale data," and parametric tests on ordinal data have superior power to non-parametric tests (p. 167).

[22] See http://www.pfc.forestry.ca/profiles/wulder/mvstats/ transform_e.html

[23] The analysis using time-on-task as the dependent variable does not violate the assumptions of ANOVA (time is a ratio variable).

In order to buttress the results from ordinal data in a parametric test (ANOVA), additional post-hoc non-parametric analyses (Kruskal-Wallis one-way analysis of variance by ranks, an extension of Mann-Whitney-Wilcoxon [MWW]) were performed on any significant results from the initial analysis of variance to control for Type I error. Kruskal-Wallis does not assume a normal population (which is often difficult to show with ordinal data), and is more robust to the effects of outliers. Additionally, an examination of normality of the ordinal data was performed by plotting the pooled residuals (i.e., the deviation of each data point from the computed mean of its experimental cell) to ensure that it approximated a normal distribution.

Finally, a series of exploratory analyses were performed using the collected personality measures and demographics, including: specific components of positive and negative affective state (e.g., level of interest, enthusiasm, and alertness, and level of guilt); overall ambiguity tolerance score; overall Internet self-efficacy score; and demographics like age, gender, and computer usage (see Appendices E and F).

Chapter 4: Results, Study 1: Reputation and Engagement

In this section results of each article are reported separately. Where means are reported, a two-way analysis of variance (ANOVA) with the respective independent and dependent measures was performed. Means of the credibility measures range from one (strongly disagree) to five (strongly agree). The measure of perceived credibility (Meyer's) is the average score of the five items in the questionnaire. The results for the main effect of reputation are summarized below in Table 7 and Table 8, and the results for the interaction are summarized in Table 9.

DV, Article 1 (online shopping)	**Britannica**	**Wikipedia**	**F**	**p**
Perceived credibility (Meyer's)	$M = 3.80$ $SD = .42$	$M = 3.56$ $SD = .46$	9.65**	.002
Perceived credibility (recommend)	$M = 3.48$ $SD = 1.18$	$M = 3.14$ $SD = 1.03$	2.41	.12
DV, Article 2 (computer security)				
Perceived credibility (Meyer's)	$M = 4.15$ $SD = .27$	$M = 3.90$ $SD = .29$	25.75**	.000
Perceived credibility (recommend)	$M = 4.20$ $SD = .97$	$M = 3.54$ $SD = .93$	12.72**	.001

Table 7. Results of main effect of reputation with respect to the given independent variable on Article 1 (online shopping) and Article 2 (computer security). (** $p < .01$)

DV, Article 1 (online shopping)	**High Engagement**	**Low Engagement**	**F**	**p**
Time (in minutes)	$M = 12.69$ $SD = 5.91$	$M = 6.01$ $SD = 6.00$	31.01**	.000
DV, Article 2 (computer security)				
Time (in minutes)	$M = 8.71$ $SD = 9.49$	$M = 5.37$ $SD = 6.59$	4.15*	.044

Table 8. Results of main effect of engagement with respect to the time on Article 1 (online shopping) and Article 2 (computer security). (* $p < .05$; ** $p < .01$)

DV, Article 1	Britannica, Low	Britannica, High	Wikipedia, Low	Wikipedia, High	F	p
Perceived credibility (Meyer's)	*M* = 3.92 *SD* = .25	*M* = 3.69 *SD* = .52	*M* = 3.31 *SD* = .33	*M* = 3.80 *SD* = .44	20.34**	.000
Perceived credibility (recommend)	*M* = 3.76 *SD* = 1.20	*M* = 3.20 *SD* = 1.12	*M* = 2.96 *SD* = 1.17	*M* = 3.32 *SD* = .85	4.42*	.038
Time (minutes)	*M* = 5.70 *SD* = 4.78	*M* = 13.35 *SD* = 5.51	*M* = 6.32 *SD* = 7.11	*M* = 12.02 *SD* = 6.33	.66	.42
DV, Article 2						
Perceived credibility (Meyer's)	*M* = 4.30 *SD* = .24	*M* = 3.99 *SD* = .20	*M* = 3.78 *SD* = .33	*M* = 4.01 *SD* = .20	29.12**	.000
Perceived credibility (recommend)	*M* = 4.44 *SD* = .87	*M* = 3.96 *SD* = 1.02	*M* = 3.28 *SD* = .94	*M* = 3.80 *SD* = .87	7.30**	.008
Time (minutes)	*M* = 5.41 *SD* = 7.51	*M* = 7.23 *SD* = 2.98	*M* = 5.34 *SD* = 5.68	*M* = 10.18 *SD* = 13.05	.85	.36

Table 9. Results of the interaction with respect to the given independent variable on Article 1 (online shopping) and Article 2 (computer security). (* $p < .05$; ** $p < .01$)

PERCEIVED CREDIBILITY (MEYER'S COMBINED MEASURE)

There was a main effect for reputation on Article 1 (Online Shopping), $F(1, 98) = 9.65$, $p = .002$, such that perceived credibility (Meyer's face valid questionnaire) was higher for Britannica ($M = 3.80$, $SD = .42$) than for Wikipedia ($M = 3.56$, $SD = .46$), thus confirming H1. Further, there was a reputation by engagement interaction, $F(1, 98) = 20.34$, $p < .001$. Follow-up tests of the simple effect of reputation within each engagement condition indicated that for the low engagement participants, those who read the Wikipedia version ($M = 3.31$, $SD = .33$) rated it as less credible than those who read the Britannica version ($M = 3.92$, $SD = .25$), $F(1, 49) = 53.24$, $p < .001$. For the high engagement participants, there was no difference in perceived credibility between those who read the Wikipedia ($M = 3.80$, $SD = .44$) and Britannica ($M = 3.69$, $SD = .52$) versions, $F(1, 49) = .68$, $p = .415$, thus confirming H2. Finally, because ordinal data were

used for the dependent variable, Kruskal-Wallis one-way analysis of variance by ranks was conducted to confirm the results obtained in the two-way ANOVA. Participants did differ on their perception of credibility based on reputation, $\chi 2(1) = 9.31$, $p = .002$, and based on the simple effect of reputation within the low engagement condition, $\chi 2(3) = 10.85$, $p = .001$.

There was a main effect for reputation on Article 2 (Computer Security), $F(1, 98) = 25.75$, $p < .001$, such that perceived credibility was higher for those who read Britannica ($M = 4.15$, $SD = .27$) than for those who read Wikipedia ($M = 3.90$, $SD = .29$), thus confirming H1. Further, there was an interaction, $F(1, 98) = 29.12$, $p < .001$, indicating that the reputation effect was present only in the low engagement condition. Follow-up tests of simple effects indicated that the participants in the low engagement Wikipedia condition ($M = 3.78$, $SD = .33$) rated it as less credible than did those in the low engagement Britannica condition ($M = 4.30$, $SD = .24$), $F(1, 49) = 40.53$, $p < .001$, whereas participants in the high engagement Wikipedia condition ($M = 4.01$, $SD = .20$) did not differ in their credibility ratings from those in the high engagement Britannica condition ($M = 3.99$, $SD = .20$), $F(1, 49) = .08$, $p = .778$, thus confirming H2. Finally, a Kruskal-Wallis one-way analysis of variance by ranks supported the findings obtained in the two-way ANOVA for both the main effect of reputation, $\chi 2(1) = 14.86$, $p < .001$, and the simple effect of reputation within low engagement, $\chi 2(3) = 33.64$, $p < .001$.

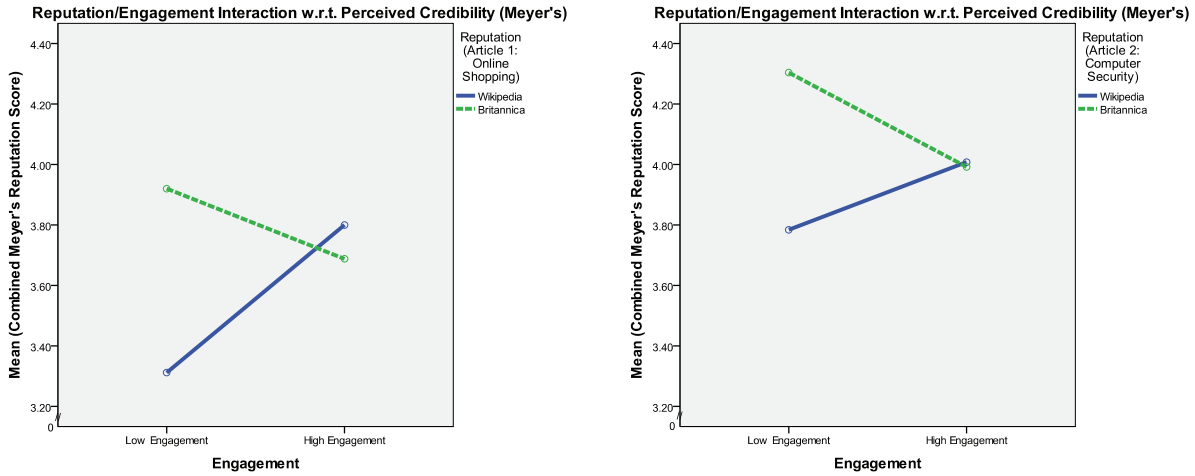

Figure 5. Reputation and engagement interactions with respect to perceived credibility (Meyer's) for Article 1 (left) and Article 2 (right).

PERCEIVED CREDIBILITY (SINGLE ITEM MEASURE: RECOMMEND TO A FRIEND)

A two-way ANOVA did not yield a main effect for reputation on Article 1 (Online Shopping) with respect to perceived credibility (single item measure: "I would recommend this article to a friend who is interested in the topic"), $F(1, 98) = 2.41$, $p > .05$; however, there was a reputation by engagement interaction, $F(1, 98) = 4.42$, $p = .038$. Follow-up tests of the simple effect of reputation within each engagement condition indicated that for the low engagement participants, those who read the Wikipedia version ($M = 2.96$, $SD = 1.17$) rated it as less credible than those who read the Britannica version ($M = 3.76$, $SD = 1.20$), $F(1, 49) = 5.69$, $p = .021$. For the high engagement participants, there was no difference in perceived credibility between those who read the Wikipedia ($M = 3.32$, $SD = .85$) and Britannica ($M = 3.20$, $SD = 1.12$) versions, $F(1, 49) = .18$, $p = .671$, thus confirming H2. Finally, because ordinal data were used for the dependent variable, Kruskal-Wallis one-way analysis of variance by ranks was conducted confirm the results obtained in the two-way ANOVA. Students did differ on their perception of credibility based on the simple effect of reputation within the low engagement condition, $\chi 2(3) = 8.21$, $p = .050$.

There was a main effect for reputation on Article 2 (Computer Security), $F(1, 98) = 12.72$, $p = .001$, such that perceived credibility was higher for those who read Britannica ($M = 4.20$, $SD = .97$) than for those who read Wikipedia ($M = 3.54$, $SD = .93$), thus confirming H1. Further, there was an interaction, $F(1, 98) = 7.30$, $p = .008$, indicating that the reputation effect was present only in the low engagement condition. Follow-up tests of simple effects indicated that the participants in the low engagement Wikipedia condition ($M = 3.28$, $SD = .94$) rated it as less credible than did those in the low engagement Britannica condition ($M = 4.44$, $SD = .87$), $F(1, 49) = 20.60$, $p < .001$, whereas participants in the high engagement Wikipedia condition ($M = 3.80$, $SD = .87$) did not differ in their credibility ratings from those in the high engagement Britannica condition ($M = 3.96$, $SD = 1.02$), $F(1, 49) = .36$, $p = .553$, thus confirming H2. Finally, a Kruskal-Wallis one-way analysis of variance by ranks supported the findings obtained in the two-way ANOVA for both the main effect of reputation, $\chi2(1) = 12.70$, $p < .001$, and the simple effect of reputation within low engagement, $\chi2(3) = 18.84$, $p < .001$.

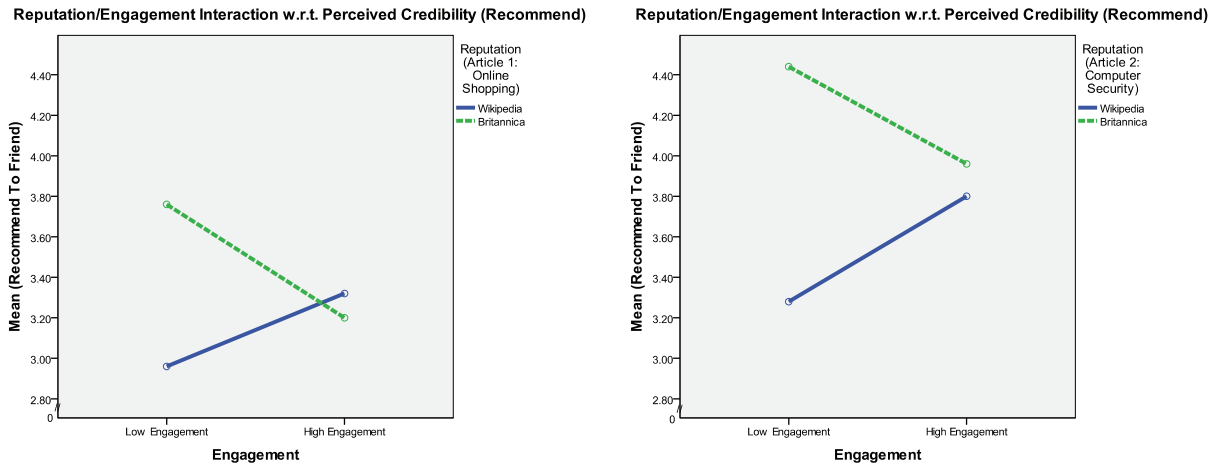

Figure 6. Reputation and engagement interactions with respect to perceived credibility (recommend) for Article 1 (left) and Article 2 (right).

