The Effect of Linguistic Explicitness and English Language Proficiency on the Credibility of Online Medical Information

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Date 12-6-2011
Abstract

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Alexandra L. Bartell

Chair of the Supervisory Committee:
Professor Jan Spyridakis
Department of Human Centered Design & Engineering

Perceived credibility is important to consumers of online medical information because it frequently forms the basis for making treatment choices. While credibility is important to users around the globe, most medical Web sites have been designed primarily for audiences within specific cultural contexts. Many medical Web sites created by low-context Western institutions may lack the graphics or interactivity that users from high-context Eastern cultures expect, forcing these users to depend on the words of a site for meaning rather than the context of the communicative situation.

The Formality/Contextuality continuum model suggests that communicative situations with less context have a greater need for linguistic precision. Moreover, the preference for the level of explicitness has been shown to differ among nonnative users of a second language where those with less proficiency prefer more explicit communications and those with greater proficiency prefer more implicit communications.

This exploratory study analyzed the effect of linguistic explicitness in an experimental medical text on the credibility of 102 Japanese Internet users who had different levels of
English language proficiency. The participants were randomly assigned to one of two experimental conditions where they read a medical text with one of two levels of explicitness and then answered a survey designed to measure their credibility perceptions.

This study added to the theory and practical applications of credibility research by showing that style in the form of explicitness does affect the credibility judgments of online medical information for high-context readers. Participants found the explicit text significantly more credible than the implicit text; however, their English proficiency levels did not appear to affect their credibility perceptions. These results suggest that increasing the explicitness level by increasing the frequency of nouns, adjectives, prepositions, and articles may enrich the context of a text and fill in the communicative gap for nonnative English readers who come from high-context cultures, thus improving their credibility perceptions. More studies should be conducted with larger samples, different types of readers, and other communication media to ascertain how the credibility of online medical information can be enhanced by increasing the explicitness of texts and reducing extraneous cognitive load.
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Dedication

To my beloved parents, who gave me everything and more...

and to

Earl, my love

Curtis, my miracle

Jan, my inspiration
Chapter 1. Introduction

Wired consumers of the 21st century use the Internet in almost every facet of their lives to make online purchases, enjoy social networking opportunities, manage their finances, pursue degrees through distance education, and make important decisions based on the information they read. One of the areas where the web has become increasingly important to online consumers is the area of e-health; more and more people around the globe are turning to the Internet to seek advice on treatment options, research findings on medical diagnoses and treatments, solicit opinions about specific conditions from authoritative medical experts, and interact with people who have the same or similar conditions as themselves (Madden & Fox, 2006).

The Pew Internet and American Life Project (2010) estimates that 80% of Internet users have searched for health information on the Web. In the United States on an average day, more Americans seek health information on the Web than those who go to a health provider (Madden & Fox, 2006). The number of daily searches for online health information is now on par with other common online activities such as paying bills, blogging, or hunting for addresses or phone numbers (Fox, 2006). Many e-patients say the internet has had a significant impact on the way they care for themselves or for others.

Several factors likely contribute to the increase in online health information searches:

- Larger numbers of users (63%) now have high-speed, broadband Internet connections.
- More users now have six or more years of Internet experience (Fox, 2006).
- Information on the Internet is “free” and available 24 x 7.
• The often longer waiting times to get medical appointments and the pressure on many health professionals to push patients quickly through their appointments make alternate sources of medical information appealing.

Globally, the number of e-health consumers is astounding. In a 2003 study, Eysenbach and Kohler estimated that at least 6.75 million searches for health information were occurring every day worldwide. With the tremendous growth of Internet users over the last decade, those numbers are likely much larger today.

While the number of e-health consumers is increasing globally, cross-cultural research reveals similarities but also significant differences among health information seekers from different countries (Morahan-Martin, 2004). The differences range from the types of health Web sites accessed, searching patterns, and the frequency of searching for online health information, to the number of users who say the Web has a significant impact on how well they understand their health problems and the probability that they would buy prescription medication on the Web without consulting a doctor (Taylor & Leitman, 2002a; Taylor & Leitman, 2002b).

Credibility of Online Medical Information

While online health searching behaviors may differ among cultures, one quality that is of interest to all cultures is the perceived credibility of online health information, an information factor that is especially important because people make treatment choices based on such perceptions. This is particularly relevant for people who have a vested interest in the information (for example, those who have a specific condition like cancer or heart disease or those who know a friend or relative with a medical condition).

Many factors have been found to affect the credibility of online medical information; however, no studies have looked at how language proficiency, communication styles, or a
combination of these two factors might affect credibility judgments for audiences from
different cultures. Fogg (2003) contends that culture plays a part in credibility judgments;
however, to date little research has identified what cultural factors play a role.

The Influence of Socio-Cultural Contexts on Credibility

People from different cultures around the globe are accessing medical information
from Web sites that have been designed primarily for audiences within a specific cultural
context.¹ If the Internet can be viewed as a communication medium within varied social
contexts, the importance of meanings and messages becomes as important as the accuracy
of health information content (Cline & Haynes, 2001).

In fact, the way messages are framed has been shown to influence how people
perceive risk information—for example, information that may point to a possible diagnosis of
a serious illness—and the style of the message has been shown to affect people differently
depending on their cognitive styles (Edwards et al., 2001). “Cognitive style” is a cognitive
psychology concept that identifies the ways people process thoughts, perceptions, and
memories as well as their inclinations for using these mechanisms to handle situations.
Recent research indicates that cognitive processes are influenced and molded by cultural
contexts (Nisbett & Miyamoto, 2005). This research suggests that people from different
cultures may process information on the Internet differently depending upon their cultural
background—even if they are using a common language to access the Internet.

While Web sites worldwide now include a large number of languages, globalization
has contributed to the increased use of English as a common language² in international

¹ This study uses the Ruhnke et al., (2000) definition of culture as a “set of learned values, beliefs,
customs, and behaviors that are shared by a group of interacting individuals.”

² The term “common language,” attributed to G. Poncini (2004), is used in this study rather than the
more common term “lingua franca” because it refers to both native and nonnative speakers of a
language. Lingua franca commonly refers only to nonnative speakers.
business, academia, and education (Crystal, 2003; House, 2002). In its estimates of the top ten languages used on the Internet, Internet World Stats lists English in the top position (2009).

Currently 53% of international students learn in English (Graddol, 2006). In fact, within the next 10 – 15 years, Graddol (2006) predicts that about 2 billion people will be learning English. In spite of this growing trend, research has shown that people using English as a common language still carry their cultural values when communicating in English (Meierkord, 2002), which means that language must somehow communicate medical information credibly to multicultural audiences. Given the global prevalence of online medical information and the use of the English language worldwide, it is possible that people from different cultures may perceive the credibility of English e-health Web sites differently depending on their culturally-mediated communication styles.

This study examines how the explicitness of a message and English language proficiency might affect nonnative English readers’ credibility judgments of online medical information. The study’s design is informed by prior research on the communication styles preferred by different cultures, the ways in which people process information to make credibility judgments, how cognitive load affects information processing, and how the explicitness level of a message might affect the comprehension and credibility of online medical information. The next sections review the relevant theories and prior research that inform this study, describe the methods, discuss the results and conclusions, and provide suggestions for future studies.
Chapter 2. Literature Review

Researchers in intercultural communication have developed various theories and paradigms to explain the attitudinal and behavioral ways in which cultures differ from each other. The theoretical framework for this study was based on four theories that informed the research. The first theory is Edward T. Hall’s high-context/low-context cultural dimensions of interaction, an extensively cited and tested theory about the ways in which different cultures prefer to communicate. Second, the Formality/Contextuality Continuum Model provides a way to understand, quantify, and analyze linguistic explicitness. Third, the Elaboration Likelihood Model (ELM) is a scaffold that can aid in understanding the levels of cognitive processes readers use to make credibility judgments about information and how those processes are affected by culturally-mediated communication styles. And last, Cognitive Load Theory provides a way to understand how the disorientation and multitasking demands of online environments can affect comprehension and perhaps influence the credibility of users with the added cognitive burdens required to process information in a second language.

Cultural Dimensions of Communication

High-Context/Low-context Theory

Edward T. Hall, a well-known anthropologist, is widely considered to be the founder of intercultural communication theory. Perhaps Hall's most researched construct is his high-context/low-context continuum of cultural orientation that defines how people interact—one aspect being communication styles (1981). Communication styles in low-context cultures are generally explicit with the message embedded in the language of the communicator, whereas high-context communication is implicit and dependent on the
beliefs, body language, the use of silence, and the situational variables of the interlocutors (Gudykunst & Nishida, 1986; Hall, 1981; Infante, Rancer, & Womack, 1997; Keegan, 1989; Wurtz, 2006). Low-context communication, then, focuses on what is said and high-context communication focuses on how it is said (italics added) (Onkvisit & Shaw, 1993).

The how factor of high-context communication, then, is dependent on the many nuances available with face-to-face communication. This type of communication is considered “rich” in the sense that multiple nonverbal channels such as tone and body language are used (Morand, 2003; Webster & Trevino, 1995). In contrast, electronic forms of communication are considered “lean” because face-to-face communicative modalities are absent and there is more reliance on language only (Morand, 2003). Social attributes such as power and social status are not easily conveyed in “lean” media that do not have visual or other nonverbal cues (Sproull & Kiesler, 1986).

**Comparative Studies of Low-Context/High-Context Web Sites**

Not surprisingly, the growth of the internet has taken place mostly in low-context cultures (Wurtz, 2006). However, with the global spread of the Internet over the last decade, high-context cultures are designing Web sites that provide contextual information more in keeping with their particular communication styles. A cross-cultural comparison of high-context and low-context Web sites by Wurtz (2006) showed that the communication of visual information and the use of animations as a means of providing context were more

---

3 It is important to note that Hall's characterizations of culture are not without critics. One of the criticisms of his work lies with his concept of “culture,” which he presumes is identified with nation-states and which does not account for the heterogeneity of populations in some countries such as the United States, which has long been referred to as a “melting pot” of different ethnic groups (Ess & Sudweeks, 2006; Ferraro, 1990). While culture is arguably too complicated a concept to reduce into categorical dimensions, high- and low-context communication have been shown to exist in every culture and one or the other generally dominates (Gudykunst & Nishida, 1986). These constructs, therefore, provide a useful way to understand cultures from a high-level, “broad brush stroke” perspective.
prevalent on the Web sites of high-context cultures; Web sites of low-context cultures placed less emphasis on graphics and more emphasis on words.

While culturally-situated Web sites target a slice of the cultural pie, sites that hope to appeal to multicultural audiences must find ways to communicate their material in ways that multiple cultures find acceptable.

Relationship of Explicitness to Communication Contexts

The Formality/Contextuality Continuum Model

While Edward Hall's cultural constructs of communication can be used to understand the communication preferences of different cultures, they do not explain how the constraints of communication media that are slanted toward one culture or another might influence the credibility of online medical information. Medical Web sites created by low-context Western institutions may not contain the graphics or interactivity that users from high-context Eastern cultures expect. Thus, users from these cultures may be forced to depend on the words of a Web site for meaning rather than the context of the communicative situation. The syntax and semantics form the overall conceptual style that characterizes the message of the site.

There are various dimensions of style, which include:

- The use of figurative language
- Diction
- Tone
- The use of active versus passive voice
- The use of first, second, or third person

One aspect of style that figures prominently in cultural communication styles is formality. The concept of formality is widely used by disciplines such as ethnography and
linguistics but a universally-accepted definition does not exist. However, the literature points to three general categories of formality (Irvine, 2001) as shown in Table 1.

**Table 1. Types of Formality (Irvine, 2001)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>The properties of the language used for communication.</td>
<td>The degree of code restructuring that involves elements such as syntax, intonational patterns, and linguistic organization.</td>
</tr>
<tr>
<td>Situational Context</td>
<td>The socio-cultural situation in which language is used. This kind of formality may be based on social hierarchies where distance and intimacy are predicated on social position.</td>
<td>Some languages have formal and informal ways of addressing others depending on whether the interlocutor is considered lower or higher in social status than the recipient. In French, for example, a young person would address an older person with the more formal &quot;vous&quot; rather than the more informal &quot;tu.&quot;</td>
</tr>
<tr>
<td>Genre</td>
<td>Technical descriptions with a high degree of explicitness and linguistic precision.</td>
<td>Scientific, government, and legal texts.</td>
</tr>
</tbody>
</table>

The "Language" category in Table 1 refers to the kind of _explicitness_ that explains language-based communication as accurately as possible in order to reduce ambiguity and misunderstanding (Cummins & Swain, 1986). This type of formality is not to be confused with the kind of formality often associated with politeness, which can variously entail the use of "formal" or prescribed words for socio-cultural rituals, a show of respect or courtesy, or the saving of "face" in social situations that Brown and Levinson (1978) conceptualized in their theory of Politeness. This type of formality derives from the message content itself rather than the social situation in which the message was produced.
A theory that quantifies this kind of linguistic explicitness is the Formality/Contextuality continuum model developed by Heylighen and Dewaele (1999), which suggests that language explicitness inversely relates to implicitness. In other words, the lower the implicitness of a communicative situation, the more the need for linguistic precision. Conversely, when implicitness is high, there is less need for explicit language to disambiguate meaning.

This theoretical model has its roots in Edward T. Hall's low-context/high-context concept of situational variables in communication. However, while Hall's observations are based mostly on anecdotal observations and experiences, Heylighen and Dewaele (1999) have developed and tested an empirical measure of explicitness (the F-measure) that uses the following formula:

\[
F = \frac{\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100}{2}
\]

The frequencies in the Heylighen and Dewaele formula are the percentage of words from each of these categories in relation to the total number of words in a text. Subtracting the total frequencies of implicit words from the total frequencies of explicit words, and normalizing the sum to 100, yields an empirical measure of explicitness that ranges from 0 to 100%.
Research using this formula has shown that the higher the $F$ score, the higher the level of explicitness (Dewaele, 2008; Heylighen & Dewaele, 2002). In an interesting juxtaposition, Heylighen and Dewaele (2002) applied their $F$-measure to Richard Hudson's (1994) categorization of word types in various communication genres (see Table 2\textsuperscript{4}). Informational writing—the category most closely related to informational Web sites in general and health Web sites in particular—scored the highest in explicitness ($F = 61$). While these data are obviously a generalization, the score can still be useful in establishing a reference framework or baseline with which to judge where text of online health Web sites might fall within the Formality/Contextuality Continuum Model.