TIME

There was a main effect for engagement on Article 1 (Online Shopping), $F(1, 98) = 31.01$, $p < .001$, such that time spent reading the article was higher for the high engagement condition ($M = 12.69$ minutes, $SD = 5.91$) than for the low engagement condition ($M = 6.01$ minutes, $SD = 6.00$), thus confirming H3. The interaction was not significant, $F(1, 98) = .66$, $p > 0.05$.

Similarly, there was a main effect for engagement on Article 2 (Computer Security), $F(1, 98) = 4.15$, $p = .044$, such that time spent reading the article was higher for the high engagement condition ($M = 8.71$ minutes, $SD = 9.49$) than for the low engagement condition ($M = 5.37$ minutes, $SD = 6.59$), thus confirming H3. The interaction was not significant, $F(1, 98) = .85$, $p > .05$.

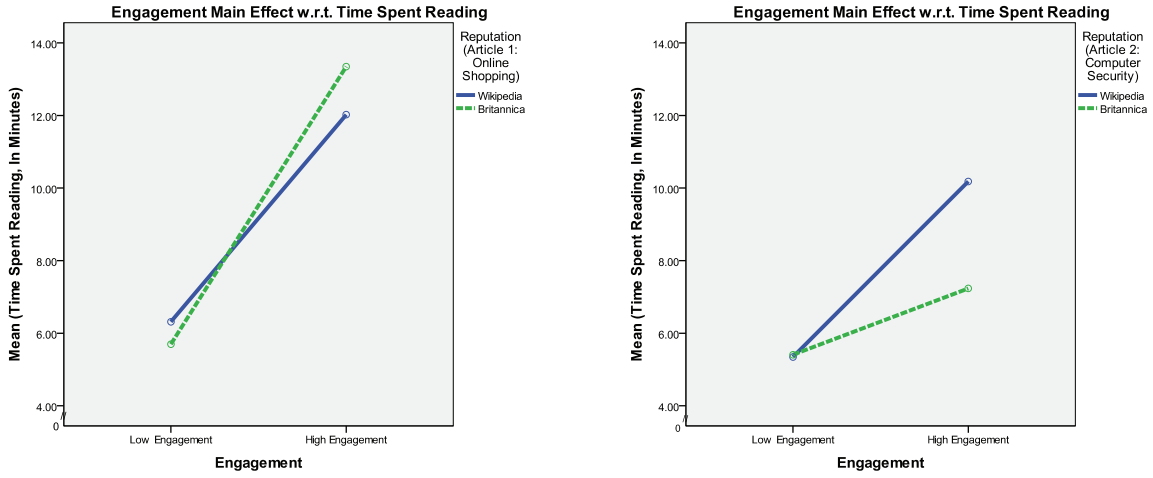

Figure 7. Engagement main effect with respect to time spent reading for Article 1 (left) and Article 2 (right).

EXPLORATORY ANALYSES

The following analyses are exploratory, and the reported findings should be treated as such. A total of 91 correlations were performed (comparisons were made among the positive/negative affective state, five demographic variables, 2 measures of

perceived credibility, time spent reading, engagement, overall ambiguity tolerance score, and Internet self-efficacy score). Only correlations with *p*-values less than .05 are reported below.

Affective state

There was a correlation between positive affect (mean of 10 positive PANAS items) and self-reported interest ($r = .40$, n = 99, $p < .001$) and involvement ($r = .40$, n = 99, $p < .001$) in the research topic. There was a correlation between level of interest (PANAS item 1) and perceived credibility (Meyer's) of the Britannica article read ($r = .28$, n = 100, $p = .005$), such that a higher level of interest was associated with a higher credibility score. Similarly, there was a correlation between level of interest and time spent reading Article 1 ($r = .23$, n = 100, $p = .021$), such that a higher level of interest was associated with a longer time spent reading the article. Additionally, the low engagement group reported higher levels of guilt (PANAS item 6) ($M = 1.18$, $SD = .44$) than the high engagement group ($M = 1.04$, $SD = .20$), $t(98) = 2.06$, $p = .042$, implying that low engagement participants felt guilty about not spending enough time to properly evaluate the articles.

Ambiguity tolerance

Males had a higher ambiguity tolerance score than females; this is reported below under Demographics. Other research that addresses gender differences in ambiguity tolerance has been inconclusive (Geller, Tambor, Chase, & Holtzman, 1993), supportive of (Elias, 1999), and contradictory to the result seen here (Rotter & O'Connell, 1982).

Internet self-efficacy

There was a correlation between Internet self-efficacy and the PANAS items strong ($r = .27$, n = 100, $p = .007$), enthusiastic ($r = .20$, n = 100, $p = .046$), and alert ($r = .22$, n = 100, $p = .031$), such that higher levels of strong, enthusiastic, and alert were associated with higher levels of Internet self-efficacy. Additionally, there was a

correlation between Internet self-efficacy and the perceived credibility (Meyer's) of the Britannica article read (r = .21, n = 100, p = .034), such that higher levels of Internet self-efficacy were associated with higher credibility scores.[24]

Demographics

There was a correlation between age and the perceived credibility (Meyer's) of Britannica articles (r = .20, n = 100, p = .041), such that a greater age was associated with higher credibility scores. Similarly, there was a correlation between age and the use of social networking sites (r = -.28, n = 100, p = .005), such that a greater age was associated with less frequent use of social networking sites (e.g., Facebook, Myspace). Note that ages ranged, from 18 – 26, with 21 as the mode and mean; eight of the 100 participants were over the age of 22.

Additionally, there were several findings based on gender. Wikipedia was rated as more reputable (Demographic item 4) by males (M = 2.76, SD = .58) than females (M = 2.19, SD = .60), t(98) = 4.72, p < .001. A faster Internet connection in the home (Demographic item 8) was more likely to be had by males (M = 3.66, SD = .48) than females (M = 2.71, SD = 1.59), t(98) = 3.70, p < .001. Males (M = 2.07, SD = 1.1) were more likely than females (M = 1.51, SD = .75) to report feeling strong (PANAS item 5), t(98) = 3.05, p = .003. A greater tolerance for ambiguity (AT combined measure) was more likely to be had by males (M = 2.87, SD = .82) than females (M = 3.40, SD = .88), t(97) = 3.08, p = .003. Finally, a higher level of Internet self-efficacy (five-point scale) was more likely to be had by males (M = 4.97, SD = 1.20) than females (M = 3.88, SD = 1.11), t(97) = 4.65, p < .001.

[24] Note that this is only concerning the perceived credibility of Britannica, and not in comparison to Wikipedia (i.e., this does not imply that higher levels of Internet self-efficacy is associated with rating Britannica higher than Wikipedia).

SUMMARY

All three hypotheses (H1: there will be a main effect for reputation, with Britannica rated higher on perceived credibility; H2: there will be a reputation and engagement interaction, with Britannica rated higher on perceived credibility in the low engagement condition; H3: participants will spend more time reading in the high engagement condition) were supported by the findings. Further, several exploratory findings based on affect, ambiguity tolerance, Internet self-efficacy, age, and gender were reported.

Chapter 5: Discussion, Study 1: Reputation and Engagement

SUMMARY

In this study, Chaiken's (1980) HSM dual-process theory and Wathen & Burkell's (2002) theory of the credibility process (specifically source reputation) were tested to measure these components' effects on perceived credibility. There was a main effect for source reputation, but this effect also was dependent upon (i.e., interacted with) the engagement of the participant. Low engagement participants were not as invested in the material or concerned about retention of material content. This casual approach to the reading task tended to increase participants' reliance on low-effort heuristics (i.e., an evaluation of reputation) to make their judgments about credibility, while those who were highly engaged in the material were more likely to participate in high-effort systematic reasoning (i.e., an evaluation of content). This effect was demonstrated by the different perceived credibility ratings between Wikipedia and Britannica in the low engagement condition and the similar perceived credibility ratings between Wikipedia and Britannica in the high engagement condition when the content of the documents was fixed (i.e., the same textual content appeared in both Wikipedia and Britannica articles). These results suggest that reputation is an important and integral factor in perceived credibility. In the domain of the Web, where authorship is frequently ambiguous, individuals maintain the importance of source reputation established in the pre-Web era of print-based publishing when evaluating credibility (based on, e.g., Web site branding like Wikipedia or Britannica), and thus content producers need to be concerned about their reputation. This is especially applicable when users are not strongly engaged in a topic when making their credibility judgments.

REPUTATION AND ENGAGEMENT

As discussed in Chapter 2, contrasting the environment of the Web with that of the pre-Web (print) environment, where published works faced substantial barriers to entry and credibility was moderated by gatekeepers before reaching consumers, emphasizes the difficulties individuals confront when determining credibility. In this environment, individuals are less able to rely on authorities or gatekeepers to evaluate materials for them, and must instead bear the onus of deciding where to place their trust (Rieh, 2002). However, as demonstrated by prior research, many individuals are underprepared for this charge (Amsbary & Powell, 2003; Meola, 2004; Scholz-Crane, 1998). This research has demonstrated that traditional credibility characteristics like reputation have a significant effect on the interpretation of online materials, even though these cues present a troubling method for establishing trust in the semi-anonymous, self-publishing environment of the Web. This relative lack of established filters and gatekeepers of online information coupled with the abundance of materials present on the Web creates a climate where, on the one hand, authority is always suspect, and on the other, individuals are increasingly prone to base their judgments on low-effort cues that rely on the authority of the source.

The Web's association with information overload creates an environment where time is limited and credibility decisions must be made quickly; this environment mimics that of casual information seeking episodes, where individuals approach materials with low information need and are inclined to judge credibility based on low-effort surface characteristics (Wathen & Burkell, 2002). For this reason, framing the credibility judgment process as a dual process model, where a mediating factor like level of engagement determines how much effort is expended on either low-effort heuristic evaluation or high-effort systematic reasoning, provides insight into the ways in which individuals choose their method of establishing credibility.

The findings in this study have shown, with a substantial effect size and high degree of significance, that individuals with low information need make credibility judgments based on peripheral cues rather than an evaluation of content. The contextual nature of the findings of this study (i.e., that participant engagement affects the perception of credibility of a single information resource) has meaning for the further development of information literacy. Traditional information literacy concepts of credibility (e.g., that discussed by Metzger, 2007) has as a main goal the development of guidelines that can be taught to individuals so they can make more informed credibility judgments; however, these results support the notion of contextual information literacy adopted by Lloyd (2007), which demonstrates that the checklist approach to determining credibility is not enough to encourage fully literate behavior. Since the use of a checklist is a high-effort evaluation, and since it is infeasible to expect individuals to always expend substantial effort in every credibility evaluation, more emphasis needs to be placed on the (appropriate) use of low-effort heuristics in evaluating credibility. Further, this research emphasizes the element of information triage that is implicitly expressed in Wathen & Burkell's model (i.e., which factors are the focus of evaluation depends on information need), and as such is more verbose than the models expressed by Fogg and Metzger, which conceptualize credibility as a list of factors without order or hierarchy.

EXPLORATORY FINDINGS

While not the main focus of this dissertation, several intriguing results were found while analyzing the measures of demographics and the individual factors presented in Chapter 2. It should be emphasized that these findings are exploratory and as such do not have a high degree of reliability. These findings are discussed below.

There was a significant correlation between Internet self-efficacy and perceived credibility, specifically those who were more self-efficacious online were more likely to rate the Britannica article as higher in credibility than those who were reading the same

article on Wikipedia, which suggests that an individual's confidence in their abilities online also affects perceived credibility.

It should be noted, however, that self-efficacy is not the same as actual skill level. Thus, individuals who may believe they are experts with online information may not actually be aware of how online information is collected, distributed and authored. Considering that males were more likely than females to exhibit high Internet self-efficacy (perhaps because of acculturation and/or stereotype threat), this disconnect between expertise and perceived expertise should be considered by authors and content distributors when considering perceived credibility. In other words, not just expertise but perceived expertise (as measured by Internet self-efficacy) affects an individual's judgment of credibility, and the more an individual has confidence in his/her abilities, the more likely s/he is to trust online materials, and the gender inequality here implies that males are evaluating credibility differently than females.

Gender was a significant variable in perceived credibility. Males had a greater tolerance for ambiguity, and males were more likely to rate themselves higher in Internet self-efficacy; males also tended to report having a faster internet connection at home. Most importantly, males tended to rate Wikipedia higher on perceived credibility than females. This gender inequality, especially with respect to the ambiguity inherent in Wikipedia's distributed authorship, is important from an information literacy standpoint: it indicates that males are more likely to trust online materials because they have a greater confidence in their abilities to competently analyze information on the Web (Internet self-efficacy). Further, males are more likely to trust materials with ambiguous authorship because of their greater tolerance for ambiguity.

LIMITATIONS

Due to the quantitative nature of this study, it is difficult to extrapolate meaning for some of these findings. Future work involving a qualitative study should explore the relationship among ambiguity tolerance, self-efficacy, and the reasons why men appear to

find Wikipedia to be more credible; it should also explore the impacts of affective state (something relatively hard to capture with survey measures) on the credibility judgment process, with a thorough analysis of speak-aloud and interview data that can further illustrate individuals' own conceptions of how their affective state affects the process. It is important to better understand the underlying psychological reasons for these results in order to develop targeted information literacy skills for individuals.

Further, this research provides one instance of the effects of reputation on credibility (i.e., Wikipedia vs. Encyclopedia Britannica). This comparison provided a polarizing instance where participants were likely to have an established sense of the reputation of these sources. In cases where the reputation of a source is less clear, but where individual information need is still low, the methods individuals use to establish credibility needs to be further explored.

THEORETICAL RELEVANCE

The predilection individuals have for basing credibility judgments on low-effort heuristics provides an illustration of Poole's (1985) principle of least effort and Simon's (1976) satisficing behavior. While these behaviors are well-documented, it is still alarming that a process as elementary and crucial as the credibility judgment process is equally prone to the use of shortcuts that avoid an evaluation of content. More work needs to be done to address how satisficing behavior is moderated in context. Individual level of interest in a topic seems to be the strongest factor affecting this behavior, but environmental factors like information overload and scarcity of time also seem to impact the credibility judgment process. Future work that examines these variables and provides insight into the ways in which individuals approach information seeking tasks will help clarify the preconditions that affect whether individuals base credibility judgments on surface characteristics or on a high-effort evaluation of content.

That credibility judgments are modulated by the information need (i.e., level of engagement) of an individual is indicative of information foraging theory (Pirolli & Card,

1999), which states that people modify their information consumption strategies, based on context, in order to maximize their information intake. The task context in this research simplified the foraging task for participants by examining them at the stage where they were considered to have already found a small set of materials to examine. This technique provided insight into a specific moment of the information seeking process, but ignores the myriad credibility judgments that must be made earlier in the foraging process when there is an abundance of source materials and the process of triage is likely even less considered and engaged. Future work is needed that examines how individuals process a larger set of materials and decide which of these to discard can further support the dual process model depicted here.

A somewhat subtle feature of this research can be observed when hypotheses one and two are examined as a set. H1 states that perceived credibility is affected by reputation, regardless of level of engagement. H2 states that perceived credibility is affected by reputation only in cases of low engagement. H1 is the simple claim, and H2 the more complex claim. This study might have stopped at H1 and shown that reputation affects credibility; H1, the simple claim, was in fact supported by the data. But H2 shows that there are situations where reputation does not affect credibility, notably, when level of engagement is low. The broad implication of this more complex view of credibility is that past research into credibility that only examined how single factors (rather than interactions) affect perceived credibility may be making sweeping claims about these factors that in fact do not apply in all situations. Future work that reexamines some of these factors in light of context (e.g., level of participant engagement) and dual-process theory may reveal a more detailed picture of credibility.

Finally, when seen in terms of persuasion theory (e.g., Fogg, 2003a), this research has shown that perceived credibility of a text (the message) can be strongly manipulated simply by changing the way in which it was delivered (the messenger). Many professions (e.g., advertising) rely on this very feature of human psychology. Future work can be

performed that examines, for instance, effective and ineffective persuasion techniques that minimize an individual's focus on message evaluation in lieu of messenger effects. It should be noted, however, that the intent of this research is for developing a more nuanced understanding of information literacy rather than the particular ways in which perceived credibility can be swayed to match the author's intentions.

Chapter 6: Method, Study 2: Media Format and Engagement

The aim of this study is to explain the interaction between the variables of media format and individual engagement on perceived credibility by comparing participants' credibility judgments across contrasting groups. This study is intended to test the hypotheses drawn from both Wathen & Burkell's (2002) theory of credibility judgments and Chaiken's (1980) heuristic-systematic dual-process model, specifically that credibility judgments are influenced by media format in addition to the veracity of the content, and especially so in cases of low individual engagement.

Study 2 replicates the format of Study 1 but examines a different stage of Wathen & Burkell's (2002) theory of credibility judgments. Whereas Study 1 examines message credibility (specifically, source credibility), Study 2 examines surface credibility (specifically, media format).[25]

PARTICIPANTS

Participants were 128 university undergraduates (78 female, 50 male), ranging from 18-34 years old. Participants came from a large southwestern research university and were from the Educational Psychology subject pool (details on the subject pool makeup are in Chapter 3).

MATERIALS/INSTRUMENTS

Participants were given two texts, each distributed in one of the following formats: as a print document, as a PDF document read on a computer, or as an HTML document read on a computer. The first article was "Weight loss and muscle building content in popular magazines oriented toward women and men" (Grieve & Bonneau-Kaya, 2007); the second article was "Targeting a minority without alienating the majority: Advertising to gays and lesbians in mainstream media" (Oakenfull, McCarthy,

[25] The method below is significantly shortened to avoid duplication, so Study 1 should be referred to for a complete description of the study design.

& Greenlee, 2008). These articles were chosen in an effort to represent the skill sets and interests of subject pool participants. Subject pool classification data indicated that a majority of participants came from either a statistics course or a human sexuality course, so short (6-8 page) research articles that included quantitative methods and examined issues of gender and sexuality were selected. Credibility judgments and survey measures were collected as in Study 1.

TASK

All participants were required to read two articles which they were told to view as the output of a search for relevant documents on the topic of gender in advertising. After receiving instructions (see script in Procedure below), each participant was presented with an article (counterbalanced for order and experimental format) to read for the purpose of formulating a list of examples of how gender affects the focus of mainstream advertising. Articles were presented in one of three experimental formats: print (a physical paper copy of the article), PDF (read on-screen in Adobe Reader), or HTML (read on-screen in Apple's Safari) (see Figure 8 for a sample). After reading each article, participants rated their perception of its credibility; after rating both articles, participants completed a series of personality measures and demographic questions (Appendices D, E, F) in the same way as in Study 1.

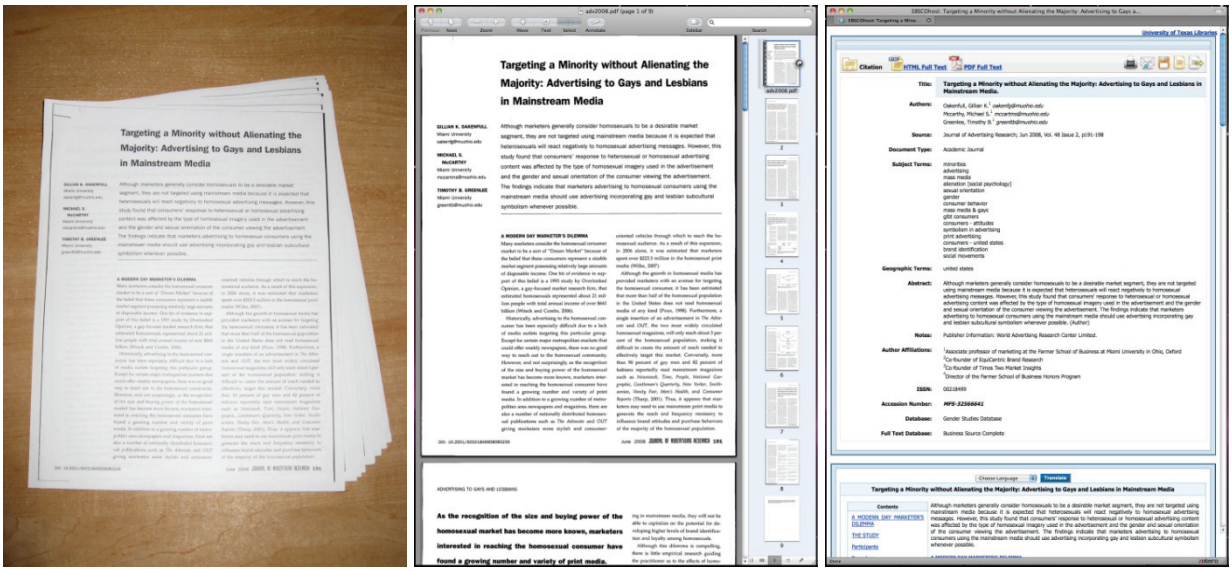

Figure 8. From left to right, article as viewed in print, PDF, and HTML formats.

DESIGN

This study examined the interaction between media format and participant engagement through a 3x2 between-subjects design[26] (see Figure 9). The first independent variable was the media format, operationalized at three levels (print, PDF, and HTML). The second independent variable was engagement, operationalized at two levels (high or low, as in Chaiken, 1980). Each participant read two articles (which are analyzed separately in the results section) formatted in one of the three media formats, counterbalanced for effects of order and media format; all permutations of article order, media format order, and media format pairings (i.e., Article 1 or 2 first; Print, PDF, or HTML first; Print with HTML, Print with PDF, or HTML with PDF pairings) were randomized for participants.

The dependent variables were the same as Study 1 (Meyer's credibility measure, recommendation credibility measure, and time spent reading an article).

[26] Note that this is a between-subjects design and not a mixed (between- and within-subjects) design. In other words, although each participant is reading two articles in different formats, the ratings of these articles are never compared with each other. Instead, comparisons are made on all participant ratings of the first article (which one third read as a print article, one third read as a PDF article, and one third read as an HTML article). In the same fashion, separate comparisons are made for the second article.

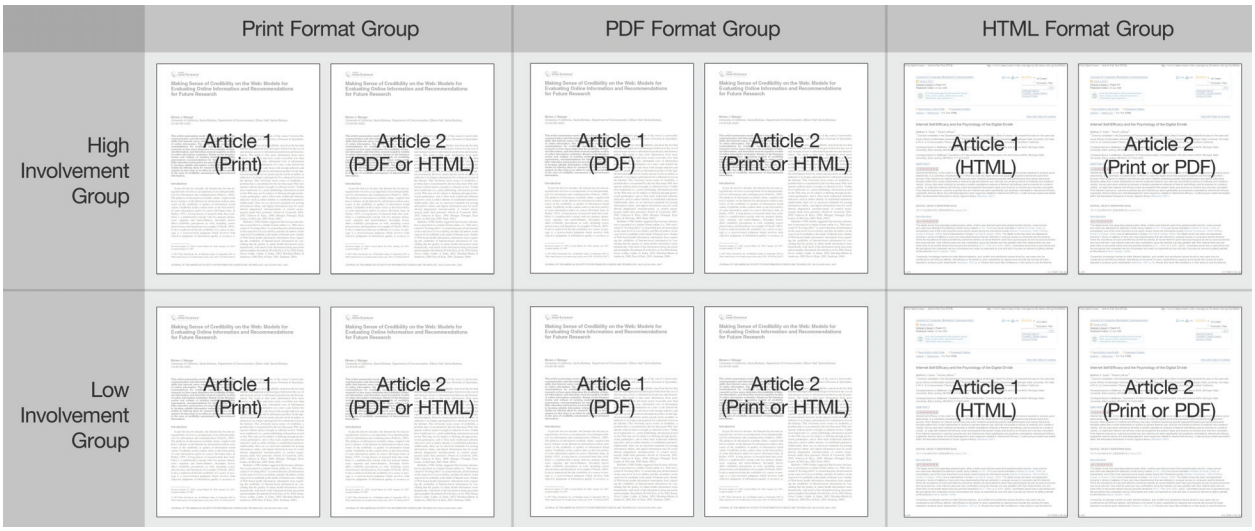

Figure 9. Media format study design.

HYPOTHESES

The following research hypotheses were tested by the experimental design (see Table 10 for a summary):

H1(a): There will be a main effect for media format (i.e., participants will rate documents in print format higher in perceived credibility (Meyer's scale) than documents in either electronic format).

H1(b): PDFs, which closely mimic the appearance of the printed page, will be rated as more credible than articles formatted in HTML.

H2: Engagement with the task will interact with the format of the media by affecting participants' ratings of perceived credibility (Meyer's scale) (i.e., credibility ratings of print articles will be higher than PDF articles and PDF articles will be higher than HTML articles for the low engagement condition, and there will be no significant difference among the groups for the high engagement condition).

H3: Participants will spend a greater amount of time reading articles in the high engagement condition.

Format \ Engagement	*High*	*Low*
Print	(No significant difference among these groups)	Highest credibility scores
PDF	(No significant difference among these groups)	Medium credibility scores
HTML	(No significant difference among these groups)	Lowest credibility scores

Table 10. Hypothesized credibility ratings of participants by levels of condition in Study 2.

PROCEDURE

The procedure replicated Study 1 until after the focus group description. After reading the script about the focus group and listening to the confederate (that step was omitted for participants in the low engagement condition), participants read the next script on their computer screens:

> Imagine that you have decided to search the UT library's resources for information on gender in advertising. Specifically, a friend has asked you for some examples of how gender affects the focus of mainstream advertising, and you want to help by writing down a list of 3-5 examples of gender in advertising. After using several different search terms, you have narrowed your results down to two research articles that look promising. You're now ready to start reading these articles to see if they have what you are looking for.

Participants then examined two articles on the topic (already prepared and of similar length and information). They were asked to read the articles thoroughly and determine how credible the information was. Media format was manipulated by presenting results in one of three formats: printed (high-resolution photocopy of an article), PDF (presented on-screen in Adobe Reader), or HTML (presented on-screen in Apple's Safari). Articles were counterbalanced across participants to ensure equal amounts of participants viewed an article in each format; article order was counterbalanced to ensure that half of the participants read Article 1 first and half of the participants read Article 2 first (see Figure 9 for the study design). Finally, as in Study 1,

after reading the articles and rating their credibility, participants were asked to fill out the survey instruments and demographic questionnaire.