\textsuperscript{4} Hudson's original categorizations (from which Table 2 is derived) includes three types of writing: informational writing, imaginative writing, and writing. It is assumed that the "writing" category must include other types of writing than imaginative or informational. Yet these categories do appear to have some overlap as they are listed.
Table 2. Explicitness Scores for English-Language Communication Genres (Hudson, 1994)

<table>
<thead>
<tr>
<th>Communication Genre</th>
<th>Explicit (% of total)</th>
<th>Implicit (% of total)</th>
<th>Explicitness Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nouns</td>
<td>Prepositions</td>
<td>Adjectives</td>
</tr>
<tr>
<td>Phone conversations</td>
<td>14</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Conversations</td>
<td>15</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Spontaneous Speeches</td>
<td>18</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Interviews</td>
<td>18</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Imaginative Writing</td>
<td>22</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Prepared Speeches</td>
<td>21</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Broadcasts</td>
<td>24</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Writing</td>
<td>28</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Informational Writing</td>
<td>30</td>
<td>13</td>
<td>8</td>
</tr>
</tbody>
</table>
The theoretical underpinning of the F (formality) formula is based on the categorization of words into two categories: explicit and implicit.\(^5\) This categorization is based on the linguistics concept of *deixis* where some types of words need context in the form of other spatial, temporal, or communicative information for meaning (Heylighen & Dewaele, 1999). The explicit category includes nouns, adjectives, prepositions, and articles. These parts of speech are non-deitic words because they are relatively invariant and retain their meaning regardless of context; for example, words such as red, woman, or tree. (Heylighen & Dewaele, 1999, 2002). The implicit category, on the other hand, includes pronouns, verbs, adverbs, and interjections. These parts of speech are deitic words because they have variable meanings depending on their context (Heylighen & Dewaele, 1999, 2002). Levelt (1989, p. 45) grouped deitic words into three categories: spatial words that have to be connected to a specific place (e.g., outside, indoors), temporal words that must be attached to a specific time (e.g., after, before, intermittently), and communicative or discourse types of words (e.g., however, therefore). The discourse category includes anaphoric references; in other words, references to things that have happened previously. Conjunctions have not been shown to have any reference either to an implied context or to an explicit object, so they are not classified as deitic or non-deitic and are therefore, not displayed or counted in the \(F\)-formula (Heylighen & Dewaele, 2002).

To calculate deixis in the most precise way possible, an average degree of deixis would need to be assigned to all of the words in a language (Leckie-Tarry, 1995). However, this kind of calculation would be extremely time-consuming and complex and would have to be performed for every language (Heylighen & Dewaele, 1999). Heylighen and Dewaele's formula might seem very mechanistic in that parts of speech are forced into categories by definition and not by context. While both researchers acknowledge that their \(F\)-formula is

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\(^5\) While Heylighen and Dewaele use the terms “formal” and “contextual,” this study uses the terms “explicit” and “implicit” to distinguish linguistic formality from situational or social formality.
less precise than Leckie-Tarry's concept, it is more practical because it does not require the enormous investment in time and effort. Their main purpose in proposing this formula is to strike a balance between validity and practicality with two objectives

- The formula should not be difficult to apply to large bodies of data without needing particular rules for dealing with all the nuances and exceptions of a language or situation.
- The formula should be able to clearly differentiate explicit from implicit text in a general sense.

One of the main advantages of Heylighen and Dewaele's (1999) formula is that it is not dependent on language. Research over the last three decades suggests that the explicitness/implicitness dimension seems to be a universal characteristic that differentiates styles and genres in different languages (Dewaele, 1995; Dewaele, 1996; Heylighen & Dewaele, 2002). Heylighen and Dewaele's studies of $F$ scores in English, French, Italian, and Dutch are supported by similar previous studies applied to Somali, Korean, and even Nukulaelae Tuvaluan—a rare language spoken on a tiny Polynesian island by only several hundred people (Besnier, 1988; Biber, 1988; Biber, Conrad, & Reppen, 1994; Bieber & Hared, 1992; Kim & Biber, 1995). Seven languages in four distinct language families have been empirically shown to share the explicitness/implicitness dimension conceptualized by Heylighen and Dewaele.

Interestingly, the preference for level of explicitness has been shown to differ among nonnative users of a second language: those with less language proficiency use explicit communications and those with greater language proficiency use more implicit communications (Dewaele, 2008). These preferences may be due to several factors. First, interlanguage\textsuperscript{\textsuperscript{6}} users with lower proficiency may gravitate toward more explicit forms of

\textsuperscript{6} Interlanguage refers to the linguistic system learners of a second language use to acquire the targeted norms of a second language (Davies, 1989; Dewaele, 2008; Palmberg, 1977; Tarone, 1983).
communication because their grasp of implicit styles is not yet routine. Second, these users may be afraid of misunderstanding a communication because of their lack of proficiency in the second language, thus preferring more explicit styles that disambiguate meaning (Dewaele, 2008).

It is already well-known that e-health consumers make treatment decisions based on the information they read online, so it is logical, then, to assume that such readers might make misinformed decisions with online medical information that they do not fully comprehend because the information is ambiguous (Keselman et al. 2008).

Cognitive Processes Involved in Credibility Judgments

**Elaboration Likelihood Model Theory**

Because the structure of explicit language is more complex, it demands a higher level of cognitive resources to process than language that is less explicit (Dewaele, 2008; Heylighen & Dewaele, 2002). This suggests that interlanguage users with lower levels of language proficiency may need to use a more conscious way of analyzing the meaning of medical information to make a judgment about its credibility.

A helpful framework to understand the cognitive processes that readers use to make credibility judgments about information is the Elaboration Likelihood Model (ELM) theory of persuasion originated by Petty and Cacioppo (1986), which states that readers use two kinds of cognitive processing for evaluating credibility. The first type is termed the central route, in which readers deliberately analyze the message of a text to judge its credibility. The second type is termed the peripheral route and involves the use of cues that are extrinsic to the reader. In the case of Web sites, such cues might include Web design features such as contact or source information.
A number of researchers have empirically tested ELM theory in the realm of online health information (Morahan-Martin, 2004). However, most of these studies have focused on peripheral processing rather than central route processing.

The Concept of Credibility

Before delving into credibility research specific to online health information, it is useful to define what credibility means in the context of online environments. Credibility, as defined by Fogg and Seng (1999), is synonymous with "believability;" that is, credible information is believable information. Fogg and Tseng further characterize their concept of credibility as:

- A quality that is perceived by individuals. In terms of Web sites, it is not a tangible part of a Web site such as the number of links or words on a page.
- A construct that comprises two components: expertise and trustworthiness.

Expertise refers to the users' perception of the source's knowledge or credentials; trustworthiness is the user's assessment of the source's truthfulness, good intentions, and objectivity.

Individuals generally use both of these components to make their ultimate credibility judgments (Fogg & Tseng, 1999).

While credibility and believability are synonymous terms, it is important to realize that the terms credibility and trust are not (Fogg & Tseng, 1999). Trust suggests a perception of dependability or assurance about a process, object, or person (Remple, Holmes, & Zanna, 1985; Rotter, 1980).

Fogg and Tseng (1999) suggest that credibility is important in human computer interactions when computer products function as sources of knowledge or help in making decisions—both of which apply to online health sites.

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7 While this study uses the definition of credibility proposed by Fogg and Seng, other researchers use the terms "trust" and "credibility" interchangeably. The term "trust"—as used by other researchers—is assumed to refer to credibility in this study when it aligns with Fogg and Seng's definition of credibility.
Credibility Research for the World Wide Web

The Persuasive Technology Lab (PST) at Stanford University has conducted several large-scale studies about credibility on the Web. In one study with 1,400 participants, they discovered that five elements increase the perception of credibility:

- Degree to which a site mimics the "real-world" nature of the organization it represents.
- Ease of use in terms of navigation and organization.
- Expertise as evidenced by the inclusion of citations, references, and author credentials.
- Trustworthiness by featuring site content policies and links to outside resources and materials.
- Customization and personalization of users’ experiences on the site.

Conversely, elements that damage credibility are commercial ads, source information not cited, the exclusion of the last modified date, poor design, and the lack of a seal of approval from a reputable third party (Fogg et al. 2001; Fogg et al. 2000; Madden & Fox, 2006). Poor design appears to be one of the strongest influences on credibility evaluations. In a study involving 2,684 participants, Fogg et al. (2003) discovered that almost half of them commented that the look-and-feel of a Web site influenced their credibility judgments of a site more than other factors.

While a significant amount of research has been conducted about credibility on the Web in general, researchers have discovered that credibility can also be "field-specific" (Stanford et al. 2002). In other words, the user criteria for credibility may vary with different kinds of Web sites (e.g., health, commercial, finance). These differences in credibility criteria

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8 The credibility studies conducted by Fogg et al. did not use real web sites to test their participants' credibility ratings. Their research method consisted of questionnaires about variables that could affect credibility based on a compilation of user interviews and experts' opinions.
make sense when one considers that a user's motivation and investment in credible online health information about a serious health challenge are likely very different than those involved in shopping online for a refrigerator.

**Credibility Research for Online Health Web Sites**

To date, most research about credibility for online health Web sites has focused on variables that affect the peripheral processing route. In a study investigating whether the inclusion of contact information on health Web sites had an effect on credibility, Freeman and Spyridakis (2008) discovered that the presence of a "Contact Us" link was processed by most participants as a peripheral cue rather than one requiring central processing. Freeman and Spyridakis (2004) also discovered that participants visiting external links used the central processing route; the presence of a street address triggered both kinds of processing.

These studies and several others have identified several factors that appear to influence the degree to which users find a medical information Web site credible:

- Visual characteristics (i.e., the “look and feel”) such as a site’s layout, design, and absence of mistakes.
- The presence of recognized brand names or icons that indicate a “seal of approval” by a trusted authority.
- The perceived quality of information.
- The degree to which the information appears to be tailored to individual users (Sillence et al. 2007).

While researchers agree that these factors play a role in user trust, they disagree on the level of importance each of them plays in promoting trust (Sillence et al. 2007). Sillence et al. (2007) propose a model of trust that takes into account the various stages of trust that occur over time and the different types of cognitive processing strategies users employ to
assess the trustworthiness of a Web site. Other research studies have been conducted using a two-level model that suggests that users who are not motivated or who lack time fall back on heuristics or rules-of-thumb that involve minimal cognitive exertion, while those who are very motivated because of high risk or engagement use more purposeful and deeper cognitive processing (McAllister, 1995; Petty & Wegener, 1999; Sillence, Briggs, Harris, & Fishwick, 2007).

In fact, people with high motivation or involvement toward a message have been found to use this systematic processing strategy while people with low motivation employ less complicated heuristics (Chaiken, 1980). This kind of deliberate evaluation is suggestive of the central route processing proposed in ELM theory and makes sense in the case of online health sites where readers can be very vested in the information—particularly in situations involving serious or life-threatening medical conditions to either themselves or their loved ones.

In addition to motivation, several other perceptions and characteristics can affect readers' perceptions of credibility:

- The level of interest readers have in the text they are reading. Studies show that readers are better able to understand and remember information when the topic is interesting to them (Asher, 1980; Baldwin, Peleg-Bruckner, & McClintock, 1985; Isakson & Spyridakis, 1999; Stevens, 1980).
- Reader perception of a text's level of difficulty. The more difficult a text is perceived to be, the greater the cognitive load (Petros, Bentz, Hammes, & Zehr, 1990).
- Existing knowledge. Readers may assess the credibility of medical information with information they already possess about a topic (Fox & Rainie, 2002).
- Relevance on a personal level. Readers who have experienced their own health difficulties or who have loved ones with health troubles find information on these topics highly relevant (Fox & Fallows, 2003; Fox & Rainie, 2002).
Demographic variables have also been found to affect credibility perceptions:

- **Age.** Some research indicates that older people are less likely to judge online information as credible than younger people (Finberg, Stone, & Lynch, 2002; Johnson & Kaye, 1998).

- **Experience using the Internet.** Users with less Internet experience are less likely to find online information credible than users who have more experience (Flanagin & Metzger, 2000).

Cognitive Load in Online Environments

**Cognitive Load Theory**

In addition to understanding how cultures differ in their communication styles and patterns of interaction, it is also necessary to understand the cognitive processes readers use to make credibility judgments about information. Cognitive Load Theory provides a framework for understanding how the additional cognitive demands of online hypertext environments—combined with the extra processing effort required to read content in a second language—might affect how users perceive the credibility of e-health information.

The origin of Cognitive Load Theory has been attributed to George Miller (1956) who suggested that human working memory\(^9\) is limited by the number of items an individual can process. The theory was further developed by John Sweller (1988) and others who characterized cognitive load as three distinct categories:

- **Intrinsic cognitive load (ICL)** - Cognitive load attributed to the inherent nature of the information (Pollack, Chandler, & Sweller, 2002).

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\(^9\) Working memory is the supervisory function of short-term memory that manages the retrieval, processing, and removal of information. Working or short-term memory is also synonymous with immediate memory.
• **Extraneous cognitive load (ECL)** - Cognitive load caused by an ineffective design or presentation of the information rather than the nature of the information itself (Pollack, Chandler, & Sweller, 2002).

• **Germaine cognitive load (GCL)** - Cognitive load that happens when short-term or working memory is freed up for more extensive schema building related to the tasks at hand (Sweller, Merrienboer, & Paas, 1998).

**The Effects of Cognitive Load in Online Environments**

Cognitive Load Theory was originally developed as a framework for understanding the way learners solve problems. While the theory has typically been applied to classroom-type learning, readers who are searching for information about a medical condition online can also be considered to be learners because they are "reading to learn" about symptoms, treatment options, and other relevant information (Bartell, Schultz, & Spyridakis, 2006). These readers are thus subject to the cognitive resource limitations posited in Cognitive Load Theory, especially the additional external cognitive load imposed by the competing demands of navigation and other interactive elements found in hypertext environments. These elements—which are absent in printed material—impose higher cognitive loads on readers' attention, recall, and comprehension.

In addition to the additional external cognitive load of hypertext environments, learners of a second language must also contend with intrinsic cognitive load—the nature and composition of the message itself. Pollack, Chandler, and Sweller (2002) discovered that the more complex the information, the higher the intrinsic cognitive load. They define complexity as *element interactivity*. An element is a piece of information that a learner can process as

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10 Online readers who are searching informational web sites are generally "reading to do" or "reading to learn" (Sticht, 1985; Redish, 1989). Readers engaged in "reading to do" are gathering information in order to accomplish a task, for example, reading instructions on how to download a piece of software. Readers engaged in "reading to learn" are gathering information in order to comprehend it and store it for later use.
one item in short-term memory. The more elements that need to be processed at the same time, the higher the element interactivity and the higher the intrinsic cognitive load.

Pollok et al. (2002) use the learning of language as an example to illustrate the distinction between low and high interactivity. Learning new vocabulary words (each a single element) represents a low interactivity situation because they can be learned on their own without relation to other elements. Thus, learners experience low intrinsic cognitive load because short-term memory has to process only a few items at a time. On the other hand, information that requires a significant knowledge of syntax involves a high interactivity level because each element derives its meaning from its relationship to other elements within a specific context. In contrast to low interactivity situations, many elements must be processed at the same time which results in a higher intrinsic cognitive load.

To deal with situations that involve high intrinsic cognitive load, human cognitive infrastructures build schemata. Schemata are cognitive mechanisms that allow people to structure and organize information into knowledge for long-term storage and recall. This kind of conceptual structuring performs two important functions: it lessens the load on short-term memory by allowing the mind to tune out irrelevant information and it also enables the transfer of knowledge from one situation to others (Rumelhart, 1980; Thorndyke & Hayes-Roth, 1977).