ANALYSES

The primary design of the study is a 3x2 between-subjects factorial design, with media format (print, PDF, or HTML) and engagement (high or low) as the main between-subjects independent variables. As in Study 1, a series of two-way ANOVAs using each dependent variable was utilized to assess the average credibility differences between groups. A total of six two-way ANOVAs were performed (see Table 11).

Analyses: Two-Way ANOVAs
DV: credibility score (Meyer's) of Article 1 (Grieve & Bonneau-Kaya, 2007);
DV: credibility score (recommend) of Article 1 (Grieve & Bonneau-Kaya, 2007);
DV: time spent reading Article 1 (Grieve & Bonneau-Kaya, 2007);
DV: credibility score (Meyer's) of Article 2 (Oakenfull, McCarthy, & Greenlee, 2008);
DV: credibility score (recommend) of Article 2 (Oakenfull, McCarthy, & Greenlee, 2008);
DV: time spent reading Article 2 (Oakenfull, McCarthy, & Greenlee, 2008).

Table 11. List of two-way ANOVAs performed in Study 2.

Both main effects (engagement and media format) as well as the interaction (engagement [high vs. low] and format [print vs. PDF vs. HTML]) on degree of credibility were assessed. As in Study 1, post-hoc non-parametric analyses were performed on significant results to address the use of ordinal data in a parametric test (ANOVA) and to further reinforce significant findings.

Finally, as in Study 1, a series of exploratory analyses were performed using the collected personality measures and demographics, including: specific components of positive and negative affective state, ambiguity tolerance, Internet self-efficacy, and demographics like age, gender, and computer usage (see Appendices E and F).

Chapter 7: Results, Study 2: Media Format and Engagement

In this section, results of each article are reported separately. Where means are reported, a two-way analysis of variance (ANOVA) with the respective independent and dependent measures was performed. Means of the credibility measures range from one (strongly disagree) to five (strongly agree).

PERCEIVED CREDIBILITY (MEYER'S COMBINED MEASURE)

A two-way analysis of variance (ANOVA) yielded no significant results for the main effect of media format, and no significant results for the interaction, on Article 1 (weight loss) and Article 2 (advertising) with respect to perceived credibility (Meyer's face valid questionnaire). See Table 12 for a summary.

		Article 1 (weight loss)			Article 2 (advertising)		
Engagement	**Format**	**M**	**SD**	**N**	**M**	**SD**	**N**
Low	*Print*	3.67	.33	22	3.78	.58	22
	PDF	3.55	.35	22	3.39	.69	19
	HTML	3.53	.37	20	3.55	.73	22
	Total	3.58	.35	64	3.58	.68	63
High	*Print*	3.53	.30	20	3.71	.65	21
	PDF	3.56	.21	22	3.86	.52	20
	HTML	3.55	.32	22	3.70	.72	21
	Total	3.55	.28	64	3.75	.63	62
Total	*Print*	3.60	.32	42	3.75	.61	43
	PDF	3.55	.29	44	3.63	.64	39
	HTML	3.54	.34	42	3.62	.72	43
	Total	3.57	.31	128	3.67	.66	125

Table 12. Descriptive statistics, perceived credibility (Meyer's combined measure).

PERCEIVED CREDIBILITY (SINGLE ITEM MEASURE: RECOMMEND TO A FRIEND)

A two-way ANOVA yielded no significant results for the main effect of media format, and no significant results for the interaction, on Article 1 (weight loss) and Article 2 (advertising) with respect to perceived credibility (single item measure: "I would recommend this article to a friend who is interested in the topic"). See Table 13 for a summary.

		Article 1 (weight loss)			Article 2 (advertising)		
Engagement	**Format**	**M**	**SD**	**N**	**M**	**SD**	**N**
Low	*Print*	3.91	1.02	22	4.00	.72	22
	PDF	3.78	.75	22	3.90	1.02	20
	HTML	3.90	.79	20	4.09	.97	22
	Total	3.86	.85	64	3.98	.90	64
High	*Print*	3.40	.94	20	3.78	1.04	23
	PDF	3.64	1.00	22	3.85	1.04	20
	HTML	3.77	1.07	22	3.90	1.04	21
	Total	3.61	1.00	64	3.84	1.03	64
Total	*Print*	3.67	1.00	42	3.87	.89	45
	PDF	3.70	.88	44	4.00	1.00	40
	HTML	3.83	.93	42	3.88	1.02	43
	Total	3.73	.93	128	3.91	.96	128

Table 13. Descriptive statistics, perceived credibility (recommend).

TIME

There was a main effect for media format on Article 1 (weight loss), $F(2, 122) = 9.04$, $p < .001$, such that time spent reading the article differed among the Print condition ($M = 16.50$ minutes, $SD = 16.53$), PDF condition ($M = 8.74$ minutes, $SD = 9.19$), and HTML condition ($M = 6.97$ minutes, $SD = 4.34$). Post hoc tests (Bonferroni) on the three levels of the media format condition indicated that Print/HTML and Print/PDF were different from each other, but not HTML/PDF. The interaction was not significant.

Similarly, there was a main effect for engagement on Article 2 (advertising), $F(2, 122) = 5.87$, $p = .004$, such that time spent reading the article differed among the Print condition ($M = 19.05$ minutes, $SD = 8.92$), PDF condition ($M = 18.21$ minutes, $SD = 12.90$), and HTML condition ($M = 12.28$ minutes, $SD = 7.50$). Post hoc tests (Bonferroni) on the three levels of the media format condition indicated that Print/HTML and HTML/PDF were different from each other, but not Print/PDF. The interaction was not significant. See Table 14 for a summary.

		Article 1 (weight loss)			**Article 2 (advertising)**		
Engagement	**Format**	**M**	**SD**	**N**	**M**	**SD**	**N**
Low	*Print*	13.37	8.90	22	16.67	9.97	22
	PDF	7.95	6.71	22	18.70	17.07	20
	HTML	6.92	5.25	20	10.13	7.38	22
	Total	9.49	7.61	64	15.06	12.36	64
High	*Print*	19.95	21.87	20	21.32	7.28	23
	PDF	9.53	11.25	22	17.73	7.06	20
	HTML	7.01	3.44	22	14.53	7.10	21
	Total	11.92	14.87	64	17.97	7.59	64
Total	*Print*	16.50	16.53	42	19.05	8.92	45
	PDF	8.74	9.19	44	18.21	12.90	40
	HTML	6.97	4.34	42	12.28	7.50	43
	Total	10.70	11.83	128	16.51	10.32	128

Table 14. Descriptive statistics, time (in minutes).

EXPLORATORY ANALYSES

The following analyses are exploratory, and the reported findings should be treated as such. A total of 91 correlations were performed (comparisons were made among the positive/negative affective state, five demographic variables, 2 measures of perceived credibility, time spent reading, engagement, overall ambiguity tolerance score,

and Internet self-efficacy score). Only correlations with *p*-values less than .05 are reported below.

Affective state

There was a correlation between positive affect (mean of 10 positive PANAS items) and self-reported interest ($r = .44$, n = 126, $p < .001$) and involvement ($r = .47$, n = 127, $p < .001$) in the research topic. There was a correlation between feelings of strength (PANAS item 5) and how knowledgeable the participant was about the research topic (measure of participant engagement item 5), ($r = .29$, n = 128, $p = .007$), such that more knowledge was associated with a greater amount of strength. There was a correlation between feelings of shame (PANAS item 13) and hours spent online per week ($r = .24$, n = 128, $p = .007$), such that more shame was associated with longer times spent online.

Ambiguity tolerance and epistemological belief structure

A higher tolerance for ambiguity was associated with younger ages, as reported below in Demographics. Additionally, there was a correlation between epistemological belief structure (EQ measure, combined four items) and feelings of nervousness ($r = .29$, n = 127, $p = .001$) and fear ($r = .25$, n = 127, $p = .004$), such that a more absolutist epistemological belief structure was associated with higher levels of nervousness (PANAS item 15) and fear (PANAS item 20).

Internet self-efficacy

Participants categorized as Sharpeners on the Ehrman & Leaver's (2003) measure of sharpeners vs. levelers (i.e., those that are more likely to see differences between objects than similarities) showed higher levels of Internet self-efficacy ($M = 4.43$, $SD = 1.40$) than those categorized as Levelers ($M = 3.57$, $SD = 1.48$), $t(124) = -2.97$, $p = .004$. There were also correlations between Internet self-efficacy and the speed of a participant's home Internet connection ($r = .33$, n = 126, $p < .001$), and the amount of

hours per week spent online (r = .29, n = 126, p = .001), such that higher levels of Internet self-efficacy were associated with faster Internet connections and more time spent online.

Demographics

There was a correlation between age and the perceived credibility (Meyer's) of electronic articles (PDF: r = -.34, n = 128, p = .001; HTML: r = -.26, n = 128, p = .034), such that a greater age was associated with lower credibility scores of electronic articles. There was a correlation between age and the use of social networking sites (r = -.35, n = 128, p < .001), such that a greater age was associated with less frequent use of social network sites (e.g., Facebook, Myspace). There was a correlation between age and Internet self-efficacy (r = .26, n = 126, p = .004), such that a greater age was associated with high levels of Internet self-efficacy. Finally, there was a correlation between age and ambiguity tolerance (r = -.28, n = 127, p = .001), such that a greater age was associated with a lower tolerance for ambiguity. Note that ages ranged, from 18 – 34, with 21 as the mode and mean; seven of the 128 participants were over the age of 22.

Additionally, there were several findings based on gender. A faster Internet connection in the home (Demographic item 8) was more likely to be had by males (M = 3.72, SD = .64) than females (M = 3.03, SD = 1.53), t(126) = 3.04, p = .003. Increased use of social networking sites (e.g., Facebook, Myspace) was more likely to be reported by females (M = 3.45, SD = .75) than males (M = 2.74, SD = 1.23), t(126) = 4.06, p < .001. Males were more likely than females to be categorized as Sharpeners on the Ehrman & Leaver's (2003) measure of sharpeners vs. levelers ($\chi 2(1) = 8.14$, p = .004). Finally, a higher level of Internet self-efficacy (five-point scale, 1 = lowest self-efficacy, 5 = highest self-efficacy) was more likely to be had by males (M = 4.96, SD = 1.41) than females (M = 3.71, SD = 1.28), t(124) = 5.17, p < .001.

SUMMARY

The first three hypotheses (H1a: there will be a main effect for media format, with print articles rated higher on perceived credibility than electronic articles; H1b: there will be a main effect for media format, with PDF articles rated higher than HTML articles; H2: there will be a media format and engagement interaction, with print articles rated higher on perceived credibility than electronic articles in the low engagement condition) were not supported by the findings. H3 (participants will spend more time reading in the high engagement condition) was supported. Further, several exploratory findings based on affect, ambiguity tolerance, Internet self-efficacy, age, and gender were reported.

Chapter 8: Discussion, Study 2: Media Format and Engagement

SUMMARY

In this second study, both Chaiken's HSM dual-process theory and Wathen & Burkell's theory on the credibility judgment process (specifically media format) were tested to measure these component's effects on perceived credibility. Participants read scholarly research articles delivered via an online database in HTML or PDF format, or as a printed copy of the article. The results did not indicate an effect of media format on perceived credibility, regardless of level of engagement.

MEDIA FORMAT AND ENGAGEMENT

The lack of support for the hypotheses in this study can be explained in one of two ways: the first interpretation is that the claims in the hypotheses (i.e., that media format affects perceived credibility in low-effort examinations but not in high-effort examinations) are false; the second interpretation is that there were limitations in the design of the study that prevented these effects from being seen.

In the first interpretation, the data can be interpreted in reference to the first study. Since a significant effect of reputation on perceived credibility was found, then it can be inferred that the surface characteristic of media format has such a small effect on perceived credibility that it is overpowered by the effects of reputation. It should be noted, however, that media format as an umbrella term for the design of a document is not shown to be ineffectual, but rather that the specific media format (print, HTML, or PDF) of a specific document type (scholarly research articles) has no effect. This interpretation is supported by the encouraging results on the same topic reported by Robins, Holmes, & Stansbury (2010), who found that design affects the perceived credibility of health information Web sites.

In the second interpretation, it is worthwhile to examine the potential deficits of the study design. These deficits are examined in more detail below in the limitations section, but can be summarized as follows: the contents of the research articles required a high level of expertise to interpret, and participants were ill-equipped to judge their credibility; participants did not have enough time to adequately assess credibility and instead assigned them "average" credibility (akin to saying "I do not know how credible this is"); or that the difference between the conditions (print, PDF, HTML) was so minimal that it had no effect on perceived credibility.

EXPLORATORY FINDINGS

Several interesting findings in the exploratory analyses deserve a brief discussion. The correlation between increased levels of positive affect and interest/involvement in the topic can have two implications: (1) that individuals approaching an information evaluation task with a more positive demeanor are less likely to base their credibility judgments on low-effort heuristics (because they are more engaged in the task), or (2) that individuals with a pre-existing interest in a topic are more likely to enjoy reading about it. Further work that explores whether (1) is the case could have important consequences for understanding the credibility judgment process, since it implies that positive affect is a precondition that encourages high-effort systematic reasoning (i.e., evaluation of content rather than peripheral cues).

The association between age and perceived credibility of electronic articles (PDF and HTML) might imply that younger individuals are more comfortable with reading documents onscreen (or of evaluating electronic documents in general). This claim is strengthened by the additional correlations between age and social network usage, Internet self-efficacy, and ambiguity tolerance; information delivered via the Web is often viewed as potentially more untrustworthy (because of ambiguous authorship and the potential for misinformation), so a higher tolerance of ambiguity can encourage high-

effort evaluations of materials whose veracity is suspect. Note that these results are tempered by the fact that participants in this study came from a limited age range (18-34).