One way of mitigating the effects of high element interactivity is by becoming an “expert” in a particular domain of knowledge. Becoming such an expert depends on the breadth of the accrued schemata and the amount of information that can be applied to average situations in a particular knowledge domain (Chi, Glasser, & Rees, 1982; Larkin, McDermott, Simon, & Simon, 1980; Sweller, Mawer, & Ward, 1983). This kind of expertise minimizes element interactivity by integrating the elements into an individual schema, which lessens the burden on short-term memory.
A group of people who are particularly sensitive to high element interactivity are individuals who are learning a second language (L2). With L2 learners who have not acquired the expertise of native readers (L1), language style is likely an important factor in the way that information is processed in a second language. If the material is written in a manner such that the message is ambiguous, the element interactivity of the message will probably be higher since multiple meanings have to be processed. Dewaele’s (2008) research supports this concept by suggesting that L2 learners with lower levels of proficiency may not yet have acquired the automated schemata for language production and comprehension that more proficient L2 learners have. Thus, depending on their level of proficiency in a second language, L2 readers may experience more or less intrinsic cognitive load with material written in that second language.

While intrinsic cognitive load has previously been thought to be immutable, a recent study (Pollock, Chandler, & Sweller, 2002) showed that it can indeed be manipulated. Pollock et al. concluded that the intrinsic cognitive load of complex information can be mitigated by lowering element interactivity. In the case of L2 learners who have not developed the schemata necessary for proficiency, intrinsic cognitive load could theoretically be lowered by using a more explicit or unambiguous writing style that would decrease the level of element interactivity.

Problem Summary

Perceived credibility is of special importance to consumers of online medical information because it frequently forms the basis for making treatment choices. While credibility is important to users of all cultures around the globe, most medical Web sites have been designed primarily for audiences within a specific cultural context. Many medical Web sites created by low-context Western institutions may not contain the graphics or
interactivity that users from high-context Eastern cultures expect. Thus, users from these cultures may be forced to depend on the words of a site for meaning rather than the context of the communicative situation.

The Formality/Contextuality continuum model suggests that communicative situations with less context have a greater need for linguistic precision, especially for readers from high-context cultures. Moreover, the preference for the level of explicitness has been shown to differ among nonnative users of a second language where those with less proficiency prefer more explicit communications and those with greater proficiency prefer more implicit communications. Because explicit language requires greater cognitive resources to process, it is likely that these readers would use the central processing route postulated in ELM theory to judge the credibility of online medical information. With the added cognitive burdens of navigating hypertext environments, readers may have even more difficulty interpreting medical content that is not explicit enough for them to make a credibility judgment.

Research Question and Hypotheses

The interplay of these theories and the studies that support them as described in the literature review suggest the following research question: How does text explicitness and English language proficiency affect readers' credibility perceptions of online medical information?

To examine this question, the following three hypotheses were proposed:

H1. Participants will rate explicit text as more credible and implicit text as less credible.

H2. Participants with lower English language proficiency will rate the experimental texts as less credible and participants with higher
English language proficiency will rate the experimental texts as more credible.

**H3.** Participants with lower English language proficiency will rate the explicit text as more credible and participants with higher English language proficiency will rate the implicit text as more credible.

The hypotheses were formulated to examine whether explicitness alone or proficiency alone would affect credibility perceptions, or whether a combined interaction between the two variables would influence the readers’ credibility ratings. The next section describes how these hypotheses were tested by describing the research design, the rationale for administering the study over the Internet, the study texts and how they were manipulated, the recruiting methods that were used, and how the data were collected and analyzed.
Chapter 3. Methods and Materials

Methods

Research Design

The experimental design consisted of a 2 x 3 factorial design with the independent variables being explicitness (explicit, implicit) and English language proficiency level (basic, independent, proficient). Table 3 illustrates the independent variables and their levels.

<table>
<thead>
<tr>
<th>English Language Proficiency</th>
<th>Explicitness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Reader</td>
<td>basic/explicit</td>
</tr>
<tr>
<td>Independent Reader</td>
<td>independent/explicit</td>
</tr>
<tr>
<td>Proficient Reader</td>
<td>proficient/explicit</td>
</tr>
</tbody>
</table>

The primary dependent variable was the credibility judgments of all the participants and the secondary dependent variables were interest, familiarity, engagement, preference, and perceived difficulty.

The English proficiency levels of the participants were assessed using their self-reported reading scores from the widely-used Test of English for International Communication (TOEIC). While the Test of English as a Foreign Language (TOEFL) is also widely used, its focus is primarily on proficiency in academic environments. The TOEIC exam is used worldwide by corporate clients to test the common English abilities of people who work in international settings and thus has broader real-world applicability. TOEIC score

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11 The TOEIC exam uses the term "user" in reference to writing, speaking, and reading measures. However, this study includes only reading measures; therefore, the participants are referred to as readers rather than users.
descriptors are described by the Educational Testing Service (ETS) as functional skills in "Can-Do" tables. Table 4 describes the "Can-Do" skills levels for reading comprehension.
Table 4. TOEIC Reading Score Descriptors (Education Testing Service, 2007)

<table>
<thead>
<tr>
<th>Level</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 450 points</td>
<td><strong>Test Takers who score around 450 typically have the following strengths:</strong></td>
<td><strong>Test takers who score around 450 typically have weaknesses only when the information tested</strong></td>
</tr>
<tr>
<td></td>
<td>- They can infer the central idea and purpose of a written text, and they can make inferences about details.</td>
<td>is particularly dense or involves difficult vocabulary.</td>
</tr>
<tr>
<td></td>
<td>- They can read for meaning. They can understand factual information, even when it is paraphrased.</td>
<td><strong>Continued on next page</strong></td>
</tr>
<tr>
<td></td>
<td>- They can connect information across an entire text, and they can make connections between two related texts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- They can understand a broad range of vocabulary, unusual meanings of common words, and idiomatic usage. They can</td>
<td></td>
</tr>
<tr>
<td></td>
<td>also make distinctions between the meanings of closely related words.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- They can understand rule-based grammatical structures. They can also understand difficult, complex, and uncommon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>grammatical constructions.</td>
<td></td>
</tr>
</tbody>
</table>

**Continued on next page**
<table>
<thead>
<tr>
<th>Level</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 350 points</td>
<td><strong>Test takers who score around 350 typically have the following strengths:</strong></td>
<td><strong>Test takers who score around 350 typically have the following weaknesses:</strong></td>
</tr>
<tr>
<td></td>
<td>▪ They can infer the central idea and purpose of a written text, and they can make inferences about details.</td>
<td>▪ They do not connect information across a wide area within a text.</td>
</tr>
<tr>
<td></td>
<td>▪ They can read for meaning. They can understand factual information, even when it's paraphrased.</td>
<td>▪ They do not consistently understand difficult vocabulary, unusual meanings of common words, or idiomatic usage. They usually cannot make distinctions between the meanings of closely related words.</td>
</tr>
<tr>
<td></td>
<td>▪ They can connect information across a small area within a text, even when the vocabulary and grammar of the text are difficult.</td>
<td>▪ They can understand medium-level vocabulary. They can sometimes understand difficult vocabulary in context, unusual meanings of common words, and idiomatic usage.</td>
</tr>
<tr>
<td></td>
<td>▪ They can understand rule-based grammatical structures. They can also understand difficult, complex, and uncommon grammatical constructions.</td>
<td>▪ They can understand rule-based grammatical structures. They can also understand difficult, complex, and uncommon grammatical constructions.</td>
</tr>
<tr>
<td>Level</td>
<td>Strengths</td>
<td>Weaknesses</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>~ 250 points</td>
<td><strong>Test takers who score around 250 typically have the following strengths:</strong></td>
<td><strong>Test takers who score around 250 typically have the following weaknesses:</strong></td>
</tr>
<tr>
<td></td>
<td>• They can make simple inferences based on a limited amount of text.</td>
<td>• They do not understand inferences that require paraphrase or connecting information.</td>
</tr>
<tr>
<td></td>
<td>• They can locate the correct answer to a factual question when the language of the text matches the information that is required. They can sometimes answer a factual question when the answer is a simple paraphrase of the information in the text.</td>
<td>• They have a very limited ability to understand factual information expressed as a paraphrase using difficult vocabulary. They often depend on finding words and phrases in the text that match the same words and phrases in the question.</td>
</tr>
<tr>
<td></td>
<td>• They can sometimes connect information within one or two sentences.</td>
<td>• They usually do not connect information beyond two sentences.</td>
</tr>
<tr>
<td></td>
<td>• They can understand easy vocabulary, and they can sometimes understand medium-level vocabulary.</td>
<td>• They do not understand difficult vocabulary, unusual meanings of common words, or idiomatic usage. They usually cannot make distinctions between the meanings of closely related words.</td>
</tr>
<tr>
<td></td>
<td>• They can understand common, rule-based grammatical structures. They can make correct grammatical choices, even when other features of language, such as difficult vocabulary or the need to correct information, are present.</td>
<td>• They do not understand more-difficult, complex, or uncommon grammatical constructions.</td>
</tr>
</tbody>
</table>
Table 4. TOEIC Reading Score Descriptors (continued)

<table>
<thead>
<tr>
<th>Level</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 150 points</td>
<td><strong>Test takers who score around 150 typically have the following strengths:</strong></td>
<td><strong>Test takers who score around 150 typically have the following weaknesses:</strong></td>
</tr>
<tr>
<td></td>
<td>• They can locate the correct answer to a factual question when not very much reading is necessary and when the language of the text matches the information that is required.</td>
<td>• They cannot make inferences about information in written texts.</td>
</tr>
<tr>
<td></td>
<td>• They can understand easy vocabulary and common phrases.</td>
<td>• They do not understand paraphrased factual information. They rely on matching words and phrases in the text to answer questions.</td>
</tr>
<tr>
<td></td>
<td>• They can understand the most-common, rule-based grammatical constructions when not very much reading is necessary.</td>
<td>• They are often unable to connect information even within a single sentence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• They understand only a limited range of vocabulary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• They do not understand even easy grammatical constructions when other language features, such as difficult vocabulary or the need to connect information, are also required.</td>
</tr>
</tbody>
</table>

While the TOEIC descriptions provide a comprehensive description of what examinees are capable of doing within a certain range of scores, they do not categorize levels of proficiency, a step that is necessary to analyze data using these descriptions. Thus, for the data analysis purposes of this study, the reading proficiency categories that were used are derived from the Common European Framework of Reference for Languages (CEFR) mapped against the TOEIC "Can Do" functional proficiency descriptors. The TOEIC "Can Do" descriptors and their CEFR correlations are described in Table 5.
Table 5. TOEIC Listening and Reading Score Descriptor Correlations with European CEFR Levels (Education Testing Service, 2008)

<table>
<thead>
<tr>
<th>Total Minimum TOEIC Score (10 to 990 pts.)</th>
<th>European CEFR Levels</th>
<th>CEFR General Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>945 pts.</td>
<td>Proficient user - Effective Operational Proficiency</td>
<td>C1</td>
</tr>
<tr>
<td>785 pts.</td>
<td>Independent user - Vantage</td>
<td>B2</td>
</tr>
</tbody>
</table>

Continued on next page
<table>
<thead>
<tr>
<th>Total Minimum TOEIC Score (10 to 990 pts.)</th>
<th>European CEFR Levels</th>
<th>CEFR General Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>550 pts.</td>
<td>Independent user - Threshold</td>
<td>B1</td>
</tr>
<tr>
<td>225 pts.</td>
<td>Basic user - Waystage</td>
<td>A2</td>
</tr>
</tbody>
</table>

*Continued on next page*
### Table 5. TOEIC Listening and Reading Score Descriptor Correlations with European CEFR Levels (continued)

<table>
<thead>
<tr>
<th>Total Minimum TOEIC Score (10 to 990 pts.)</th>
<th>European CEFR Levels</th>
<th>CEFR General Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 pts.</td>
<td>Basic user - Breakthrough</td>
<td>A1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can understand and use familiar and everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.</td>
</tr>
</tbody>
</table>

SOURCE: Correlation Table, TOEIC Listening and Reading Scores Descriptors and European CEFR Levels. (2008). In TOEIC_L_R_can-do_table.pdf (Ed.): Educational Testing Service
To further simplify data analysis and interpretation, the five European CEFR levels mapped against the TOEIC reading score descriptors were collapsed as shown in Table 6.

Table 6. Collapsed CEFR/TOEIC Scores and Descriptors

<table>
<thead>
<tr>
<th>Original Descriptors and Scores...</th>
<th>Collapsed to...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English Proficiency Level</strong></td>
<td><strong>Score Range</strong></td>
</tr>
<tr>
<td>Basic User&lt;sup&gt;12&lt;/sup&gt; - Breakthrough</td>
<td>120 pts.</td>
</tr>
<tr>
<td>Basic User - Waystage</td>
<td>225 pts.</td>
</tr>
<tr>
<td>Independent User - Vantage</td>
<td>785 pts.</td>
</tr>
<tr>
<td>Proficient User - Effective Operational Efficiency</td>
<td>945 pts.</td>
</tr>
</tbody>
</table>

Using Heylighen and Dewaele's *F-measure* (2002), the explicitness level of the experimental texts was varied by increasing or decreasing the frequencies of the parts of speech as described in Table 7.

Table 7. Manual Variation of Explicitness Levels

<table>
<thead>
<tr>
<th>To Make the Text...</th>
<th>Increase Frequency of</th>
<th>Decrease Frequency of</th>
</tr>
</thead>
<tbody>
<tr>
<td>More explicit</td>
<td>Nouns, adjectives, prepositions, articles</td>
<td>Pronouns, verbs, adverbs, interjections</td>
</tr>
<tr>
<td>More implicit</td>
<td>Pronouns, verbs, adverbs, interjections</td>
<td>Nouns, adjectives, prepositions, articles</td>
</tr>
</tbody>
</table>

The experimental texts consisted of text only, extracted from a medical information Web site in the public domain designed for e-health consumers. Graphics, videos, or other types of visual elements were not embedded in the texts so that they would not affect the

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<sup>12</sup> The CEFR categorizes examinees as "users" in the same manner as the TOEIC. The term "user" is meant to encompass reading, speaking, and listening skill levels. However, this study included only reading measures; therefore, the participants are referred to as readers rather than users.
main variable being studied—the explicitness of the texts. However, the study involved reading in on online environment, so all of the elements that users engage with when browsing on the Web—such as clicking hyperlinks or scrolling—were either embedded in the texts or available through the participants' browser interfaces (see p. 47 for a description of the actions required by the participants to complete and navigate through the survey). It was assumed that, while minimal, the demands of the hypertext environment would have some impact on the extraneous cognitive load of the participants, but this effect was not measured in this study.

Participants

Participants consisted of Japanese Internet users. The choice to use subjects from this cultural group is grounded on three premises. First, as discussed in the literature review, Asian and Western cultures have been shown to differ significantly in several communication variables and dimensions. Japan is near the top of the continuum for high-context cultures whereas the U.S. is near the bottom for low-context cultures (Hall, 1990).

Second, while Web pages, in general, have evolved from primarily text-based to rich multimedia displays that include interactivity, graphics, and animation (Wurtz, 2006), many medical Web sites still eschew visuals for text-only, low-context content. In addition, most of the well-known medical Web sites are hosted by U.S.-based institutions which means they are likely crafted by authors from low-context cultures. Much research exists about factors that influence the credibility of online medical information by users who come from low-context cultures; nothing exists about which factors might influence credibility for high-context users who visit low-context Web sites.

Third, a great deal of empirical research exists about the differences (Ess & Sudweeks, 2006) between American and Japanese culture. Along with Edward Hall, some
of the seminal and most prominent scholars of intercultural communication such as William B. Gudykunst, Clifford Clarke, and John C. Condon, have conducted the bulk of their research on Japanese/American cultural differences (Rogers et al. 2002). In fact, the number of studies about differences between Japanese and American communication styles surpasses those conducted between other cross-cultural pairs (Ito, 1992). This broad research base offers a solid empirical framework from which to compare the communication styles of high-context and low-context cultures.

**Participant Requirements**

Participants in this study had to meet several requirements in order to participate.

Participants had to be:

- **Japanese Individuals** between the ages of 18 – 65.
- **Comfortable with computers and the Internet.**
- **Japanese individuals with varying levels of ESL proficiency** who had taken the Test of English for International Communication (TOEIC) within the past five years.

Participants were asked to submit their TOEIC score for reading.

**Participant Recruiting**

Recruiting targeted people from similar demographic segments (e.g., computer users from both genders with similar levels of computer literacy and/or education). All participants were required to submit their TOEIC exam scores, but were assured that their scores would remain confidential.

Recruiting took place over a period of 8 months (June 2010 – March 2011) and occurred entirely over the Internet. Participants were solicited by a variety of means such as e-mails, hard copy fliers, and postings on Web sites. The bulk of the recruiting took place via popular social media sites such as Facebook, LinkedIn, and Mixi (the Japanese version of
Facebook). Both individual participants and relevant groups (such as Japanese student associations or English language programs) were targeted. Appendix A shows some sample recruitment materials.

Recruitment venues also included English language programs located at colleges and universities in the Puget Sound (Seattle) area and the rest of the United States. In addition, recruiting took place in higher education institutions in other countries where English is an official language, (i.e., England, Canada, New Zealand, and Australia).

In return for participation, participants were given the opportunity to win a lottery for gift certificates to Amazon.com or Amazon.co.jp.

**Informed Consent**

This study fell under the Human Subjects Exempt Research category because participants read material that they could easily have been exposed to by mass media—whether by television, books, magazines, or other means. The risks entailed from participating in the study were no greater than if they had read these materials on their own. Nonetheless, each participant was briefed on privacy rights, any possible risks, and their rights—including the right not to participate or to drop out of the study at any time.

Participants’ identities remained confidential throughout the study. However, participants were asked to submit their e-mail addresses at the completion of the survey questionnaire if they wished to participate in a raffle for the Amazon.com or Amazon.co.jp gift certificates.

**Materials**

The materials for this study included:

- Several baseline medical texts used to establish a general explicitness level for medical web sites from Western institutions.
- One experimental text with two versions of explicitness (one explicit, the other less explicit).
- A survey to assess credibility judgments.
- A medical article unrelated to the experimental texts, as well as a subsequent test designed to assess the English language proficiency levels of participants.

The following sections provide further details about the materials.

Baseline Texts

A preliminary analysis was conducted to determine the explicitness level of five reputable English-language medical Web sites from Western institutions to establish a baseline for explicitness levels. Sample texts of approximately 200 words about Dengue Fever were scored by the researcher and another coder for their level of explicitness using Heylighen and Dewaele’s (2002) F-measure (see Appendix B for the texts of the five articles).

In order to assess the explicitness scores for each article, the words in the texts had to be deconstructed into their parts of speech. Several methods were used as a form of triangulation to improve the accuracy of the deconstruction. In the first method, the researcher manually deconstructed the parts of speech with the aid of various grammar texts as well as the online version of the Merriam-Webster dictionary (http://www.merriam-webster.com/) because many words in the English language function as more than one part of speech, depending on context. In the second method, a PhD student who taught English writing skills at the college level deconstructed the parts of speech using a rubric supplied by the researcher (see Appendix C for the scoring instructions and guidelines, and Appendix D for the manually deconstructed baseline texts).

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13 SOURCE: CAPHIS: Consumer and Patient Health Information Section of the Medical Library Association (http://caphis.mlanet.org/consumer/top100all.pdf).
In the third method, the texts were parsed by the online Infogistics Natural Language Processor (NLP) at http://www.infogistics.com/posdemo.htm. Natural language processors used for parts-of-speech tagging use algorithms derived from linguistics, statistics and computer sciences to determine which part of speech a word belongs to. This particular parser uses the modified Penn Treebank set to define the parts of speech used in corpus linguistics (see Appendix E). As such, each part of speech category is broken down into the various forms it may take depending on its context. For example, verbs are broken down as follows:

- VB – Verb, base form
- VBD – Verb, past tense
- VBG – Verb, gerund or present participle
- VBN – Verb, past participle
- VBP – Verb, non-third person singular present
- VBZ – Verb, third person singular present
- MD – Modal auxiliary (helping verb)

(See Appendix F for the baseline texts parsed by the Infogistics Natural Language Processor.)

Because Heylighen and Dewaele's *F-measure* does not differentiate the different forms a part of speech may assume, the Modified Penn Treebank tags were grouped to conform with the parts of speech in their formula as shown in Table 8. For example, all the Modified Penn Treebank tags associated with verb forms (i.e., VB, VBD, VBG, VBN, VBP, VBZ, MD) were rated as verbs, all the tags associated with noun forms (i.e., NN, NNS, NNP, NNPS, POS) were rated as nouns, and so forth.
Table 8. Parts of Speech Groupings with Modified Penn Treebank Tagset (Infogistics, 2001)

<table>
<thead>
<tr>
<th>Penn TreebankTag</th>
<th>Description</th>
<th>Examples</th>
<th>Grouped as...</th>
</tr>
</thead>
<tbody>
<tr>
<td>VB</td>
<td>Verb, base form</td>
<td>Tell, run, shout, bend, talk</td>
<td>Verb</td>
</tr>
<tr>
<td>VBD</td>
<td>Verb, past tense</td>
<td>Talked, ran, looked, swam</td>
<td></td>
</tr>
<tr>
<td>VBG</td>
<td>Verb, gerund or present participle</td>
<td>Moving, reading, talking</td>
<td></td>
</tr>
<tr>
<td>VBN</td>
<td>Verb, past participle</td>
<td>Moved, grouped, practiced</td>
<td></td>
</tr>
<tr>
<td>VBP</td>
<td>Verb, non-third person singular present</td>
<td>Shine, drop, cut</td>
<td></td>
</tr>
<tr>
<td>VBZ</td>
<td>Verb, third person singular present</td>
<td>Turns, repairs, reads</td>
<td></td>
</tr>
<tr>
<td>MD</td>
<td>Modal auxiliary (helping verb)</td>
<td>Can, should, might</td>
<td>Noun</td>
</tr>
<tr>
<td>NN</td>
<td>Noun, singular or mass</td>
<td>Apple, car, house</td>
<td></td>
</tr>
<tr>
<td>NNS</td>
<td>Noun, plural</td>
<td>Colleges, houses, roads</td>
<td></td>
</tr>
<tr>
<td>NNP</td>
<td>Proper noun, singular</td>
<td>Peter, Africa, Atlanta</td>
<td></td>
</tr>
<tr>
<td>NNPS</td>
<td>Proper noun, plural</td>
<td>Indians, Americans, Smiths</td>
<td></td>
</tr>
<tr>
<td>POS</td>
<td>Noun, possessive ending</td>
<td>Rabbit's, boy's, ball's</td>
<td>Adjective</td>
</tr>
<tr>
<td>JJ</td>
<td>Adjective</td>
<td>Black, third, dark</td>
<td></td>
</tr>
<tr>
<td>JJR</td>
<td>Adjective, comparative</td>
<td>Wilder, smoother, creamier</td>
<td></td>
</tr>
<tr>
<td>JJS</td>
<td>Adjective, superlative</td>
<td>Finest, boldest, darkest</td>
<td></td>
</tr>
<tr>
<td>WDT</td>
<td>Wh-determiner</td>
<td>That, what, which</td>
<td></td>
</tr>
<tr>
<td>CD</td>
<td>Cardinal number</td>
<td>2, 1992, three</td>
<td></td>
</tr>
<tr>
<td>PDT</td>
<td>Predeterminer (elements that precede an article or possessive noun)</td>
<td>All, many, this</td>
<td></td>
</tr>
</tbody>
</table>

Continued on next page
<table>
<thead>
<tr>
<th>Penn TreebankTag</th>
<th>Description</th>
<th>Examples</th>
<th>Grouped as...</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX</td>
<td>Existential <em>there</em></td>
<td>There</td>
<td>Pronoun</td>
</tr>
<tr>
<td>PRP</td>
<td>Personal pronoun</td>
<td>Her, him, them</td>
<td></td>
</tr>
<tr>
<td>PRPS</td>
<td>Possessive pronoun</td>
<td>Mine, theirs, hers</td>
<td></td>
</tr>
<tr>
<td>WP</td>
<td>Wh-pronoun</td>
<td>That, which, what</td>
<td></td>
</tr>
<tr>
<td>WP$</td>
<td>Possessive wh-pronoun</td>
<td>Whose</td>
<td></td>
</tr>
<tr>
<td>RB</td>
<td>Adverb</td>
<td>Quickly, broadly, unfailingly</td>
<td>Adverb</td>
</tr>
<tr>
<td>RBR</td>
<td>Adverb, comparative</td>
<td>Fatter, lesser, greater</td>
<td></td>
</tr>
<tr>
<td>RBS</td>
<td>Adverb, superlative</td>
<td>Fattest, biggest, most</td>
<td></td>
</tr>
<tr>
<td>WRB</td>
<td>Wh-adverb</td>
<td>However, therefore, why</td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>Preposition or coordinating conjunction</td>
<td>Below, above, between</td>
<td>Preposition</td>
</tr>
<tr>
<td>TO</td>
<td><em>To</em> as preposition or infinitive</td>
<td>To</td>
<td></td>
</tr>
<tr>
<td>RP</td>
<td>Particle (one-syllable words that are either directional adverbs or prepositions)</td>
<td>Whole, just, per</td>
<td></td>
</tr>
<tr>
<td>DT</td>
<td>Determiner</td>
<td>All, another, some</td>
<td>Article</td>
</tr>
</tbody>
</table>
The same scoring guidelines used by the first and second coders were applied to the NLP parsed texts. In addition, the NLP texts were normalized as follows:

- Compound nouns such as geographical areas (e.g., United States) that were considered several units by the parser were considered as one unit in the normalized scores.
- As in the manually-coded versions, acronyms following a spelled-out term were not counted; however, acronyms standing on their own were scored.
- Punctuation and symbols used for bulleted list items (SYM tag) were not scored since these elements are not part of the Heylighen-Dewaele explicitness formula.
- Verb phrases with two or more verbal elements such as a helping (auxiliary) verb followed by gerund or present participle (e.g., is helping) were scored as one unit.
- Foreign words were not scored.
- Cardinal numbers, expressed in numeric form or spelled out, were treated as adjectives or nouns, depending on their context.

A comparison of the F-measures for the three instances of coding in Table 9 shows that the F scores among the two coders and NLP parser were quite close.
Table 9. Score Comparison for Preliminary Analysis

<table>
<thead>
<tr>
<th>Dengue Article Web Sites</th>
<th>Coding Comparison</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coder 1*</td>
<td>Coder 2**</td>
<td>Infogistics NLP</td>
<td></td>
</tr>
<tr>
<td>Mayo Clinic</td>
<td>78</td>
<td>80.7</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Web M.D.</td>
<td>83.9</td>
<td>82.5</td>
<td>81.7</td>
<td></td>
</tr>
<tr>
<td>NIH</td>
<td>77.6</td>
<td>71.3</td>
<td>76.2</td>
<td></td>
</tr>
<tr>
<td>Virtual Hospital</td>
<td>83.4</td>
<td>77.5</td>
<td>79.6</td>
<td></td>
</tr>
<tr>
<td>Wrong Diagnosis</td>
<td>79.4</td>
<td>73.7</td>
<td>71.6</td>
<td></td>
</tr>
</tbody>
</table>

*Coder 1 – Researcher  
**Coder 2 – Second Coder

The explicitness score of 61 that Heylighen and Dewael attributed to "informational writing" was used as a benchmark. Sites that scored higher than this benchmark were considered more explicit; those that scored lower were considered less explicit.

Experimental Texts

The experimental texts consisted of two versions of an article (1,074 words) about Dengue Fever with two levels of explicitness (see Appendix G for the two texts). In the interest of better assessing the ecological validity of real-life medical Web sites, the text was drawn from the Centers for Disease Control Web site (http://www.cdc.gov). The material consisted of text only; other elements that have been found to affect credibility were minimized or excluded. In other words, graphics, design elements such as banners or logos, source information such as the name of the article's author(s) or the sponsoring institution, and temporal information such as the last revised date were excluded.

Using the same deconstruction method that was used for the baseline articles, a preliminary assessment of the experimental article by the researcher revealed an explicitness measure of approximately 75 categorizing it as a very explicit text in the

14 The CDC website is in the public domain; thus, the use of its material would not be considered copyright infringement.
framework of Heylighen and Dewaele's explicitness continuum. The researcher corroborated the deconstruction with a professor who had 30 years of experience in teaching grammar with a resulting explicitness score of 78.9 (see Appendix H for the manual deconstruction of the two experimental texts).

The researcher then manipulated the explicitness of the article to make it more implicit, i.e., less explicit, by substituting pronouns for nouns; reducing the numbers of articles, prepositions, and adjectives; and converting adjectives to adverbs wherever possible (for example converting the word "unintended" [adjective] into "unintentionally" [adverb]). The manipulations were conducted in such a way that the basic meaning of the original text remained basically intact.

In sentence groups where nouns referring to people or animals were used multiple times, the referent (noun) was stated at the beginning of the chain. When the referent changed (e.g., from "Dengue" to "mosquito" or "virus"), the new noun referent was used. Thereafter, pronouns were used until the referent changed again. The intent was to make the text less explicit but comprehensible.

The more implicit text had a word count of 613. While it would seem that the implicit version would likely be less explicit than the formal version simply because it contained 461 fewer words, it is the overall F (explicitness) score based on the frequency of the parts of speech that make the text more or less explicit. Table 10 shows the frequencies calculated for each part of speech category for both the explicit and implicit versions of the article.

<table>
<thead>
<tr>
<th>Text</th>
<th>Noun</th>
<th>Adj</th>
<th>Prep</th>
<th>Art</th>
<th>Pro</th>
<th>Verb</th>
<th>Adv</th>
<th>Int</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit</td>
<td>34.7</td>
<td>10.8</td>
<td>6.8</td>
<td>3.6</td>
<td>11.0</td>
<td>21.5</td>
<td>11.6</td>
<td>n/a</td>
</tr>
<tr>
<td>Explicit</td>
<td>33.7</td>
<td>20.7</td>
<td>14.8</td>
<td>9.7</td>
<td>3.5</td>
<td>10.9</td>
<td>6.7</td>
<td>n/a</td>
</tr>
</tbody>
</table>
The implicit version shows a higher frequency of pronouns, verbs, and adverbs and a lower frequency of adjectives, prepositions, and articles\textsuperscript{15}, which makes it fall in the less explicit end of the explicitness continuum. Conversely, the explicit version shows a higher frequency of nouns, adjectives, prepositions, and articles, and a lower frequency of pronouns, verbs, and adverbs, which makes it fall in the more explicit end of the formality continuum.