Finally, the results based on gender supported those found in Study 1, with males reporting faster Internet connections and Internet self-efficacy. Further, males were more likely to be classified as Sharpeners, indicating a preference for observing distinctions when comparing objects (as opposed to Levelers, who prefer to find commonalities).

LIMITATIONS

While there was no significant effect of media format and engagement on perceived credibility in the initial analyses, a number of observations can be made.

First, in comparison to Study 1, participants were asked to read actual research articles rather than encyclopedia articles, and the difference in language use (from academic to more extemporaneous) and article length may have been too overwhelming for a one-hour research study. Participants (university undergraduates) may have been ill-equipped to evaluate scholarly research articles, a task in many fields reserved for graduate work and beyond. It is also possible that participants felt they did not have enough time to adequately understand the articles and determine their credibility in the time allotted, and instead gave a rating that was merely "average." To address these limitations, follow-up analyses were performed where participants who spent less than five minutes reading either of the articles (36 participants, 26 of which were in the low engagement condition) were excluded. The five-minute cutoff was determined after an examination of the data revealed a cluster of participants below that point. Results for Article 1 were only marginally different (test statistics were increased, but not to a significant level). However, results for Article 2 revealed a significant interaction effect, $F(2,83) = 3.31$, $p = .041$. Follow-up tests of simple effects indicated that participants in the low engagement condition ranked Print articles ($M = 3.93$, $SD = .42$) as more credible than HTML ($M = 3.40$, $SD = .78$), $F(1, 21) = 3.98$, $p = .050$, or PDF ($M = 3.25$, $SD = .71$), $F(1, 24) = 7.88$, $p = .010$; there was no significant difference among the

formats in the high engagement condition (see Figure 10). These results partially support H2 (there were no significant findings when comparing the perceived credibility of PDF and HTML articles).

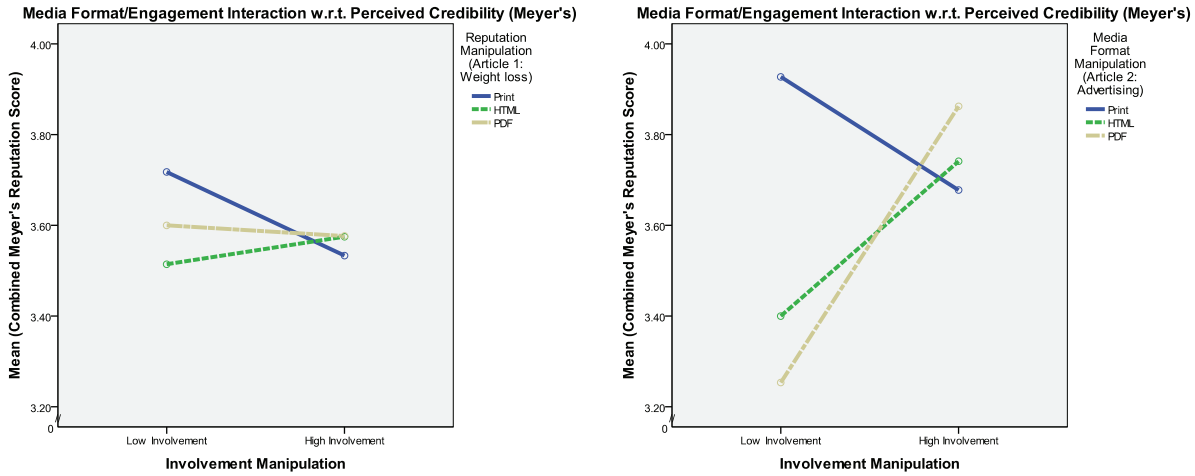

Figure 10. Media format and engagement interactions with respect to perceived credibility (Meyer's) for Article 1 (left) and Article 2 (right), with participants reading for less than 5 minutes removed.

Second, participants spent significantly more time reading the paper-based articles than their electronic counterparts (PDF or HTML), and spent the least amount of time reading the HTML version. The meaning of this is unclear, such that it could imply participants found reading the electronic versions easier and faster, or that they spent more time analyzing the paper version. Previous research on the subject (Gould et al., 1987; Dillon, 1992) has shown that participants slower to attain similar task performance when reading electronic documents.

Finally, the differences between the media format conditions were less conspicuous than originally assumed. Before this research was performed, there were several characteristics of the media formats in question that were expected to be evaluated. First, low-resolution, fax-quality printouts of articles were assumed to be difficult to read and thus an indicator of unprofessional work. Second, the distinction

between articles delivered electronically from an online database in PDF format (usually a high-quality press copy) and HTML format (usually a low-quality copy with formatting cues like columns and pagination removed, and figures and tables represented in very low resolution) were expected to be evaluated. At the time the research was performed, however, the online database from which the articles were harvested (EBSCOhost) had undergone a site redesign that increased the professional appearance of HTML-delivered articles; additionally, the printouts of articles were of a high quality and closely mimicked the PDF versions. Ultimately, there were still substantial differences among the formats, but much less than originally expected, which may have affected the impact that media format had on perceived credibility.

FUTURE WORK

Under the first interpretation (that the hypotheses claiming an interaction between media format and engagement were rejected), future work should either examine other messenger characteristics that impact perceived credibility, or examine other characterizations of media format with other document types. For example, examining personal correspondence in the formats of handwritten letter, mass-produced greeting card or form letter, or email may indicate an effect of media format. Previous research (e.g., Amsbary & Powell, 2003) has examined the comparison of news delivered via newspaper, Web, or television, but not in a dual process framework that examined the effects of engagement.

Under the second interpretation (i.e., that the limitations of the study prevented the hypotheses from being supported), the results of Study 2 should not be interpreted as evidence that media format has no effect on the perception of credibility of online resources. Further examination should be attempted to determine whether the effect can be amplified and variance minimized, in order to see if media format has a significant effect on perceived credibility. Towards that end, a cross-article comparison involving a highly relevant article and a marginally relevant article (e.g., the title and abstract seem

relevant, but the contents are not) for a given search task may yield more interesting results (e.g., the difference score of perceived credibility between the articles could be higher for participants in the high engagement condition). Additionally, it may be that the content of the articles chosen was too unfamiliar to the study participants, causing them to assess "default" credibility across conditions because of a lack of expertise. In some sense, individuals in an experimental setting are "forced" to gauge credibility on material they may feel they have no business rating by themselves, causing them to give a rating that indicates "I cannot determine whether this is credible or not," which means something entirely different than "average" credibility. An option on the survey instrument that allows participants to answer that they feel unable to determine credibility may be useful, or a series of comprehension questions following the reading task that indicates whether participants read and understood what they read. Alternatively, a more homogeneous participant population in relation to field of study might be utilized to ensure a base level of expertise.

Chapter 9: Conclusion

One of the primary intents of the two studies performed for this dissertation was to provide an empirical basis for the model proposed by Wathen & Burkell (2002), which states that individuals first examine surface credibility (e.g., media format, design) and message credibility (e.g., reputation), before finally reaching an evaluation of content. The results of Study 1 (reputation and engagement) support this model and its perception as a dual-process model (specifically the HSM proposed by Chaiken, 1980) by demonstrating that individuals with low information need are more likely to use low-effort evaluations like reputation to evaluate credibility before moving on to an evaluation of content, and individuals with high information need are more likely to base their credibility judgments on a high-effort evaluation of content. In light of this research, Wathen & Burkell's model (as illustrated in Figure 1) is clarified below in Figure 11.

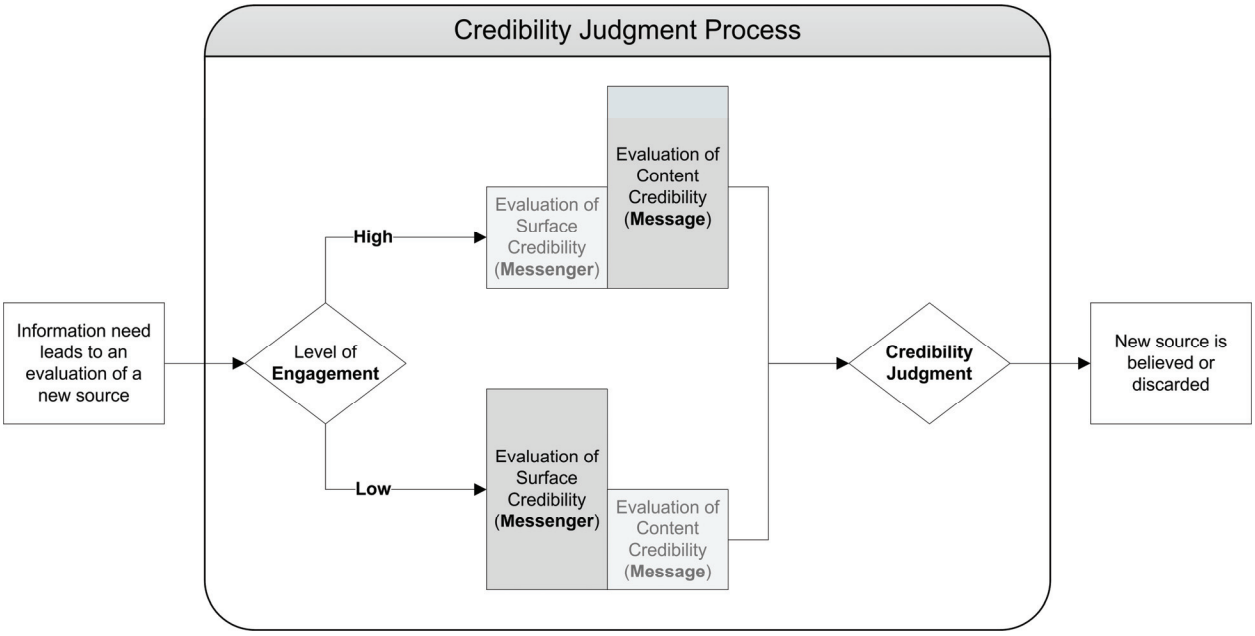

Figure 11. Wathen & Burkell's credibility process remodeled.

However, the lack of significant findings in Study 2 (media format and engagement) can be interpreted in two ways: (1) that surface credibility, and specifically media format, do not factor strongly into the credibility judgment process, or (2) that the design of the study did not minimize variance enough to make the effect apparent. It is likely that the specific instance of media format chosen for the study (research articles formatted in paper, PDF, or HTML) was not successful at teasing out the effects of media format on perceived credibility, since similar studies comparing media formats (e.g., news delivered via newspapers, the Web, or television, Amsbary & Powell, 2003) showed significant findings with respect to credibility. If the results of Study 2 are bracketed because of its methodological limitations (e.g., time constrains, lack of expertise in the reading material), the results of Study 1 supply strong empirical evidence for the validity of this model as an accurate representation of the credibility judgment process.

It is important to note that the two studies performed here examined specific factors that affect the credibility judgment process (namely, reputation, media format, and engagement), and there exist many other factors involved in the model proposed by Wathen & Burkell. An important avenue of research for future work would be to study the effects of other low-effort heuristics such as presentation and organization of information, usability, and interface design on the credibility judgment process, as well as additional mediating factors (like engagement) that manipulate the degree to which individuals use low-effort heuristics or high-effort systematic reasoning to arrive at a credibility judgment.

These findings have strong implications for the understanding of information literacy on the Web. In particular, the effects of engagement on the credibility judgment process demonstrate the contextual nature of these judgments and highlight the importance that an individual's information need has on the level of effort they are willing to expend to evaluate credibility. This understanding casts doubt on the traditional

information literacy policy of teaching individuals to process a checklist of credibility factors by highlighting that individuals treat time as a scarce resource and will rely on low-effort heuristics to evaluate content they (for whatever reason) are not fully engaged with.

This dissertation treats credibility as an individual perception (rather than a quale of a document) and has framed a credibility judgment as a contextual process. It has focused specifically on the domain of the Web, where ambiguous authorship, peer-produced content, and the lack of gatekeepers present individuals with an environment where credibility judgments are a necessary routine in triaging information. It has reviewed the relevant literature on existing credibility frameworks and the component factors that affect credibility judgments, with an emphasis on the models proposed by Wathen & Burkell (the three-stage model of credibility judgments) and Chaiken (the heuristic-systematic model based on dual-process theory). The online encyclopedia (instantiated as Wikipedia and Encyclopedia Britannica) was proposed as a canonical form to examine the specific effects of factors on the credibility judgment process (e.g., reputation).

The two main claims advanced here were (1) that information sources are composed of both message (the content) and messenger (the way the message is delivered), and that the messenger impacts perceived credibility; and (2) that perceived credibility is tempered by information need (individual engagement). These claims were framed by the models proposed by Wathen & Burkell and Chaiken to forward a composite dual process theory of credibility judgments, which was tested by two experimental studies.

In order to explore the pertinent variables (source reputation, media format, and engagement) on perceived credibility, two studies were conducted. Study 1 instructed participants to read identical articles about computer security formatted as either a Britannica or Wikipedia article. Engagement was manipulated by instructing participants

that they would have to be participating in a focus group after reading the article (high engagement) or that they would not have to participate in the focus group (low engagement). Overall, results demonstrated a statistically significant effect of both engagement and source reputation: when participants were highly engaged in the topic, there was no significant effect of source reputation; however, when participants were not highly engaged in the topic, they rated an article from Britannica higher on perceived credibility than the same article from Wikipedia. These results suggest that when participants are highly engaged, they look beyond superficial cues (e.g., reputation) that only require the use of low-effort heuristics, and base their credibility judgments more on high-effort systematic analysis (an evaluation of content).