As with the baseline articles, the Infogistics Natural Language Processor was used to parse the parts of speech in both experimental texts (see Appendix I for the experimental texts parsed by the Infogistics Natural Language Processor). Table 11 shows that the explicitness scores of the NLP were fairly close to those of the human coders.

### Table 11. Experimental Text Coding Comparisons

<table>
<thead>
<tr>
<th>Experimental Texts</th>
<th>Coding Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manual</td>
</tr>
<tr>
<td>Explicit Text</td>
<td>78.9</td>
</tr>
<tr>
<td>Implicit Text</td>
<td>55.9</td>
</tr>
</tbody>
</table>

**Survey Content and Delivery**

The study was administered and delivered by a Web-based survey that measured the credibility judgments, interest, familiarity, engagement, preference, and perceived difficulty for the two experimental conditions. The survey also asked about participant demographics such as age, gender, education, and computer/Internet literacy (see Appendix J for the survey questionnaires). The survey was designed and delivered to the participants using the University of Washington's Catalyst tool (see Appendix K for the survey delivery in Catalyst).

A pilot test was conducted before the experiment began in order to identify any problems with the survey questions or the Web-based survey tool (Catalyst). College-level

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\textsuperscript{15} The frequency of nouns in Table 10 is slightly higher for the implicit rather than the explicit texts. However, the frequencies for all the other parts of speech add up to an overall explicitness score of 78.9 for the explicit experimental text and 55.9 for the implicit experimental text.
Japanese students from ESL programs around the Puget Sound area were recruited to participate in the pilot test. Based on their input, the survey was further refined and clarified.

**Survey Procedures**

Participants were provided with a URL to whichever version of the experimental text (explicit or implicit) they were assigned. Once they reached the study's home page, they used the following procedure for completing and navigating through the survey (see Appendix K for screen captures of all study screens in the Catalyst Web tool):

1. Participants were taken to the initial welcome screen where they read general information about the study and were informed about the approximate length of time it would take to participate in the study as well as the chance to enter a raffle to win an Amazon.com gift certificate at the completion of the survey. Participants were assured of the confidentiality of their responses and provided an informed consent statement that stated they were agreeing to participate in the study by clicking the "Next" link at the bottom of the page.

2. After clicking the “Next” link on the welcome screen, participants were taken to the page containing instructions for completing the survey.

3. Clicking the “Next” link on the instruction screen took participants to the demographic survey where they made response choices by clicking radio buttons or entering text into free-form text fields.

4. The “Next” link on the demographic survey screen took participants to a screen with instructions for reading the experimental text.

5. Clicking the "Next" link then took them to the screen with the experimental text.

6. After reading the experimental text, the participants clicked “Next” to go to the credibility questionnaire where they made response choices by clicking radio buttons or clicking options from pull-down menus.
7. After completing the credibility questionnaire, participants clicked the “Next” link to go to a screen describing the comprehension article and questionnaire.

8. Clicking the “Next” link took participants to the comprehension text (the topic was rheumatoid arthritis).

9. After reading the comprehension article, participants clicked the “Next” link to go to the screen with the follow-on questionnaire which they completed by clicking their response choices via radio buttons.

10. Following completion of the comprehension article questionnaire, participants were taken to the final screen where they were thanked for their participation, reminded that their responses would remain confidential, and invited to submit their e-mail address via a text-form field if they wanted to participate in the Amazon.com raffle for gift certificates.

While a “Next” link was provided on each screen of the study, “Previous” links were not provided in order to discourage participants from referring back to the articles they read. Participants were also asked several times throughout the study not to return to the articles after they completed the subsequent questionnaires.

Comprehension Article and Test

Because participants were required to submit their TOEIC reading scores, a verification measure consisting of a Web-based text unrelated to the experimental texts about the causes, symptoms, and treatment of Rheumatoid Arthritis, followed by 5 – 8 multiple-choice reading comprehension questions (see Appendix L for the text of the comprehension article and test questions) was included in the survey. This additional verification mechanism was included to ensure that their self-reported scores reflected their actual reading proficiency.
Rationale for Remote-Based Administration and Delivery

The experimental conditions and surveys were delivered remotely via the World Wide Web rather than in a face-to-face lab situation or by regular postal mail. There are many documented advantages to conducting research in this manner; some of the most important include:

- The likelihood that users in naturally-occurring environments such as their homes or offices, at their own leisure, and with varying kinds of equipment, will exhibit more real-world behavior than they would in the controlled setting of a lab, thus enhancing external or ecological validity (Gosling, Vazire, Srivastava, & John, 2004; Laugwitz, 2001; Reips, 2002; Reips, 1997; Spyridakis, Wei, Barrick, Cuddihy, & Maust, 2005). Recent research shows that most online health seekers (80%) look for information from home (Madden & Fox, 2006).
- The potential to reach participants around the globe through the Internet quickly and easily (Buchanan & Smith, 1999; Dillman, 2000; Evans & Mathur, 2005; Gosling et al. 2004; Nosek, Banaji, & Greenwald, 2002; Schmidt, 1997).
- The low cost entailed in creating, publishing, and disseminating Web surveys (Dillman, 2000; Kraut et al. 2004; Lliewa, Baron, & Healey, 2002; Wright, 2006). Because this study used the University of Washington’s Catalyst survey tool, the survey did not cost anything. Moreover, this kind of electronic surveying eliminated travel costs for the researcher as well as the material costs (i.e., paper, postage, printing) associated with using conventional in-lab or mailed surveys.
- The possibility of increasing statistical power and effect sizes with a potentially large pool of participants (Birnbaum, 2004; Evans, 2005).
• The elimination of manual coding errors because Web-based surveys automate the process of data collection and enable easy data export to statistical packages such as SPSS (Kraut et al. 2004; Umbach, 2004; Wright, 2006; Zhang, 2000).

• The greater anonymity afforded to respondents (as opposed to face-to-face testing), which can reduce the discomfort associated with answering socially or emotionally sensitive questions, (Pealer, Weiler, Pigg, Miller, & Dorman, 2001).

• The reduction of demand and experimenter characteristics such as the Hawthorne Effect (Llieva, Baron, & Healey, 2002; Reips, 2002).

It should also be noted that broad empirical evidence shows that the results obtained from Web-based surveys are comparable to those obtained from traditional paper-based surveys (Benet-Martinez & John, 1998; Buchanan & Smith, 1999; Foster, Campbell & Twenge, 2003; Gosling et al., 2004; Johnson, 2000; McGraw, Tew, & Williams, 2000; Yun & Trumbo, 2000).

While the advantages of Internet-based research are many as described above, disadvantages have been documented as well. These issues should be addressed by any researcher considering remote-based research.

This study attempted to mitigate the risks and possible problem areas inherent in Web-based research by using the best practices and design principles for Web-based surveys documented by various well-known scholars and researchers (Couper, 2000; Dillman; 2000; Dillman & Bowker, 2001; Dillman, Tortora, & Bowker, 1998; Kraut et al., 2004; Spyridakis, Wei, Barrick, Cuddihy & Maust, 2005; Umbach, 2004). These techniques address problems with coverage, nonresponse, or measurement errors, and the potential for drop-out. These errors, problems, and issues are defined as follows:

• **Coverage error**—Coverage error can occur when the sample studied is dissimilar from the target population (the larger group from which inferences are made).
• **Measurement error** – Measurement error can occur when survey responses are not accurate because the questions are not understood in the way they were intended because of poor wording, structure, or the modality of the survey instrument itself (i.e., paper versus online).

• **Nonresponse error** – Nonresponse error can be introduced when survey participants are dissimilar from people in a sample frame who did not respond for reasons that may include the inability to access the survey instrument, lack of time, computer illiteracy, and so forth.

• **Drop-out** – Survey participants may drop out of an online study for some of the following reasons:
  
  o Questions are too personal or sensitive.
  
  o The wording of the questions is unclear or confusing.
  
  o The survey does not provide enough motivation or incentive to complete it.
  
  o The survey is too long.
  
  o The online navigation is cumbersome.

• **Ethical issues** can occur when participants' privacy is at stake and when informed consent is lacking or inadequate.

Table 12 describes the specific risk mitigation techniques adapted for this study from the research of the scholars and researchers cited.
Table 12. Risk Mitigation Strategy for Web-Based Participant Survey (Adapted from Umbach, 2004)

<table>
<thead>
<tr>
<th>Design Principle/Best Practice</th>
<th>Error/Problem Type**</th>
<th>Risk Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C M N D R E</td>
<td></td>
</tr>
<tr>
<td>Format web-based surveys to be similar to those of paper-based surveys.</td>
<td>X X</td>
<td>Most of the survey responses used structure and formatting similar to those used on paper surveys such as radio buttons, checkboxes, and free-form text fields.</td>
</tr>
<tr>
<td>Motivate the participants by using the Welcome screen to encourage them to complete the survey and tell them how to proceed to the next section.</td>
<td>X X</td>
<td>The Welcome screen thanked the respondents for their participation and stated how their responses would aid the research effort. Participants were invited to enter a drawing for three Amazon.com gift certificates after they completed their survey responses. Clear instructions were given on how to proceed with the study.</td>
</tr>
<tr>
<td>Restrict the time to complete online surveys (no more than 20 minutes long).</td>
<td>X</td>
<td>The survey was timed by pilot participants and averaged 20 minutes total (the timing included reading the instructions, the experimental texts, and answering the survey questions).</td>
</tr>
</tbody>
</table>

C – Coverage  
M – Measurement  
N – Nonresponse  
D – Drop-out  
R – Reliability  
E – Ethics

Continued on next page
Table 12. Risk Mitigation Strategy for Web-Based Participant Survey (continued)

<table>
<thead>
<tr>
<th>Design Principle/Best Practice</th>
<th>Error/Problem Type</th>
<th>Risk Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Divide long surveys into sections.</td>
<td>X</td>
<td>The survey was divided up into 10 sections. Instructions, experimental texts, and survey questions were not combined on any screen.</td>
</tr>
<tr>
<td>Ensure that survey navigation and instructions for completing the survey are unambiguous and straightforward.</td>
<td>X</td>
<td>Participants were given simple instructions about what they would do and in what order. They were instructed to click the “Next” link at the end of each section to proceed to the next section of the study. Participants were also told to maximize their browser windows for better viewing of the study Web pages, not to open multiple windows or tabs for the study site, and not to return to the experimental texts after completing the surveys following them.</td>
</tr>
<tr>
<td>Use the principles of good survey question structure and wording.</td>
<td>X</td>
<td>The researcher used Dillman’s (2000) criteria and guidelines for writing, structuring, and formatting effective survey questions.</td>
</tr>
<tr>
<td>Minimize the use of drop-down menus because they require more effort.</td>
<td>X</td>
<td>Only one question with drop-down menus was used.</td>
</tr>
<tr>
<td>Restrict the use of color for grouping or decorative purposes.</td>
<td>X</td>
<td>The survey and experimental texts were formatted entirely in black and white in order to enhance readability, avoid accessibility issues, provide adequate figure-ground contrast, and facilitate navigation.</td>
</tr>
</tbody>
</table>

Continued on next page
Table 12. Risk Mitigation Strategy for Web-Based Participant Survey (continued)

<table>
<thead>
<tr>
<th>Design Principle/Best Practice</th>
<th>Error/Problem Type</th>
<th>Risk Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearly inform participants about the confidentiality of their responses.</td>
<td>C</td>
<td>Respondents were informed on the Welcome screen that their names would not be associated with any of the study’s data.</td>
</tr>
<tr>
<td>Make sure to include some mechanism up front for informed consent.</td>
<td>M</td>
<td>The Welcome screen informed participants about the risks by stating that participation in the study should cause them no more discomfort than reading other information on the Web and answering questions about it. In lieu of a physical signature, participants were informed that they were agreeing to participate in the study by the following statement: “By clicking on the 'Next' link, you are agreeing to participate in this study and are affirming that you are at least 18 years old.” Participants were invited to print a copy of the consent form for their records.</td>
</tr>
<tr>
<td>Use the “high-hurdle” technique to reduce drop-out. The high-hurdle technique places items that could negatively impact motivation (such as demographic information) early in the study to encourage those who will drop out to do so before beginning the experimental portion of the survey.</td>
<td>N</td>
<td>Demographic questions were placed immediately after the survey instructions at the beginning of the survey.</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>
Table 12. Risk Mitigation Strategy for Web-Based Participant Survey (continued)

<table>
<thead>
<tr>
<th>Design Principle/Best Practice</th>
<th>Error/Problem Type</th>
<th>Risk Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the &quot;seriousness check&quot; technique to reduce drop-out. The seriousness check involves asking participants early on for a degree of seriousness about their participation.</td>
<td>X</td>
<td>Participants were informed on the Welcome screen that their responses would be used to help develop guidelines that improve English-language medical Web sites for non-native English speakers.</td>
</tr>
<tr>
<td>Test online surveys on different computer systems to ensure that there are no differences in visual appearances due to different screen sizes, Internet browsers, and operating systems.</td>
<td>X X X</td>
<td>The survey was tested on three major internet browsers: Internet Explorer, Safari, and Firefox. It was also tested on mobile devices.</td>
</tr>
<tr>
<td>Do not force participants to answer each question before going to the next one.</td>
<td>X</td>
<td>The answering of all survey questions was optional for participants.</td>
</tr>
<tr>
<td>Minimize the use of open-ended questions and check-all-that-apply types of questions.</td>
<td>X</td>
<td>Only five questions were open-ended and only one question was a check-all-that-apply type.</td>
</tr>
<tr>
<td>Use techniques to discourage multiple submissions. While multiple participations have been found to be less than 3% in most studies, the consensus is that they do not significantly affect the reliability of Web-based studies. (Krantz &amp; Dalal, 2000; Musch &amp; Reips, 2000; Reips, 1997).</td>
<td>X</td>
<td>While incentives in the form of a raffle were used to enhance the motivation for participation, the financial value of the prizes was kept intentionally low to dissuade participants from entering multiple times.</td>
</tr>
</tbody>
</table>

Continued on next page
Table 12. Risk Mitigation Strategy for Web-Based Participant Survey (continued)

<table>
<thead>
<tr>
<th>Design Principle/Best Practice</th>
<th>Error/Problem Type</th>
<th>Risk Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use consistency and validation techniques to ensure that participants are who they say they are.</td>
<td>X</td>
<td>Various questions were placed throughout the study to ensure that participants were providing truthful information about themselves. For example, if participants rated themselves as having a very high level of English reading ability, but their reported TOEIC score was in the novice range, their responses were excluded from the data analysis.</td>
</tr>
<tr>
<td>Conduct a pretest of the online survey materials to collect feedback about problematic questions, misunderstandings, and confusing instructions.</td>
<td>X</td>
<td>The study's pilot test uncovered several areas of confusing wording and response formatting that were corrected in the final study.</td>
</tr>
<tr>
<td>Use a software application designed to create and administer Web-based surveys.</td>
<td>X</td>
<td>The University of Washington’s Catalyst WebQ survey tool was used to create and deliver the study materials. This application maintains the confidentiality of participants, automates data collection, provides multiple question and answer formats, and records drop-out rates.</td>
</tr>
<tr>
<td>Use the multiple site entry technique to ensure that the frame sample is representative of the target population.</td>
<td>X</td>
<td>Participants were recruited from a variety of venues that included social media sites such as Facebook groups, LinkedIn, Mixi (the Japanese equivalent of Facebook), e-mails to professors teaching English as a second language, flyers for posting within relevant companies, list serves, and Japan Student Clubs.</td>
</tr>
</tbody>
</table>
Readability Statistics

Readability statistics were collected for all of the texts used in this study to ascertain the level of reading difficulty because this factor, in addition to the style of a text, has been shown to affect the comprehension of online medical information (see Table 13). A synthesis of reading levels for medical articles on the Web implies that their reading levels are often too high (Eysenbach, 2002; Keselman et al., 2008). Researchers have suggested that health material should be geared toward the fifth- or sixth-grade reading levels instead of the 10th-grade level or above which is fairly common (McCray, 2005)—and these levels are geared toward American native English speakers, not those for whom English is a second language.