Study 2 instructed participants to read identical articles about advertising (weight loss and gender in advertising) in one of the following formats: PDF, HTML or print. Engagement was manipulated in the same manner as in Study 1. Results demonstrated a statistically significant effect for time spent reading the articles, in which participants spent more time reading print articles than PDF or HTML articles; further, participants in the high engagement condition spent more time reading that those in the low engagement condition. Effects of media format on perceived credibility were only found with respect to Article 2 when participants spending less than 5 minutes reading were excluded.

The results of these studies encourage a more nuanced understanding of the credibility judgment process by framing it as a dual-process model, and showing that certain mediating variables can affect the relative use of low-effort heuristic evaluation and high-effort systematic reasoning when forming a perception of credibility. Finally, the results support the importance of messenger effects on perceived credibility, implying that credibility judgments, especially in the online environment, and especially in cases of low individual engagement, are based on peripheral cues rather than an informed evaluation of content.

Appendix A: Encyclopedia Article: Online Shopping (Study 1, Reputation/Engagement)

Online shopping

From Wikipedia, the free encyclopedia

Online shopping is the process consumers go through to purchase products or services over the Internet. An online shop, eshop, e-store, internet shop, webshop, webstore, online store, or virtual store evokes the physical analogy of buying products or services at a bricks-and-mortar retailer or in a shopping mall.

The metaphor of an online catalog is also used, by analogy with mail order catalogs. All types of stores have retail web sites, including those that do and do not also have physical storefronts and paper catalogs.

Online shopping is a type of electronic commerce used for business-to-business (B2B) and business-to-consumer (B2C) transactions.

The term "Webshop" also refers to a place of business where web development, web hosting and other types of web related activities take place (Web refers to the World Wide Web and "shop" has a colloquial meaning used to describe the place where one's occupation is carried out).

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History

Since the early 1990s, online shopping has emerged into every corner of life, linking people to the culture of capitalism in frequent and daily ways[1]. It lets us buy what we want, when we want at our convenience , and helps us to imagine ourselves buying, owning, and having positive outcomes by the goods available out there on the web[1]. Shopping has been a way of identifying oneself in today's culture by what we purchase

and how we use our purchases. Online shopping has always been a middle to high class commodity since its first arrival on the internet in society[2]. In 1990, Tim Berners-Lee created The World Wide Web Browser[2].

Charles Stack created the first online book store, Book Stacks Unlimited (aka Books.com) in 1992, two years before Jeff Bezos began Amazon.[3] Other advances took place in 1994 such as Online Banking, After that, the next big development was the opening of an online pizza shop by Pizza Hut[2]. During that same year, Netscape introduced SSL encryption to enable encryption over the data transferred online which has become essential for online shopping. In 1995, Amazon expanded its online shopping, and in 1996, eBay opened up for online shopping as well[2].

The idea of online shopping pre-dates the World Wide Web for there were earlier experiments involving real-time transaction processing from a domestic television. The technology, based on Videotex, was first demonstrated by Michael Aldrich in 1979 who designed and installed systems in the UK, including the first Tesco pilot system in 1984[4].The first B2B was Thomson Holidays in 1981.[5]

Customers

In general, shopping has always catered to middle class and upper class women. Shopping is fragmented and pyramid-shaped. At the pinnacle are elegant boutiques for the affluent, a huge belt of inelegant but ruthlessly efficient “discounters” flog plenty at the pyramid’s precarious middle. According to the anaylsis of Susan D. Davis, at its base are the world’s workers and poor, on whose cheapened labor the rest of the pyramid depends for its incredible abundance.[1] Shopping has evolved from single stores to large malls with different services such as offering delivery, attentive service and store credit

and accepting return.[1] These new additions to shopping have encouraged and targeted middle class women.

In recent years, online shopping has become popular; however, it still caters to the middle and upper class. In order to shop online, one must be able to have access to a computer, a bank account and a debit card. Shopping has evolved with the growth of technology. According to research found in the Journal of Electronic Commerce, if we focus on the demographic characteristics of the in-home shopper, in general, the higher the level of education, income, and occupation of the head of the household, the more favourable the perception of non-store shopping.[6] It should be remembered that an influential factor in consumer attitude towards non-store shopping is exposure to technology, since it has been demonstrated that increased exposure to technology increases the probability of developing favourable attitudes towards new shopping channels.[6]

Online shopping widened the target audience to men and women of the middle class. At first, main users of online shopping were young men with a high level of income and a university education.[6] This profile is changing. For example, in USA in the early years of Internet there were very few women users, but by 2001 women were 52.8% of the online population.[6] Sociocultural pressure has made men generally more independent in their purchase decisions, while women place greater value on personal contact and social relations.[6] In addition, male shoppers are more independent when deciding on purchasing products because unlike women, they don't necessarily need to see or try on the product.

Trends

One third of people that shop online use a search engine to find what they are looking for and about one fourth of people find websites by word of mouth.[7] Word of mouth has

increased as a leading way that people find websites to shop from. When an online shopper has a good first experience with a certain website sixty percent of the time they will return to that website to buy more.[7]

Books are one of the things bought most online, however clothes, shoes and accessories are all very popular things to buy online. Cosmetics, nutrition products and groceries are increasingly being purchased online.[7] About one fourth of travelers are buying their plane tickets online because it is a quick and easy way to compare airline travel and make a purchase. Online shopping provides more freedom and control than shopping in a store.[1] [7]

According to sociological perspective online shopping is arguably the most predictable way to shop.[1] One knows exactly what website to go to, how much the product will cost, and how long it will take for the product to reach them. Online shopping has become extremely routine and predictable, which is one of its great appeals to the consumer.

Logistics

Consumers find a product of interest by visiting the website of the retailer directly, or do a search across many different vendors using a shopping search engine.

Once a particular product has been found on the web site of the seller, most online retailers use shopping cart software to allow the consumer to accumulate multiple items and to adjust quantities, by analogy with filling a physical shopping cart or basket in a conventional store. A "checkout" process follows (continuing the physical-store analogy) in which payment and delivery information is collected, if necessary. Some stores allow consumers to sign up for a permanent online account so that some or all of this information only needs to be entered once. The consumer often receives an e-mail

confirmation once the transaction is complete. Less sophisticated stores may rely on consumers to phone or e-mail their orders (though credit card numbers are not accepted by e-mail, for security reasons).

Payment

Online shoppers commonly use credit card to make payments, however some systems enable users to create accounts and pay by alternative means, such as:

- Debit card
- Various types of electronic money
- Cash on delivery (C.O.D., offered by very few online stores)
- Cheque
- Wire transfer/delivery on payment
- Postal money order
- PayPal
- Google Checkout
- Moneybookers
- Reverse SMS billing to mobile phones
- Gift cards
- Direct debit in some countries

Some sites will not allow international credit cards and billing address and shipping address have to be in the same country in which site does its business. Other sites allow customers from anywhere to send gifts anywhere. The financial part of a transaction might be processed in real time (for example, letting the consumer know their credit card was declined before they log off), or might be done later as part of the fulfillment process.

While credit cards are currently the most popular means of paying for online goods and services, alternative online payments will account for 26% of e-commerce volume by 2009 according to Celent.[8]

Product delivery

Once a payment has been accepted the goods or services can be delivered in the following ways.

- Download: This is the method often used for digital media products such as software, music, movies, or images.
- Shipping: The product is shipped to the customer's address.
- Drop shipping: The order is passed to the manufacturer or third-party distributor, who ships the item directly to the consumer, bypassing the retailer's physical location to save time, money, and space.
- In-store pickup: The customer orders online, finds a local store using locator software and picks the product up at the closest store. This is the method often used in the bricks and clicks business model.
- In the case of buying an admission ticket one may get a code, or a ticket that can be printed out. At the premises it is made sure that the same right of admission is not used twice.

Shopping cart systems

- Simple systems allow the offline administration of products and categories. The shop is then generated as HTML files and graphics that can be uploaded to a webspace. These systems do not use an online database.
- A high end solution can be bought or rented as a standalone program or as an addition to an enterprise resource planning program. It is usually installed on the company's

own webserver and may integrate into the existing supply chain so that ordering, payment, delivery, accounting and warehousing can be automated to a large extent.

- Other solutions allow the user to register and create an online shop on a portal that hosts multiple shops at the same time.
- open source shopping cart packages include advanced platforms such as Interchange, and off the shelf solutions as Satchmo, osCommerce, Magento, Zen Cart and VirtueMart.
- Commercial systems can also be tailored to ones needs so that the shop does not have to be created from scratch. By using a framework already existing, software modules for different functionalities required by a webshop can be adapted and combined.

Design

Why does electronic shopping exist? For customers it is not only because of the high level of convenience, but also because of the broader selection; competitive pricing and greater access to information.[9][10] For organizations it increases their customer value and the building of sustainable capabilities, next to the increased profits[11].

There are a number of online store options. Yahoo, Ebay and Amazon have store builders. WebStore by Amazon passes down the features from Amazon to the merchant's personalized store. eBay integrates its store solution with sales on ebay.

Information load

Designers of online shops should consider the effects of information load. Mehrabian and Russel (1974) introduced the concept of information rate (load) as the complex spatial and temporal arrangements of stimuli within a setting.[12] The notion of information load is directly related to concerns about whether consumers can be given too much information in virtual shopping environments. Compared with conventional retail

shopping, computer shopping enriches the information environment of virtual shopping by providing additional product information, such as comparative products and services, as well as various alternatives and attributes of each alternative, etc.[13]

Two major sub-dimensions have been identified for information load: complexity and novelty.[14] Complexity refers to the number of different elements or features of a site, which can be the result of increased information diversity. Novelty involves the unexpected, suppressing, new, or unfamiliar aspects of the site. A research by Huang (2000) showed that the novelty dimension kept consumers exploring the shopping sites, whereas the complexity dimension has the potential to induce impulse purchases[13].

Consumer expectations

The main idea of online shopping is not in having a good looking website that could be listed in a lot of search engines and it is not about the art behind the site.[15] It also is not only just about disseminating information, because it is all about building relationships and making money.[15] Mostly, organizations try to adopt techniques of online shopping without understanding these techniques and/or without a sound business model.[15] Rather than supporting the organization's culture and brand name, the website should satisfy consumer's expectations.[15] Many researchers notify that the uniqueness of the web has dissolved and the need for the design, which will be user centered, is very important.[15] Companies should always remember that there are certain things, such as understanding the customer's wants and needs, living up to promises, never go out of style, because they give reason to come back.[15] And the reason will stay if consumers always get what they expect. McDonaldization theory can be used in terms of online shopping, because online shopping is becoming more and more popular and website that wants to gain more shoppers will use four major principles of McDonaldization: efficiency, calculability, predictability and control.

Organizations, which want people to shop more online for them, should consume extensive amounts of time and money to define, design, develop, test, implement, and maintain website.[15] Also if company wants their website to be popular among online shoppers it should leave the user with a positive impression about the organization, so consumers can get an impression that the company cares about them.[15] The organization that wants to be acceptable in online shopping needs to remember, that it is easier to lose a customer then to gain one.[15] Lots of researchers state that even when site was a "top-rated", it would go nowhere if the organization failed to live up to common etiquette, such as returning e-mails in a timely fashion, notifying customers of problems, being honest, and being good stewards of the customers' data.[15] Organizations that want to keep their customers or gain new ones try to get rid of all mistakes and be more appealing to be more desirable for online shoppers. And this is why many designers of webshops considered research outcomes concerning consumer expectations. Research conducted by Elliot and Fowell (2000) revealed satisfactory and unsatisfactory customer experiences.[16]

User interface

It is important to take the country and customers into account. For example, in Japan privacy is very important and emotional involvement is more important on a pension's site then on a shopping site.[11] Next to that, there is a difference in experience: experienced users focus more on the variables that directly influence the task, while novice users are focusing more on understanding the information.[17]

There are several techniques for the inspection of the usability. The ones used in the research of Chen & Macredie (2005) are Heuristic evaluation, cognitive walkthrough and

the user testing. Every technique has its own (dis-)advantages and it is therefore important to check per situation which technique is appropriate.[18]

When the customers went to the online shop, a couple of factors determine whether they will return to the site. The most important factors are the ease of use and the presence of user-friendly features.[18]

Market share

E-commerce product sales totaled $146.4 billion in the United States in 2006, representing about 6% of retail product sales in the country. The $18.3 billion worth of clothes sold online represented about 10% of the domestic market.[19]

For developing countries and low-income households in developed countries, adoption of e-commerce in place of or in addition to conventional methods is limited by a lack of affordable Internet access.

Convenience

Online stores are usually available 24 hours a day, and many consumers have Internet access both at work and at home. A visit to a conventional retail store requires travel and must take place during business hours.

Searching or browsing an online catalog can be faster than browsing the aisles of a physical store. Consumers with dial-up Internet connections rather than broadband have much longer load times for content-rich web sites and have a considerably slower online shopping experience.

Some consumers prefer interacting with people rather than computers (and vice versa), sometimes because they find computers hard to use. Not all online retailers have succeeded in making their sites easy to use or reliable.