Data Collection and Analysis

Recruiting and data collection took place over a period of eight months. The data were collected by the University of Washington’s Catalyst survey tool and exported to the IBM PASW Statistics 18 package (formerly SPSS) for analysis on a Dell Latitude E6400 laptop computer.
Table 13. Readability Statistics for Study Texts

<table>
<thead>
<tr>
<th>Readability Statistics</th>
<th>Mayo</th>
<th>WebMD</th>
<th>NIH</th>
<th>Virt Hosp</th>
<th>Wrong Diag</th>
<th>Explicit</th>
<th>Contextual</th>
<th>Comp</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Words</td>
<td>241</td>
<td>243</td>
<td>238</td>
<td>251</td>
<td>251</td>
<td>1279</td>
<td>767</td>
<td>679</td>
</tr>
<tr>
<td>Characters</td>
<td>1168</td>
<td>1227</td>
<td>1220</td>
<td>1259</td>
<td>1273</td>
<td>6801</td>
<td>4365</td>
<td>3448</td>
</tr>
<tr>
<td>Paragraphs</td>
<td>11</td>
<td>21</td>
<td>11</td>
<td>14</td>
<td>5</td>
<td>34</td>
<td>37</td>
<td>12</td>
</tr>
<tr>
<td>Sentences</td>
<td>11</td>
<td>9</td>
<td>11</td>
<td>12</td>
<td>14</td>
<td>51</td>
<td>52</td>
<td>38</td>
</tr>
<tr>
<td><strong>Averages</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentences per Paragraph</td>
<td>2.2</td>
<td>3.0</td>
<td>2.7</td>
<td>2.4</td>
<td>2.8</td>
<td>3.4</td>
<td>3.7</td>
<td>3.8</td>
</tr>
<tr>
<td>Words per Sentence</td>
<td>16.5</td>
<td>15.2</td>
<td>18.0</td>
<td>18.0</td>
<td>17.9</td>
<td>22.4</td>
<td>13.0</td>
<td>17.7</td>
</tr>
<tr>
<td>Characters per Word</td>
<td>4.8</td>
<td>4.9</td>
<td>5.0</td>
<td>4.9</td>
<td>4.9</td>
<td>5.1</td>
<td>5.5</td>
<td>4.9</td>
</tr>
<tr>
<td><strong>Readability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive Sentences</td>
<td>27%</td>
<td>55%</td>
<td>9%</td>
<td>58%</td>
<td>14%</td>
<td>31%</td>
<td>19%</td>
<td>10%</td>
</tr>
<tr>
<td>Flesch Reading Ease</td>
<td>54.4</td>
<td>48.7</td>
<td>45.8</td>
<td>51.0</td>
<td>53.1</td>
<td>37.2</td>
<td>39.0</td>
<td>52.5</td>
</tr>
<tr>
<td>Flesch-Kincaid Grade Level</td>
<td>9.7</td>
<td>10.2</td>
<td>11.3</td>
<td>10.6</td>
<td>10.3</td>
<td>13.4</td>
<td>11.0</td>
<td>10.3</td>
</tr>
</tbody>
</table>

Note: The full names of the baseline and experimental text Web sites and their URLs are contained in Appendix D.
Chapter 4. Results

A total of 127 people participated in the study; however, responses from only 102 were analyzed. Ten participants with very low TOEIC rating scores were considered outliers and were removed from the data analysis. Another 14 participants were excluded because they did not submit TOEIC scores and one participant was excluded for not meeting the minimum age requirement of 18.

The data from the online survey were analyzed on a Dell Latitude E6400 laptop computer using the IBM PASW Statistics 18 package (formerly SPSS).

The online survey contained 45 questions that were broken down as follows:

- Five questions about participants’ comfort level and usage of both computers and the Web.
- Twelve demographic questions about participants’ age, gender, education levels, English language proficiency, and whether they had worked or were working as a medical professional.
- Seventeen questions about participants’ perceptions of credibility of the experimental texts.
- Five questions about factors such as interest, familiarity, and Web site characteristics that could relate to participants’ credibility perceptions.
- Six questions about participants’ comprehension of the second article that were designed to provide a rough indication of their English language reading comprehension.
Demographic Composition

Of the 102 participants analyzed, there was a fairly even distribution of gender with approximately 58% being male and approximately 41% being female. Their ages ranged from 19 – 56 with the average falling between 26 – 35 years of age (M=3.08, SD=1.06, where 1 = under 18 years; 6 = over 56 years).

Computer and Web Use

As would be expected with young, well-educated individuals, the participants’ were largely computer and Web literate and had used the Web for many years. As far as their comfort level with computers, 63% were very comfortable or somewhat comfortable using computers while 23% were somewhat uncomfortable or very uncomfortable (M = 3.65, SD = 1.37, where 1 = very uncomfortable; 5 = very comfortable). A similar pattern occurred with regard to participants’ comfort using the Web (M = 3.62, SD = 1.41, where 1 = very uncomfortable; 5 = very comfortable). Eight-eight percent of the participants had used the Web for 7 or more years (M = 3.41, SD = .934, where 1 = 1–3 years; 5 = more than 10 years).

In terms of the types of information participants searched for on the Web, most searched for general information on a regular basis, but fewer searched for medical information. The vast majority of the participants, 93%, said they use the Web to look up general information more than once a week (M = 5.83, SD = .662, where 1 = never; 6 = more than once a week). However, the results were more variable when it came to accessing medical information on the Web, with 47% accessing medical a few times a year, 38% accessing it on a monthly basis, and 11% accessing it on a weekly basis (M = 2.83, SD = 1.29, where 1 = never; 6 = more than once a week).
Education

All participants received the bulk of their general education in Japan; most of them also learned English there as well. Two-thirds of the participants were well educated with post-secondary degrees, 42% having attained a 4-year Bachelor’s degree and 21% having earned a graduate degree (M = 5.25, SD = 1.93, where 1 = junior high school; 7 = graduate degree). Most participants had not had a general education in English-speaking countries: 60% learned English in Japan and only 30% learned it over a period of 1-5 years in English-speaking countries such as the United States, Australia, Canada, and the United Kingdom (M = .56, SD = .76, where 0 = no years; 3 = 11-15 years).

Participant Involvement with Topic

Participants had little prior involvement with the topics covered in the experimental text. None of the participants reported having had the illness described in the experimental texts; however one participant reported that a friend or relative had contracted it.

Experience in Medical Professions

While none of the participants reported that they were currently employed in the medical professions, 12% (n = 12) had previously held jobs in those areas (e.g., physician, nurse, researcher).

Analysis of Ancillary Credibility Variables

Because the level of interest in the topic of the experimental text, its perceived difficulty, and its familiarity can influence perceptions of credibility, independent sample t-tests were conducted to test whether the level of explicitness affected these variables. None of the results revealed significant differences for interest \([t (100) = .376, p = .708]\), difficulty \([t (99) = 1.347, p = .181]\), or familiarity \([t (99) = .317, p = \ldots]\)
Most participants (64%) rated the topic as interesting or very interesting to read. Almost half of the participants (46%) rated the topic neutral in terms of difficulty; however, 24% found the information difficult or very difficult and 29% found the information easy or very easy. More than half (57%) of the participants were unfamiliar or very unfamiliar with the topic and only a small percentage (17%) were familiar with it.

Independent sample t-tests were also run to test which characteristics of a web site would most affect the readers' decision to use the online health information they read. These characteristics included author credentials, contact information, the information itself, the sponsoring institution, the layout and design, or other factors. Only one characteristic proved to be significant. Proficient English language users stated that layout and design would influence them significantly more (M = 4.89, SD = .737) than independent English language users (M = 4.21, SD = 1.255) (t (99) = 2.293, p = .024).

Analysis of Participant English Comprehension Levels

The participants' scores for the English comprehension article were analyzed as an additional verification measure for their self-reported TOEIC scores. However, the resulting scores from the comprehension survey questions did not correlate with the TOEIC scores submitted by the participants. Several participants made comments after they completed the survey that the comprehension article was difficult for them to understand because it contained more medical terminology than the credibility article. Therefore, the scores from the comprehension survey questions were dropped from further analysis.

Interestingly, the TOEIC scores correlated with the self-reported English language proficiency levels provided by the participants (r_s (101) = .391, p = .000).
Principal Components Analysis of Credibility Ratings

To simplify data analysis by reducing the number of dependent variables—thus reducing the potential for an inflated alpha level—the 15 dependent variables related to credibility were reduced to a smaller set of factors by conducting several iterations of a principal components analysis. In order to minimize the impact and distortions of outliers, all ten TOEIC scores in the Basic Proficiency category (the lowest proficiency category) were excluded in the analysis using a PASW filter.

A principal components analysis using Varimax with Kaiser Normalization rotation was conducted by producing a correlation matrix to generate the correlations between the fifteen credibility variables. Two variables—Information Meaning and Information Bias—were reverse coded to avoid negative valences (these variables had been scored in the opposite direction of the other variables). Coefficients with values of .3 or less were suppressed from the output. The rotated components matrix revealed four factors with Eigenvalues above 1 (Table 14). Although several measures (objectiveness, authoritativeness, clarity, similarity, and organization) cross-loaded across the factors, those crossloadings were relatively low (.438 or lower).
### Table 14. Four-Factor Rotated Components Matrix with Reverse Coding

<table>
<thead>
<tr>
<th>Credibility Variable</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
<th>Component 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Believability</td>
<td>.860</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Trustworthiness</td>
<td>.838</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Correctness</td>
<td>.826</td>
<td>.351</td>
<td>-.323</td>
<td></td>
</tr>
<tr>
<td>Information Objectiveness</td>
<td>.462</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Quality</td>
<td>.804</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Currency</td>
<td>.746</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Authoritativeness</td>
<td>.700</td>
<td>.324</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Meaning</td>
<td>.702</td>
<td>.622</td>
<td>.438</td>
<td></td>
</tr>
<tr>
<td>Information Clarity</td>
<td>.336</td>
<td>.611</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Detail</td>
<td>.403</td>
<td>.490</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Similarity</td>
<td>.410</td>
<td>.421</td>
<td>.568</td>
<td></td>
</tr>
</tbody>
</table>

Several variables were eliminated for the second factor analysis. The Information Similarity variable was deleted because it did not appear to fit conceptually with the other three variables with which it was grouped (Information Meaning, Information Clarity, and Information Detail). Similarly, the last three variables (Information Bias, Information Amount, and Information Organization) were excluded because they also did not appear to group conceptually. This final factor analysis was thus conducted with a three-factor loading to eliminate seemingly unrelated variables and to reduce the number of cross-factor loadings.

The following criteria were used for the final factor solution:

- Eigenvalues or 1 or more were required for all factors.
- The retained factors had to contain at least three measures with a loading of .6 or above.
Sampling adequacy had to measure .50 or higher with the Kaiser-Meyer-Olkin (KMO) statistic.

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was .699, which was above the .60 recommended minimum (Pallant, 2010), indicating that the three-factor dataset was suitable for factoring (Table 15). The observed significance level of Bartlett’s Test of Sphericity was highly significant \( p < 0.000 \) proving that the correlation matrix was not an identity matrix and also indicating that the variables in the correlation matrix were strong enough to proceed with a principal components analysis.

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</th>
<th>.699</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett’s Test of Sphericity</td>
<td>Approx. Chi-Square</td>
</tr>
<tr>
<td></td>
<td>df</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
</tbody>
</table>
The communalities after extraction were all above .3, further indicating that each item had some common variance with all the other items (Table 16).

**Table 16. Communalities after Extraction**

<table>
<thead>
<tr>
<th>Credibility Variable</th>
<th>Initial</th>
<th>Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Correctness</td>
<td>1.000</td>
<td>.760</td>
</tr>
<tr>
<td>Information Believability</td>
<td>1.000</td>
<td>.823</td>
</tr>
<tr>
<td>Information Authoritiveness</td>
<td>1.000</td>
<td>.673</td>
</tr>
<tr>
<td>Information Clarity</td>
<td>1.000</td>
<td>.661</td>
</tr>
<tr>
<td>Information Quality</td>
<td>1.000</td>
<td>.742</td>
</tr>
<tr>
<td>Information Currency</td>
<td>1.000</td>
<td>.488</td>
</tr>
<tr>
<td>Information Trustworthiness</td>
<td>1.000</td>
<td>.755</td>
</tr>
<tr>
<td>Information Reverse Meaning</td>
<td>1.000</td>
<td>.672</td>
</tr>
<tr>
<td>Information Detail</td>
<td>1.000</td>
<td>.361</td>
</tr>
</tbody>
</table>

Taken together, the KMO Measure of Sampling Adequacy and the Communalities after Extraction passed the minimum recommended values for proceeding with a principal components analysis.

The final principal components analysis for the three retained factors yielded stronger factor loadings (from .5 to .8) and reduced cross-factor loadings (Table 17).
Table 17. Retained Factors

<table>
<thead>
<tr>
<th>Credibility Variable</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Information Believability</td>
<td>.883</td>
</tr>
<tr>
<td>Information Correctness</td>
<td>.852</td>
</tr>
<tr>
<td>Information Trustworthiness</td>
<td>.848</td>
</tr>
<tr>
<td>Information Quality</td>
<td></td>
</tr>
<tr>
<td>Information Authoritativeness</td>
<td></td>
</tr>
<tr>
<td>Information Currency</td>
<td></td>
</tr>
<tr>
<td>Information Reverse Meaning</td>
<td></td>
</tr>
<tr>
<td>Information Clarity</td>
<td></td>
</tr>
<tr>
<td>Information Detail</td>
<td></td>
</tr>
</tbody>
</table>

The total variance explained for the three retained factors was 65.9% (Table 18) with Factor 1 accounting for 33.9%, Factor 2 accounting for 18.0%, and Factor 3 accounting for 13.9%.

Table 18. Total Variance Explained

<table>
<thead>
<tr>
<th>Credibility Variable Components</th>
<th>Initial Eigenvalues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>3.052</td>
</tr>
<tr>
<td>2</td>
<td>1.626</td>
</tr>
<tr>
<td>3</td>
<td>1.256</td>
</tr>
<tr>
<td>4</td>
<td>.852</td>
</tr>
<tr>
<td>5</td>
<td>.720</td>
</tr>
<tr>
<td>6</td>
<td>.483</td>
</tr>
<tr>
<td>7</td>
<td>.456</td>
</tr>
<tr>
<td>8</td>
<td>.338</td>
</tr>
<tr>
<td>9</td>
<td>.217</td>
</tr>
</tbody>
</table>
The final retained factors, each containing three measures, were then given a label that conceptually described the distinct constructs. The measures were analyzed by reviewing credibility literature and recognized definitions of credibility constructs and dimensions. Table 19 describes the rationale behind the grouping and labeling of the retained factors.

**Table 19. Retained Factors Groupings**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Factor Label</th>
<th>Credibility Variables</th>
<th>Related Survey Question</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Trustworthiness</td>
<td>Information Believability</td>
<td>I can believe the information in this article.</td>
<td>Information must be believed before it can be trusted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information Correctness</td>
<td>The information in this article seems correct.</td>
<td>If information is perceived as incorrect, it is unlikely to be perceived as trustworthy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information Trustworthiness</td>
<td>I can trust the information in this article.</td>
<td>N/A (The survey question asks about trustworthiness directly.)</td>
</tr>
</tbody>
</table>

*Continued on next page*
Next, a Multiple Analysis of Variance (MANOVA) was conducted to assess the effect of text explicitness and English language proficiency on the three extracted credibility factors: trustworthiness, quality, and accuracy. Significant differences were found for the effect of explicitness (Wilks' Lambda, $F (3, 95) = 2.890, p = .039$). The MANOVA did not prove significant for English language proficiency or for an interaction of text explicitness and English language proficiency.
Finally, the between subjects effects for text explicitness was investigated for the three credibility factors. There was a main effect for explicitness on the **Quality** factor only, $F(1,95) = 4.131$, $p = .045$. Participants in the explicit condition ($M = 3.50$, $SD=.62$) rated the text as more credible in terms of quality than participants in the implicit condition ($M = 3.07$; $SD = .61$). There were no significant main effects for the other two extracted credibility factors (i.e., trustworthiness and accuracy).
Chapter 5. Discussion and Conclusions

The first part of this chapter discusses how the demographic and reader attribute data along with the participants’ ratings of interest, familiarity, and difficulty might have affected their credibility perceptions and ratings. The second part interprets the study’s results within the framework of the three proposed hypotheses. Study limitations are then discussed in terms of their effect on the outcomes. Finally, the conclusion discusses the theoretical and practical implications of this study and suggests future research.

Discussion

This dissertation was an exploratory study that analyzed the following research question: How does text explicitness and English language proficiency affect readers’ credibility perceptions of online medical information? Three hypotheses were derived from this question and tested with Japanese ESL learners:

- **H1**: Participants would rate explicit text as more credible and implicit text as less credible.
- **H2**: Participants with lower English language proficiency would rate the experimental texts as less credible and participants with higher English language proficiency would rate the experimental texts as more credible.
- **H3**: Participants with lower English Language proficiency would rate the explicit text as more credible and participants with higher English Language proficiency would rate the implicit text as more credible.

The first hypothesis examined only how the level of explicitness might affect credibility ratings, without considering the participants’ level of proficiency; the second hypothesis examined only the effect of proficiency levels on credibility; and the third hypothesis
examined whether the level of text explicitness and participant English language proficiency would interact on the credibility measures.

**Demographic Data**

Since demographic variables have been shown to affect credibility perceptions, it is important to analyze the demographic composition and attributes of participants in credibility studies.

The participants were very Internet literate; 88% had used the Web for seven or more years, lending credence to the likelihood that their experience level would predispose them to find online information credible since studies have shown that users with more Internet experience are likely to find online information more credible than users who have less experience. The participants' level of computer and Internet involvement was undoubtedly bolstered by the extent of their education with most of them (63%) having completed a Bachelor's degree or earned a graduate degree. Because higher education is so intertwined with technological advances these days, almost all post-secondary students around the globe use computers and the Internet to study, write papers, and do research.

While almost all of the participants (93%) said they used the Web for searching general information several times a week, they searched less frequently for online medical information with 47% accessing it a few times a year, 38% accessing it monthly, and 11% accessing it on a weekly basis. The lower frequency may have been due to the relative youth of the participants and the fact that they might not have been at a stage in their life where medical information is important to them.

Another variable that can affect credibility perceptions is age. Previous research shows that older people are less likely to judge online information as credible than younger people because they have not grown up using computers as have today's younger population. The participants in this study were relatively young with the average age falling within 26 – 35, so
their age, combined with their extensive use of computers and the Internet, points to the likelihood that they would at least be open to finding online information credible, basically having grown up with the Internet and having spent a number of years shopping, learning, and socializing in online environments.

**Reader Attribute Data**

In addition to demographic characteristics that can affect credibility, other perceptions and characteristics can affect the credibility of online medical information such as the level of interest in and familiarity with the topic as well as the perceived difficulty. For example, if readers are too familiar with a topic because they have worked in the medical field, they may disagree with the content or possess additional information that contradicts it. Conversely, if readers are too unfamiliar with a topic they may not have enough prior knowledge to build a schema for processing this new information.

In terms of familiarity, all of the participants—with the exception of one participant who had had a friend or relative with Dengue Fever—had little prior knowledge of the disease covered in the experimental texts. And only a small number of the participants (12%) had previously worked in medical professions where they would have had experience with or knowledge of Dengue. While the participants may not have had much knowledge about Dengue Fever in particular, the 38% who perused online information several times a month may have had some general knowledge about mosquito-borne illnesses such as malaria that might have given them some cognitive scaffolding for understanding Dengue. Other participants may have received some general information about these types of illnesses during the course of their education. Thus, the information in the experimental texts was probably not overly familiar nor too unfamiliar, a situation that might have affected the participants' credibility perceptions.
As far as level of difficulty, 75% of the participants rated the information as either neutral or easy/very easy while 24% found it difficult. These results need to be interpreted in conjunction with the readability statistics that were calculated for each text in the study. The three texts—explicit, implicit, and comprehension—ranged from 10.3 to 13.4 for the Flesch-Kincaid Grade Level, which were comparable to the reading levels for the five texts from real-life medical Web sites that were used in the preliminary analysis.\(^{16}\) Those texts averaged a Flesch-Kincaid Grade Level of 10.4. The levels for both the experimental texts and the real-life Web sites were far higher than the 6\(^{th}\) to 8\(^{th}\) grade level that are generally recommended for online medical information.

Interestingly, the comprehension article had a lower (10.3) readability score than the two experimental texts (explicit = 13.4, implicit = 11.0), yet several participants made comments after the study that they found the comprehension article more difficult to understand than the experimental texts. In fact, these comments seem rather counterintuitive because the comprehension article had fewer words per sentence (17.7) than the explicit text (22.4). This suggests that the level of difficulty may have related to the kind of words used rather than their amount. The comprehension article contained many words that could be considered medical jargon such as vasculitis, sicca syndrome, and so on. Both the explicit and implicit texts, on the other hand, contained simpler, less jargon-laden language.

The final variable that might have impacted credibility was the participants' level of interest in the topic. A little over half of the participants rated the topic as interesting or very interesting. Studies have shown that topics that are perceived as interesting enable readers to understand and remember information better, which increases the likelihood that it will be more credible to them. A related variable that could also have affected the participants'

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\(^{16}\) While the comprehension article was not used to verify the participants' level of self-reported proficiency as originally planned, it provided some useful insights about all the texts used in the study based on post-survey comments from several participants.
credibility perceptions is personal relevance. Readers who have had health challenges or who have loved ones with health difficulties find information about these topics very interesting and relevant and are more likely to perceive them as credible. Since only one participant in this study knew a friend or relative who had contracted Dengue Fever, the probability that relevance would have affected credibility perceptions was low.

In summary, the probability that demographic factors or reader attributes might have influenced the participants’ credibility ratings was minimal.

**Participant Proficiency and Perceptions of Credibility**

While neither the English Language proficiency levels by themselves—or in combination with the experimental text’s explicitness levels—affected the credibility ratings of the participants, language proficiency levels did matter with one of the characteristics of Web sites that have previously been shown to be important in influencing credibility evaluations: site layout and design (Fogg et al. 2003). Both Independent and Proficient English Language participants rated site layout and design as being “somewhat important” (1 = most important, 2 = very important, 3 = important, 4 = somewhat important, 5 = not very important) in terms of credibility; however in terms of the actual ratings, the Proficient language participants rated site layout and design as somewhat less important to the evaluation of credibility ($M = 4.89$, $SD = .737$) than the independent participants ($M = 4.21$, $SD = 1.255$). This result is difficult to interpret in terms of the two proficiency levels involved because it is not clear whether the participants were referring to Web sites in their native language (in which case the proficiency variable would be moot), or whether they were referring to English language Web sites. The result does, however, confirm Fogg’s and others’ findings that good layout and design are important in helping readers make credibility judgments.
Credibility Results and Hypotheses

The first hypothesis was partially confirmed; the other two hypotheses were not. The first hypothesis, that participants would rate the explicit text as more credible and the implicit text as less credible, was partially confirmed. Because credibility has been shown to be a multidimensional construct, the principal components analysis attempted to reduce the 15 credibility variables to three in order to simplify data analysis (trustworthiness, quality, and accuracy). Out of these three variables, only the quality variable proved to be significant, with participants who read the explicit text judging it to be more credible than participants who read the implicit text.

A closer look at the statistics show that although there was a very small spread between the means of the implicit and explicit groups, the observed power (.521) was sufficient to reveal a difference on quality between the explicit and implicit texts. Statistical power determines whether a real difference exists between the treatment groups of an experiment. There are many components that affect statistical power: in this study, the number of participants and the effect size were relevant. The effect size measures the strength of the relationship between the independent variable (in this case the explicitness and implicitness of the topic) and the dependent variable (credibility). The number of participants can also affect power with more participants increasing power and fewer participants decreasing it.

While the recommended level of observed power is usually .8 or above, the fact that even the low observed power of .521 and the small spread in the means between the participant groups for the Quality variable achieved significance means that the strength of the association between explicitness and credibility was strong enough that even a small number of participants could still make a difference. However, while the spreads between means for the Trustworthiness and Accuracy variables was similarly small, the observed
power for each was too small to achieve significance (trustworthiness = .119, accuracy = .191), suggesting that more participants might have made a difference for these variables.

The second hypothesis, which proposed that participants with lower English language proficiency would rate the texts as less credible and participants with higher English language proficiency would rate the texts as more credible, was not proven. Again, the spread between the mean scores was too close and the observed power too low (ranging from .057 to .076 for the three credibility variables).

The third hypothesis suggested that participants with lower proficiency would rate the explicit text as more credible and participants with higher proficiency would rate the implicit texts as more credible. Although this hypothesis was not confirmed, a deeper examination of the data shows an interesting result with the Trustworthiness variable. While the Wilks’ Lambda measure was not significant (.933)—precluding any further analysis—it is interesting that in the Between Subjects test for trustworthiness, there was a trend toward significance (.09) for an interaction of explicitness and English Language proficiency as measured by the participants’ TOEIC scores. Again, the observed power was low (.396), suggesting that more participants might have made a difference.

Study Limitations

Several limitations affected the outcome of this study, perhaps the most significant being what turned out to be a small sample size. The power analysis revealed that the power of all the interactions was low, suggesting that a larger sample size may have increased the statistical significance. In addition, 25 participants were dropped from the study as discussed in the Results chapter, which further decreased the analyzable data.

Two factors that may have contributed to the small sample size included the time constraints of the study and the difficulties of recruiting participants remotely. Recruiting
proved to be more time-consuming and involved than anticipated. Part of the problem stemmed from the fact that the Japanese academic schedule for secondary education institutions is different than that of American institutions. A great deal of the recruiting involved Japanese students studying English in Japan and it turned out that the recruiting and data collection phase overlapped with their vacation times so they were unavailable for part of the data collection phase. In addition, the Japanese Tsunami that occurred on March 11, 2011, toward the end of the data collection phase, precluded the recruitment of any further participants from Japan for both ethical and practical reasons.

In addition to these scheduling and event-driven constraints, recruiting materials had to be tailored not only to different audiences (students, professors, and working professionals), but the recruiting material had to be customized for the formatting, length restrictions, and display requirements of social media channels such as Twitter, Facebook, and LinkedIn.

Both English and Japanese versions of the recruiting materials were used. As with the English recruiting materials, the Japanese versions had to be tailored for each type of audience and distribution method (e.g., social media web site postings, newspaper and newsletter advertisements, or e-mail). Care was taken to use the proper tone and appropriate honorifics (such as the suffix “-san” appended to a first name) in direct solicitations to Japanese professors and working professionals.

Yet another problem with remote recruiting—which is also an increasingly promising and tantalizing opportunity—concerns recruiting via the Internet in general and via social media in particular. The proliferation of social media web sites in the last five years provides a seemingly limitless opportunity to recruit millions of participants, either individually or within groups, from all over the world at little or no cost to researchers. However, postings on many social networking sites are ephemeral, lasting only until they are replaced by more recent postings. While a social networking site may have hundreds or even thousands of members,
it could be that only a few individuals are exposed to the posting before it is replaced by another one.

Establishing contacts in other countries (such as professors with possible student participants), sight unseen, is also difficult. Some contacts were willing to help outright but others preferred establishing more rapport before making a commitment, or had doubts about the researcher’s credibility, intentions, and ability to safeguard participants’ rights and privacy. To this end, the researcher provided a link in the recruiting materials to her LinkedIn profile that described her professional and academic credentials and provided endorsements by her own professors as well as colleagues in the technical communication field.

In hindsight, more participants might have been solicited in a shorter period of time by using the Test of English as a Foreign Language (TOEFL) rather than the TOEIC as a measure of English language proficiency. The TOEIC is more widely administered in Japan than in the United States, and with the recruiting challenges attributed to distance and the inability to make in-person contacts as described above it was difficult to obtain a larger sample size. Soliciting participants who had taken the TOEFL in an area geographically near the researcher would likely have increased the sample size substantially.

Several other limitations involved methodological issues related to credibility measures and their statistical analyses. While researchers agree that credibility is an important component in the usefulness of online medical information, there is no general consensus about how it should be measured or interpreted. Complicating this issue is the fact that credibility has been shown to have many dimensions or components. Some researchers who conduct credibility studies use the statistical technique of principal components analysis as a way to reduce the number of variables to a more manageable number for examination. However, the conceptual grouping and labeling of variables into meaningful categories is, at best, a subjective judgment of the researchers involved, which makes replication difficult.
In addition, while it is widely used, there is little agreement about what constitutes an adequate sample size for a principal components analysis, with some researchers advocating subject to ratio heuristics such as 15:1 or 30:1, and others promoting absolute minimum sample sizes. There is, however, general agreement that a principal components analysis should include several hundred participants at a minimum to avoid uncertain factor loadings, magnified error rates, and the inability to generalize to a larger population. Through consultation with a statistician, the researcher executed a successful principal components analysis on only 100 participants, but this number is below what is considered a minimum sample size for this technique.

Another methodological difficulty concerned the difficulty in correlating the parts of speech parsing from the human coders with that of the Infogistics Natural Language Processor. Parts of speech can change depending on context. The natural language processor is bound by defined rules that frequently do not pick up on meaning informed by context. Parts of speech coding requires judgment. For example, should the range of numbers 3 – 10 days be coded as one unit or two? Natural language processors parse words down into a very literal and granular level. As an example, the Infogistics Natural Language Processor considers the term “Dengue Fever” an adjective and a noun, while the Merriam English dictionary considers the term one unit—a proper noun. In addition, this parser categorizes certain parts of speech in ways that are clearly at odds with most authoritative sources. For example, it considers the DT “determiner” tag a type of article that includes words like “another,” “that,” “every,” and “these” when most experts consider articles to be “a,” “an,” or “the.” For research purposes it is probably necessary to get a reasonable measure of the formality level of a text. But for practical purposes, the explicitness level could be improved simply by increasing the frequency of non-deitic parts of speech to disambiguate meaning and to “paint” a more complete picture, particularly for those high-
context cultures that must try to derive the most complete meaning possible from essentially low-context information on Web sites.