In most cases, merchandise must be shipped to the consumer, introducing a significant delay and potentially uncertainty about whether or not the item was actually in stock at the time of purchase. Bricks-and-clicks stores offer the ability to buy online but pick up in a nearby store. Many stores give the consumer the delivery company's tracking number for their package when shipped, so they can check its status online and know exactly when it will arrive. For efficiency reasons, online stores generally do not ship products immediately upon receiving an order. Orders are only filled during warehouse operating hours, and there may be a delay of anywhere from a few minutes to a few days to a few weeks before in-stock items are actually packaged and shipped. Many retailers inform customers how long they can expect to wait before receiving a package, and whether or not they generally have a fulfillment backlog. A quick response time is sometimes an important factor in consumers' choice of merchant. A weakness of online shopping is that, even if a purchase can be made 24 hours a day, the customer must often be at home during normal business hours to accept the delivery. For many professionals this can be difficult, and absence at the time of delivery can result in delays, or in some cases, return of the item to the retailer. Automated delivery booths, such as DHL's Packstation, have tried to address this problem. There are sites such as www.visitthebest.com that gives essential guide to top shopping sites

In the event of a problem with the item - it is not what the consumer ordered, or it is not what they expected - consumers are concerned with the ease with which they can return an item for the correct one or for a refund. Consumers may need to contact the retailer, visit the post office and pay return shipping, and then wait for a replacement or refund.

Some online companies have more generous return policies to compensate for the traditional advantage of physical stores. For example, the online shoe retailer Zappos.com includes labels for free return shipping, and does not charge a restocking fee, even for returns which are not the result of merchant error. (Note: In the United Kingdom, Online shops are prohibited from charging a restocking fee if the consumer cancels their order in accordance with the Consumer Protection (Distance Selling) Act 2000.[20])

Information and reviews

Online stores must describe products for sale with text, photos, and multimedia files, whereas in a physical retail store, the actual product and the manufacturer's packaging will be available for direct inspection (which might involve a test drive, fitting, or other experimentation).

Some online stores provide or link to supplemental product information, such as instructions, safety procedures, demonstrations, or manufacturer specifications. Some provide background information, advice, or how-to guides designed to help consumers decide which product to buy.

Some stores even allow customers to comment or rate their items. There are also dedicated review sites that host user reviews for different products.

In a conventional retail store, clerks are generally available to answer questions. Some online stores have real-time chat features, but most rely on e-mail or phone calls to handle customer questions.

Price and selection

One advantage of shopping online is being able to quickly seek out deals for items or services with many different vendors (though some local search engines do exist to help

consumers locate products for sale in nearby stores). Search engines and online price comparison services can be used to look up sellers of a particular product or service.

Shoppers find a greater selection online in certain market segments (for example, computers and consumer electronics[21]) and in some cases lower prices. This is due to a relaxation of certain constraints, such as the size of a "brick-and-mortar" store, lower stocking costs (or none, if drop shipping is used), and lower staffing overhead.

Shipping costs (if applicable) reduce the price advantage of online merchandise, though depending on the jurisdiction, a lack of sales tax may compensate for this.

Shipping a small number of items, especially from another country, is much more expensive than making the larger shipments bricks-and-mortar retailers order. Some retailers (especially those selling small, high-value items like electronics) offer free shipping on sufficiently large orders.

Fraud and security concerns

Given the lack of ability to inspect merchandise before purchase, consumers are at higher risk of fraud on the part of the merchant than in a physical store. Merchants also risk fraudulent purchases using stolen credit cards or fraudulent repudiation of the online purchase. With a warehouse instead of a retail storefront, merchants face less risk from physical theft.

Secure Sockets Layer (SSL) encryption has generally solved the problem of credit card numbers being intercepted in transit between the consumer and the merchant. Identity theft is still a concern for consumers when hackers break into a merchant's web site and steal names, addresses and credit card numbers. A number of high-profile break-ins in the

2000s has prompted some U.S. states to require disclosure to consumers when this happens. Computer security has thus become a major concern for merchants and e-commerce service providers, who deploy countermeasures such as firewalls and anti-virus software to protect their networks.

Phishing is another danger, where consumers are fooled into thinking they are dealing with a reputable retailer, when they have actually been manipulated into feeding private information to a system operated by a malicious party. Denial of service attacks are a minor risk for merchants, as are server and network outages.

Quality seals can be placed on the Shop webpage if it has undergone an independent assessment and meets all requirements of the company issuing the seal. The purpose of these seals is to increase the confidence of the online shoppers; the existence of many different seals, or seals unfamiliar to consumers, may foil this effort to a certain extent.

A number of resources offer advice on how consumers can protect themselves when using online retailer services.[22] These include:

- Sticking with known stores, or attempting to find independent consumer reviews of their experiences; also ensuring that there is comprehensive contact information on the website before using the service, and noting if the retailer has enrolled in industry oversight programs such as trustmark or trust seal.
- Ensuring that the retailer has an acceptable privacy policy posted. For example note if the retailer does not explicitly state that it will not share private information with others without consent.
- Ensuring that the vendor address is protected with SSL (see above) when entering credit card information. If it does the address on the credit card information entry screen will start with "HTTPS".

- Using strong passwords, without personal information. Another option is a "pass phrase," which might be something along the lines: "I shop 4 good a buy!!" These are difficult to hack, and provides a variety of upper, lower, and special characters and could be site specific and easy to remember.

Although the benefits of online shopping are considerable, when the process goes poorly it can create a thorny situation. A few problems that shoppers potentially face include identity theft, faulty products, and the accumulation of spyware. Most large online corporations are inventing new ways to make fraud more difficult, however, the criminals are constantly responding to these developments with new ways to manipulate the system. Even though these efforts are making it easier to protect yourself online, it is a constant fight to maintain the lead. It is advisable to be aware of the most current technology and scams out there to fully protect yourself and your finances.[23]

One of the hardest areas to deal with in online shopping is the delivery of the products. Most companies offer shipping insurance in case the product is lost or damaged; however, if the buyer opts not to purchase insurance on their products, they are generally out of luck. Some shipping companies will offer refunds or compensation for the damage, but it is up to their discretion if this will happen. It is important to realize that once the product leaves the hands of the seller, they have no responsibility (provided the product is what the buyer ordered and is in the specified condition).[23]

Privacy

Privacy of personal information is a significant issue for some consumers. Different legal jurisdictions have different laws concerning consumer privacy, and different levels of enforcement. Many consumers wish to avoid spam and telemarketing which could result from supplying contact information to an online merchant. In response, many merchants

promise not to use consumer information for these purposes, or provide a mechanism to opt-out of such contacts.

Brick-and-mortar stores also collect consumer information. Some ask for address and phone number at checkout, though consumers may refuse to provide it. Many larger stores use the address information encoded on consumers' credit cards (often without their knowledge) to add them to a catalog mailing list. This information is obviously not accessible to the merchant when paying in cash.

Product suitability

Category	U.S. online sales (2006)[24]
Apparel, accessories and footwear	$18.3 billion
Computer hardware and software	$17.2 billion
Autos and auto parts	$16.7 billion
Home furnishings	$10.0 billion
Total products sales (excluding travel)	$146.4 billion
Travel	$73.5 billion[25]

Many successful purely virtual companies deal with digital products, (including information storage, retrieval, and modification), music, movies, office supplies, education, communication, software, photography, and financial transactions. Examples of this type of company include: Google, eBay and Paypal. Other successful marketers use Drop shipping or affiliate marketing techniques to facilitate transactions of tangible goods without maintaining real inventory. Examples include numerous sellers on eBay.

Some non-digital products have been more successful than others for online stores. Profitable items often have a high value-to-weight ratio, they may involve embarrassing

purchases, they may typically go to people in remote locations, and they may have shut-ins as their typical purchasers. Items which can fit through a standard letterbox — such as music CDs, DVDs and books — are particularly suitable for a virtual marketer, and indeed Amazon.com, one of the few enduring dot-com companies, has historically concentrated on this field.

Products such as spare parts, both for consumer items like washing machines and for industrial equipment like centrifugal pumps, also seem good candidates for selling online. Retailers often need to order spare parts specially, since they typically do not stock them at consumer outlets -- in such cases, e-commerce solutions in spares do not compete with retail stores, only with other ordering systems. A factor for success in this niche can consist of providing customers with exact, reliable information about which part number their particular version of a product needs, for example by providing parts lists keyed by serial number.

Products less suitable for e-commerce include products that have a low value-to-weight ratio, products that have a smell, taste, or touch component, products that need trial fittings — most notably clothing — and products where colour integrity appears important. Nonetheless, Tesco.com has had success delivering groceries in the UK, albeit that many of its goods are of a generic quality, and clothing sold through the internet is big business in the U.S. Also, the recycling program Cheapcycle sells goods over the internet, but avoids the low value-to-weight ratio problem by creating different groups for various regions, so that shipping costs remain low.

Aggregation

High-volume websites, such as Yahoo!, Amazon.com and eBay, offer hosting services for online stores to small retailers. These stores are presented within an integrated

navigation framework. Collections of online stores are sometimes known as virtual shopping malls or online marketplaces.

Become.com is a product price comparison service and discovery shopping search engine with a mission to help shoppers make ideal buying decisions. Dulance was a price engine that specialized in searching for hard-to-find products often sold by small independent online retailers ("The Long Tail").

See also

- Bricks and clicks business model
- Electronic business
- Electronic commerce
- Open catalogue
- Retail therapy
- Online shopping rewards
- Value Shopping

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Categories: Electronic commerce | Online retailers

Appendix B: Encyclopedia Article: Safe and secure practices (Study 1, Reputation/Engagement)

Safe and Secure Practices

From Wikipedia, the free encyclopedia

There are some best practices from passwords, backing up your data, filtering your email and more that you should incorporate into how you manage you home computing environment.

At times, protecting yourself and your computer may seem daunting. However, the vast majority of security tools that you need can be set to protect automatically. In addition, much like looking both ways before crossing the street, safe Internet behaviors will quickly become second nature to you.

We all use the Internet for a variety of tasks from emailing to online shopping to social networking. In addition, we access the Web through a variety of means whether it is from a desktop computer, laptop computer or a mobile phone.

No matter how you access or use the Internet, the NCSA has put together a variety of safe and secure practices for you to easily employ to ensure a safe and productive online experience.

Back Up Your Files and Data

Even a secure computer can fail, causing you to lose all of your documents, family photos, music and anything else you've stored electronically. If you follow a few simple

tips, and make it a habit to make regular backup copies of all critical information on your computer, you can protect yourself from the worst sort of computer disasters.

How to back up your computer:

There are several tools you can use to back up your computer. They vary widely in price, size and ease of use. Some tools, like external hard drives, may provide instructions for how to back up files. In most cases, copying files is as easy as finding the information you want to back up on your computer and copying it onto the media or drive you're using.

Backup devices/tools include:

- Recordable CDs - CDs are inexpensive, but are slow to copy and offer limited storage capacity. They're useful for home users with little information to backup (people without large music and digital photo libraries, for instance).
- Recordable DVDs - DVDs provide substantially more storage capacity than CDs but are also slower than other backup methods. And, some older computers may not be equipped to save files to DVD. You have to check if your computer has a DVD drive.
- USB Flash Drives - Flash drives - sometimes called "thumb" drives after their size - are small, fast and readily transportable. On the downside, they're expensive compared to CDs and DVDs and have relatively little storage capacity. They're great from moving documents from one computer to another, but not the best backup solution, especially for large files -- like music and photos.
- External Hard Drives - External hard drives are the most expensive, but also the most effective backup tool. They typically boast huge storage capacity, and allow for extremely rapid copying of files. They allow for easy overwriting of previous backups, and fast recovery of stored information.

Backup Tips:

- Make backups a regular habit. Depending on how much you use your computer (and how many new files you create in a given week) it's a good idea to set a regular time (weekly, biweekly, monthly) to make your backups.
- If possible, store your backup device in a different place than where you keep your computer. This will help to protect your data against loss from theft and natural disasters.
- Keep your important files in one place on your computer -- a specific folder perhaps -- to make for easier backups.
- Use your computer's backup tools. Most operating systems now provide backup software designed to make the process easier.

Choosing Safe Passwords

Your passwords are the equivalent of the lock and key to your house on the Internet. Using easy to decipher passwords is akin to hanging the key to your house outside of your door so anyone coming along can use it. Passwords are a major defense and developing good password practices will help keep your sensitive personal information and identity more secure. Below are some suggestions for developing better passwords:

- Passwords should have at least eight characters and include upper case (capital letters) and lowercase letters, numerals and symbols.
- Avoid common words: some hackers use programs that try every word in the dictionary.
- Don't use personal information—name, children's name, birthdates, etc. that someone might already know or easily obtain.
- Change passwords regularly—at least every 90 days. If you believe you system has been compromised change passwords immediately.

- Use different passwords for each online account you access (or at least a variety of passwords).
- If you must write down passwords, under no circumstances should you store them in a document on your computer. Keep them in a secure location away from your computer.

One reason people pick passwords that are too easy is because they think they are going to forget them. One way to create a strong easy to remember password is to think of a memorable phrase and use the first letters, upper case and lower case letters, numbers, and maybe an added twist to make it secure. For example, "Only you can prevent forest fires" could become: oYcp4estF

Increasingly, online service providers are implementing new tools to create secure access to accounts. Some involve additional levels of authentication. For example, some sites now offer a small device that attaches to a key chain that gives you a new numeric password every time you log on. Once that password has been used in can never be used again.

Beyond Passwords

Nowadays, a good password may not be enough, especially to protect your most sensitive information and accounts. You may want to look into what the experts call "two-factor" identification to protect your most sensitive information.

If you have an ATM card, you're already using "two-factor" authentication. All it means is that you need two things, something you have -- your ATM card -- and something you know -- your PIN number -- to get at your information.

Many vendors now offer tokens, smart cards, or even biometric scanners (that read thumb prints and other distinctive bodily markers) that can be used in conjunction with passwords to make your most sensitive information even more secure.

Ask your bank, credit card provider(s) and Internet service provider if they offer additional authentication tools for more sensitive transactions.

Email Filters

If you have an email account, you know why you need email filters.

Left unchecked, any email account will quickly become overloaded with junk, some which will contain dangerous viruses and scams. The good news is that any good email program now contains a lot of options for filtering out the stuff you don't want. Learn how to use those tools properly to make your email experience faster, safer and a lot simpler.

The first thing to do is to enable a junk email (or "spam") filter. Most email programs and online services come with one of these installed. In many cases these are set to "on" by default, but if they're not, you can easily activate by finding your filtering preferences tab, or using your program's "help" tool.

Some junk mail filters -- like the one that comes with Microsoft Outlook -- have multiple junk mail settings. At the highest level these will filter out virtually everything you don't want. Just be aware that at the highest settings, spam filters can sometimes trap emails you want to receive. If you have your junk mail settings cranked up, make sure to take an occasional peek at your junk mail folder.

The next level of email filtering is to block all email from specific addresses. This works differently in different programs, but in Microsoft Outlook, for instance, you just select the message from the sender you wish to block by clicking on it, select "block sender" from the "message" pull-down window then click "yes" and "ok."

IMPORTANT NOTE: No email filter is perfect, so you still want to treat every message you get -- even the ones that appear to come from companies you do business with -- with a certain degree of caution.

WiFi Hotspots

Wireless or "WiFi" Internet hotspots provide convenience and flexibility for Internet users. As WiFi hotspots and notebook computers have become prevalent, it's easy to work where you want, when you want. As with all technologies, WiFi hotspots come with risks. If you follow the appropriate precautions, you can take advantage of all the benefits of WiFi, while limiting your exposure to danger.

Public Wireless Hot Spots

The most convenient wireless services -- free hotspots offered by coffee shops, schools, libraries, etc. -- carry the greatest risks. Many hotspots are completely open, or protected by a common password that you get for the price of a cup of coffee. Clever scammers using the network can intercept messages as you send and receive information. If you're connecting to email or e-commerce sites, you may be transmitting passwords that can be snatched out of the ether by a nearby crook.

If you're going to use a public WiFi hotspot, make sure your security tools (anti-virus, anti-spyware and particularly firewall are up-to-date and active. Most firewalls can be

used to secure your wireless connections, but you have to check the settings. You may want to avoid conducting sensitive transactions over public wireless networks.

Setting Up Your Own Wireless Network

One of the best ways to take advantage of wireless access, while maintaining strong security is to set up your own WiFi hot spot using your high-speed Internet connection. Many ISPs offer wireless routers as an add-on, and you can buy wireless routers that are easy to set up. Once you set up your network, you can restrict access by requiring a password key and increase your protection level further by:

- Change your default passwords. Many wireless devices come pre-configured with simple administrator passwords to help in setup. Change your password to something unique and hard-to-guess.
- Encrypt the data on your network. US-CERT has more information on how to encrypt your data.
- Make sure your firewall is running. Your firewall is your first line of defense against wireless and wired intrusions. Check the firewall section and make sure your software and settings are up-to-date.

Keep Your Laptop Safe

Keeping Laptops from Getting Lost or Stolen

A laptop computer defines convenience and mobility. It enables you to work from home, a hotel room, a conference hall, or a coffee shop.

Maybe you've taken steps to secure the data on your laptop: You've installed a firewall. You update your antivirus software. You protect your information with a strong password. You encrypt your data, and you're too smart to fall for those emails that ask for your personal information. But what about the laptop itself?

A minor distraction is all it takes for your laptop to vanish. If it does, you may lose more than an expensive piece of hardware. The fact is, if your data protections aren't up to par, that sensitive and valuable information in your laptop may be a magnet for an identity thief.

Chances are you've heard stories about stolen laptops on the news or from friends and colleagues. No one thinks their laptop will be stolen—at least not until they find the trunk of their car broken into, notice that their laptop isn't waiting at the other side of airport security, or get a refill at the local java joint only to turn around and find their laptop gone.

NCSA suggests keeping these tips in mind when you take your laptop out and about:

Treat your laptop like cash. If you had a wad of money sitting out in a public place, would you turn your back on it—even for just a minute? Would you put it in checked luggage or leave it on the back seat of your car? Of course not! Keep a careful eye on your laptop just as you would a pile of cash.

Keep it locked. Whether you're using your laptop in the office, a hotel, or other public place, a security device can make it more difficult for someone to steal it. Use a laptop security cable: attach it to something immovable or to a heavy piece of furniture that's difficult to move, such as a table or a desk.

Keep it off the floor. No matter where you are in public—at a conference, a coffee shop, or a registration desk—avoid putting your laptop on the floor. If you must put it down, place it between your feet or at least up against your leg, so that you're aware of it.

Use a non-descript carrying case. Use a form fitting sleeve to protect the laptop and carry it in your briefcase, backpack or tote. If using something with a zipper, consider adding a small lock to the zipper to keep hands from easily reaching in to the bag.

Keep your passwords elsewhere. Remembering strong passwords or access numbers can be difficult. However, leaving either in a laptop carrying case or on your laptop is like leaving the keys in your car. There's no reason to make it easy for a thief to get to your personal or corporate information.

Password protect your system. Use startup passwords to prevent thieves from easily accessing your data. Make sure to choose a strong password that would not be easy to guess. Drawing a blank on what to use? Consider a favorite saying or line from a song and use the first letter of each word. Adding capital letters and/or numbers will help to strengthen the password even more.

Backup important data before traveling. No one wants to think about losing their data, but a few minutes spent backing up your files will protect you later.

Write it down. Make note of your laptop's serial number and keep it in a safe place. This will help the police to return it to you should it be recovered.

Mark it. Engrave your name and phone number on the laptop case or affix a permanent asset tag. These permanent forms of identification will help police to return the laptop to you if found and will make it just a little harder for thieves to sell your laptop to unsuspecting buyers.

Finally, if the worst does happen and your laptop is stolen, report it to local authorities immediately. If it was a business laptop, also notify your employer. You may also wish to review the Consumer Information section of the FTC website at www.ftc.gov for information about data breaches and identity theft.

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See also

- Authentication
- Authorization
- CERT
- Computer security model

- Cryptography
- Cyber security standards
- Data security
- Differentiated security
- Fault tolerance
- Firewalls
- Human-computer interaction (security)
- Identity management
- ISO/IEC 15408
- Internet privacy
- Network security
- Proactive Cyber Defence
- Penetration test
- Physical information security
- Physical security
- Security Architecture
- Separation of protection and security
- Wireless LAN Security

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Categories: Computer security | Electronic commerce | Secure communication | Computer network security | Security | Crime prevention | National security

Appendix C: Credibility Measures

Meyer's (1988) Five-Item Subset of the Gaziano-McGrath (1986) Credibility Scale

Please rate your perception of the credibility of the article by indicating your level of agreement with the following statements. Rank each item using the following scale:

—	—	—	—	—
Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

- This article can be trusted.
- This article is accurate.
- This article is fair.
- This article tells the whole story.
- This article is unbiased.

Additional Content-Valid Measures of Credibility (from Aumer-Ryan & Aumer-Ryan, 2008)

Please rate your perception of the credibility of the article by indicating your level of agreement with the following statements. Rank each item using the following scale:

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

- This article is relevant to the research topic.
- I would recommend this article to a friend who is interested in the topic.

Appendix D: Measures of Participant Engagement

Face-Valid Measures of Engagement

Please rate your overall experience reading the article. Rank each item using the following scale:

—	—	—	—	—
Very Disinterested	Disinterested	Neutral	Interested	Very Interested

- How interested were you in the research topic?
- Rank each item using the following scale: very uninvolved; uninvolved; neutral; involved; very involved.
- How involved were you when reading the article?
- Rank each item using the following scale: not knowledgeable; somewhat knowledgeable; adequately knowledgeable; very knowledgeable; expert knowledge.
- How knowledgeable were you about the research topic before reading the article?

Appendix E: Measures of Personality and Cognitive Style

Watson, Clark, & Tellegen's (1988) PANAS Measure of Affective State

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer next to that word. Indicate to what extent you have felt this during this study. Rank each item using the following scale:

Very Slightly or Not At All	A Little	Moderately	Quite a Bit	Extremely

- Interested
- Distressed
- Excited
- Upset
- Strong
- Guilty
- Scared
- Hostile
- Enthusiastic
- Proud
- Irritable
- Alert
- Ashamed
- Inspired
- Nervous
- Determined
- Attentive
- Jittery
- Active
- Afraid

Budner's (1962) Measure of Tolerance of Ambiguity

Please indicate the degree to which you agree or disagree with the following statements. Rank each item using the following scale:

Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

- An expert who doesn't come up with a definite answer probably doesn't know too much.
- There is really no such thing as a problem that can't be solved.
- A good job is one where what is to be done and how it is to be done are always clear.
- In the long run it is possible to get more done by tackling small, simple problems rather than large and complicated ones.
- What we are used to is always preferable to what is unfamiliar.
- A person who leads an even, regular life in which few surprises or unexpected happenings arise, really has a lot to be grateful for.
- I like parties where I know most of the people more than ones where all or most of the people are complete strangers.
- The sooner we all acquire similar values and ideals the better.
- I would like to live in a foreign country for a while.
- People who fit their lives to a schedule probably miss most of the joy of living.
- It is more fun to tackle a complicated problem than to solve a simple one.
- Often the most interesting and stimulating people are those who don't mind being different and original.
- People who insist upon a yes or no answer just don't know how complicated things really are.
- Many of our most important decisions are based upon insufficient information.
- Teachers or supervisors who hand out vague assignments give a chance for one to show initiative and originality.
- A good teacher is one who makes you wonder about your way of looking at things.

Schommer's (1989) Epistemological Questionnaire (EQ) (Subset)

Please indicate the degree to which you agree or disagree with the following statements. Rank each item using the following scale:

___	___	___	___	___	___
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

- Most words have one clear meaning.
- I don't like movies that don't have an ending.
- Scientists can ultimately get to the truth.
- An expert is someone who has a special gift in some area.

Ehrman & Leaver's (2003) Measure of Sharpener vs. Leveler Cognitive Style

Please indicate for each pair of items what you think you are like. If you feel strongly about one of the statements, mark the space nearest that phrase (labeled "most like this").

Most like this __ __ __ __ __ __ __ __ __ __ __ Most like this

I like to reduce differences and look for similarities.	I like to explore differences and disparities among things.
I notice mostly how things are similar.	I quickly notice differences, even fairly fine distinctions.
I tend not to remember small distinctions, such as those between similar-seeming words or symbols.	I have a good memory for fine distinctions such as those between similar-seeming words or symbols.

Eastin & LaRose's (2000) Measure of Internet Self-Efficacy

Please indicate the degree to which you agree or disagree with the following statements. Rank each item using the following scale:

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

I feel confident…:

- Understanding terms/words relating to Internet hardware.
- Understanding terms/words relating to Internet software.
- Describing functions of Internet hardware.
- Troubleshooting Internet problems.
- Explaining why a task will not run on the Internet.
- Using the Internet to gather data.
- Learning advanced skills within a specific Internet program.
- Turning to an online discussion group when help is needed.

Appendix F: Demographic Questionnaire

What is your gender?

- Female
- Male

In what year were you born?

_____

How often do you use social networking sites like Facebook or Myspace?

- Multiple times a day
- Every day
- Every week
- Every month
- I have never used a social networking site

How would you, as an individual, describe Wikipedia's reputation?

- Wikipedia's information is always useful and accurate
- Wikipedia's information is usually useful and accurate
- Wikipedia is only a good place to start research
- Wikipedia's information is rarely useful and accurate
- Wikipedia's information is never useful and accurate

How would you describe Wikipedia's reputation in the broader academic world?

- Wikipedia's information is always useful and accurate
- Wikipedia's information is usually useful and accurate
- Wikipedia is only a good place to start research
- Wikipedia's information is rarely useful and accurate
- Wikipedia's information is never useful and accurate

What is the highest level of education that you have completed?

- High School or equivalent
- Associate's Degree
- Bachelor's Degree
- Some graduate school, but no degree
- Graduate Degree

What type of Internet connection do you have for your home computer/other primary computer?

- Dial-up (56k or less)
- DSL (broadband)
- Cable modem (broadband)
- T1 or T3 line
- Other
- Not sure

Excluding email, how many hours per week do you spend on the Internet or World Wide Web?

_____

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Vita

Paul Richard Aumer-Ryan was born to Richard and Gayle Ryan on September 5, 1980, and spent his early years in Iowa and Minnesota. As a high school student at Jefferson High School, Paul traveled the country as a United States Academic Decathlon National Competitor and graduated as valedictorian in 1999. Paul studied English, Computer Science, Mathematics, and Philosophy at the University of Iowa, where he earned three degrees (B.A., B.S., B.S.) and graduated with highest distinction in 2003. Paul then moved to Honolulu, Hawai‘i, to pursue his love of sand, surf, mountains, and native literature. After working in Honolulu as a product engineer and founding a film and visual effects company, Paul decided to pursue a doctorate degree at the University of Texas at Austin in 2005, supported both by a grant from the Institute of Museum and Library Services (IMLS) and by teaching undergraduate students about the joys of information science. In his free time, Paul trains in Shotokan Karate, and enjoys swimming, surfing, wakeboarding, taking his dog out running, and bicycling everywhere.

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