Another challenge of this study involved some of the recruiting venues. The working professionals solicited on the LinkedIn social media Web site tended to have very high TOEIC scores. This may have excluded working professionals who had lower TOEIC scores and possibly introduced coverage error.

Finally, other unaccounted for variables may have confounded the results. The study did not measure other factors that might have affected the level of explicitness such as the use of graphics to make the topic more explicit and to provide context.

In addition, there may have been other elements that might have reduced comprehension and affected credibility ratings in spite of the explicitness of the text. While graphics and other visual elements were not embedded in the texts—allowing the participants to make credibility judgments solely from text—the participants still had to contend with all the mechanisms for reading in an online environment such as clicking hyperlinks to get from screen to screen, filling out the survey with a mouse or keypad, scrolling to read content that was longer than one screen, and so on. The extraneous cognitive load of the hypertext environment combined with the intrinsic cognitive load of the texts may have affected the way in which the readers processed the materials, reducing short-term or working memory for germane cognitive load. Germane cognitive load is particularly important for two reasons in this type of communicative situation. First, the intrinsic cognitive load of the material itself may have been compounded by the proficiency level of the interlanguage readers. Second, the participants were likely using the central route posited in ELM theory to judge the credibility of the experimental texts since interlanguage users are consciously processing syntax and grammar which were not native to them.
Conclusions and Recommendations for Future Work

In spite of the difficulties in recruiting participants, the methodological and statistical constraints, and the inability to achieve a larger sample size, one of the three hypotheses for this study was partially confirmed. Participants in this study—regardless of proficiency level—found the explicit text more credible on quality than the implicit text. This finding suggests that increasing the explicitness level by increasing the frequency of nouns, adjectives, prepositions, and articles may enrich the context of a text and fill in the communicative gap for nonnative English readers who come from high-context cultures, thus improving their credibility perceptions of quality. Because the participants were all from a high-context culture, they may find that in low-context Web sites where the graphics and interactivity that they are used to are absent, more explicit text fills in contextual gaps and "paints" a more complete picture of the information for them.

It may seem intuitive that the addition of more graphics or interactive elements might clarify meaning for readers from high-context cultures, and in fact, this may be appropriate for some types of informational Web sites. However, it may be completely inappropriate or inadvisable for medical Web sites. For example, a graphic video about a major surgical procedure may be so disturbing to readers who are contemplating it that they may be frightened away from getting a medical treatment they really need. In addition, graphical depictions of very personal or intimate bodily functions such as childbirth may be embarrassing or offensive to some readers, particularly those from cultures where these types of events are very private and not considered suitable for public forums such as the Web.

As the Web evolves, the trend has been to use words more sparingly. There are many reasons to argue for this trend toward minimalism. Part of this trend may be due to studies that have shown that readers get more easily fatigued from reading online material rather
than printed matter. Information overload is another source of reader fatigue that advocates for reducing the number of words and element interactivity in Web sites; many users search for specific information and do not want to wade through masses of irrelevant material. In addition, the proliferation of mobile devices means users are reading information on very small screens that demand an economy of words.

However, online medical information may be an exception because people who are searching for medical information for themselves or a loved one likely want as much detail as possible about the causes, symptoms, and treatment options of medical conditions. The higher the level of risk, the higher the likelihood that these consumers will want and seek detailed information that will answer their questions and help them make decisions.

While disambiguation is important to make sure that the right meaning gets across to e-health consumers who are nonnative English speakers, it may not ensure that they get enough nuanced meaning in order to make informed decisions. One could argue that systematic mechanisms and techniques already exist for disambiguating meaning. Controlled natural languages such as Plain English or Simplified Technical English already perform the function of disambiguating meaning by reducing the complexity of sentence structure and using a limited and standardized vocabulary. However, most controlled languages are used in very specific domains such as aircraft maintenance manuals or government documents and their goal is to limit vocabulary to reduce ambiguity rather than to augment and clarify meaning by adding more words.

In the case of high-context readers who are visiting a low-context medical Web site, it may be possible to provide a kind of semantic enrichment that enriches and clarifies meaning and paints a fuller picture of the information by increasing the frequency of non-deitic parts of speech such as nouns, prepositions, articles, and adjectives to enhance explicitness while using a lower frequency of deitic parts of speech that depend on context for meaning such as pronouns.
While increasing the frequency of non-deitic words seems like a straightforward approach to enrich meaning, a balance must be struck between using too many words—which may frustrate readers who want to get answers quickly—and not using enough. In addition, overly complex medical jargon that impacts readability levels should be avoided or described in simpler, layperson terms where possible.

Authors of online medical texts must consider ways to reduce both the intrinsic cognitive load of medical texts (which can be daunting given their potentially complex subject matter) as well as the extraneous cognitive load imposed on readers with limited proficiency or from different cultures. Future studies should include larger sample sizes, which in turn might answer the question posed in this study about whether language proficiency for L2 learners interacts with the explicitness of online medical to increase or decrease credibility. Other adult populations that have difficulty reading English might also benefit from an increased level of explicitness in online medical information. These might include elderly people with declining cognitive abilities, individuals with learning disabilities, or those with low literacy.

While this study specifically examined the effects of explicitness on the credibility of e-health information, it might be fruitful to also explore how the extraneous load of hypertext environments might interact with the text’s level of explicitness to influence credibility judgments. For example, would a higher or lower level of hypertext interactivity (hyperlinks, scrolling, mouse clicking) with implicit or explicit texts affect readers’ credibility evaluations?

Another intriguing direction might be to explore whether an increase in the explicitness level of online medical information matters for low-context readers who speak English as a second language and whether their proficiency levels factor into the equation. Because e-health consumers can be very invested in medical information if they or their loved ones are afflicted with medical challenges, it may be that readers, regardless of their socio-
cultural communication styles, want and need the greater detail and clarity of more explicit information on which to base their medical decisions.

In a related but somewhat different direction, researchers might also consider exploring whether the addition of more signaling devices such as headings and graphical elements such as tables, charts, and bulleted lists might organize information in a visual way that, combined with a higher level of explicitness, might help high-context readers understand and judge information in a better way.

Future studies could also explore whether explicitness could be generalized to paper-based texts to help improve the credibility of medical information. While more of the world's population is accessing the Web every day, there are still millions of people who do not have access to the Web for economical, political, or social reasons. For these individuals, medical information is still available only from brochures in their doctor's offices, in magazines, or through other paper-based media.

As continuing research in the area of online credibility is showing, many variables—from reader demographics and attributes to the way information is designed and displayed—affect the credibility perceptions of readers. While the style of texts, such as the use of active versus passive voice, has been shown to affect these perceptions, the level of explicitness has not, until this study, been explored to see what role it might play in credibility evaluations. This study has added to the theory and practical applications of credibility research by showing that style in the form of explicitness does affect the credibility judgments of online medical information for high-context readers. Because explicitness has been empirically shown to be the most basic and common component of variation in style across languages, its manipulation shows great promise in the attempt to improve the credibility of online medical information across geographic borders.

Authors and sponsors of online medical information should keep in mind that the interest in and concern for human health are shared by people around the globe. Millions of
people are accessing online health information—much of it from English language Web sites—every day around the world. In keeping with the concept of digital inclusion, online medical information for e-health consumers who speak English as a second language must deliver information that is unambiguous but robust enough that readers will feel they are receiving the credible information they need to help them make important health decisions.
Appendix A – Recruiting Material

E-mail to ESL Professors at Universities

Subject: Seeking Japanese ESL Participants for an Online Study

Dear Dr. Smith,

I am a Ph.D. student at the University of Washington in Seattle who is looking for Japanese ESL individuals over the age of 18 who have taken the TOEIC exam within the last 5 years to participate in an online study for my dissertation research. The purpose of my dissertation study is to use the input from my survey participants to help develop guidelines that improve English-language Web sites for nonnative English speakers.

I would like to invite your Japanese students to participate in my study. If you think some of your students might be qualified and interested can you suggest a good way for me to contact them? I know you cannot give out names, but I am wondering if you would consider sending your students an e-mail I’ve prepared that contains details about the study as well as the URL to access it. Alternatively, do you have a Web site where I could post some information?

I am offering several incentives to those who participate. Participation is voluntary and all responses will be kept strictly confidential.

Many thanks and looking forward to hearing back from you.

P.S. If you would like to get an idea about my background and credentials, I have a profile on LinkedIn at: http://www.linkedin.com/pub/sandy-bartell/6/10/7ab
E-mail for Professors to E-Mail Their Students

A Ph.D. student at the University of Washington in Seattle is looking for Japanese ESL (English as a Second Language) individuals over the age of 18 who have taken the TOEIC exam within the last 5 years for an online study. She is looking for recruits with ALL LEVELS OF ENGLISH PROFICIENCY—from beginner to advanced. The purpose of her dissertation study is to use the input from survey participants to help develop guidelines that improve English-language Web sites for nonnative English speakers.

Participation is entirely voluntary. Participants will need to submit their TOEIC scores when they take the survey but all of their responses will be kept strictly confidential.

Participants will read two short articles and answer some survey questions. At the end of the study they will have the chance to enter a drawing for some Amazon.com or Amazon.co.jp (their choice) gift certificates.

To participate in the study, go to the following URL and follow the directions to proceed with the study:

https://catalysttools.washington.edu/Webg/survey/sandybar/102698

If participants have other friends or colleagues who might qualify or be interested in participating in this study, the Ph.D. student will be grateful if they pass on this information to them.
Classified Advertisement for University Student Newspaper

Title: Japanese ESL Students Needed for online study.

Eligible participants must be:

- Japanese person between the ages of 18 – 65.
- Japanese individuals with ANY level (from beginner to advanced) of English-language proficiency. They must have taken the Test of English for International Communication (TOEIC) within the past 5 years and will be asked to submit their reading proficiency score.
- Comfortable with computers and the Internet.

The participants will read two online short articles and answer some survey questions. This will take about 20 minutes and at the end of the study they will have the chance to enter a drawing for some Amazon.com gift certificates. If interested contact:

sandybar@u.washington.edu
E-mail to Students or Individuals Who Requested Additional Information

Dear Morimu,

Thank you for showing interest in my study! It is an online study accessed via the Internet (I will give you the URL). You would read two short articles and answer some survey questions. The whole thing should take around 20 minutes or so. The purpose of my study is to gather data that would help improve English-language Web sites for nonnative speakers.

Requirements are:

- You must be over 18
- You must be a Japanese individual
- You must have taken the TOEIC exam within the last 5 years

You'll be asked to submit your TOEIC score but ALL responses will be kept strictly confidential. At the end of the study you would have the chance to enter a raffle for an Amazon.com or Amazon.co.jp gift certificate (your choice). If you're still interested I can send you the URL.
Posting on Japanese Mixi Social Network (in Japanese)

オンライン研究の為にTOEICの受験経験のあるアンケート回答者募集中！

アンケート回答者には抽選でAmazon.co.jpのギフトカードを差し？悉考構想？

現在シアトルのワシントン大学の大学院研究生がリサーチに参加できるESL（英語が母国語ではない人）で次の条件を満たした日本人アンケート回答者を募集しています。この5年間以内に難度のレベルに関わらずTOEIC（Test of English for International Communication）のテストを受けられた18歳から65歳の日本人の方、パソコンとインターネットが問題なく使える方。

参加者にはTOEICの成績を提出して頂きますが全ての個人情報は厳格に保護されます。

実際のアンケートでは2つの短い論文を読んで頂いた後、いくつかの質問に答えていただきます。アンケート完了後にAmazon.co.jpのギフトカードの抽選権が得られます。

アンケートのURL：https://catalysttools.washington.edu/Webq/survey/sandybar/9695

URLを開いた後は、表示された指示に従ってアンケートを完了してください。
Posting on Japanese Mixi Social Network (English Translation)

Complete an online research survey for a chance to enter a drawing for some Amazon.co.jp gift certificates!

A Ph.D. student at the University of Washington in Seattle (U.S.A.) is looking for Japanese ESL (English as a Second Language) individuals over the age of 18 who have taken the TOEIC exam within the last 5 years for an online study. She is looking for recruits with ALL LEVELS OF ENGLISH PROFICIENCY—from beginner to advanced. The purpose of her dissertation study is to use the input from survey participants to help develop guidelines that improve English-language Web sites for nonnative English speakers.

Participants will need to submit their TOEIC scores when they take the survey but all of their responses will be kept strictly confidential.

If interested, you will read two short articles and answer some survey questions. At the end of the study you will have the chance to enter the drawing for the Amazon.co.jp gift certificates.

To get the URL for the study, go to:
https://catalysttools.washington.edu/Webq/survey/sandybar/96958

Then follow the instructions at that URL to proceed with the study.
E-mail to Individual ESL Teachers via Facebook

Hi! I'm a Ph.D. student at the University of Washington in Seattle who is looking for Japanese ESL individuals over the age of 18 who have taken the TOEIC exam within the last five years to participate in an online study for my dissertation research. Do you have any students who might be qualified and interested? They would read two short articles and answer some survey questions. By participating in the study they can enter a drawing to win some Amazon.com or Amazon.co.jp (their choice) gift certificates. Your students can access the study at:

https://catalysttools.washington.edu/Webq/survey/sandybar/102698

Instructions for proceeding with the study are located at this URL. Thank you for your help! …and if you have any friends or other colleagues whom you think might qualify and be interested, please feel free to give them the URL!
E-mail to Specific ESL Teachers in a Group on LinkedIn

Subject: Seeking Japanese ESL Subjects for Online Study

Dear Jim,

I ran across your name in the JALT group on LinkedIn while searching for individuals who might be involved in teaching Japanese people ESL. By way of introduction, I am a Ph.D. student at the University of Washington in Seattle. I am trying to recruit Japanese individuals over the age of 18 who have taken the TOEIC exam within the last five years for my dissertation research.

I've been doing most of my recruiting via Facebook and LinkedIn—and some even on Mixi through a Japanese contact, but so far have not been able to recruit too many participants. Do you have some students or professional colleagues who might qualify and be interested? I am looking for either ESL students or Japanese professionals working in multinational corporations who have taken the TOEIC (ALL levels of proficiency—from beginner to advanced).

My study is online and involves reading two short articles and answering some survey questions. Participants have the chance to enter a drawing at the end of the study to win some Amazon.com or Amazon.co.jp gift certificates (their choice). Participation is voluntary and all responses will be kept strictly confidential. Looking forward to hearing back from you.

P.S. If you would like to check out my credentials, you can find me on LinkedIn at:

http://www.linkedin.com/profile/edit?id=17937779&trk=hb_tab_pro_top
LinkedIn E-mail to Japanese Individuals Who Have Taken the TOEIC Exam

Dear Hayashi,

I ran across your name on LinkedIn while searching for individuals who might be involved in teaching Japanese people ESL. By way of introduction, I am a Ph.D. student at the University of Washington in Seattle. I am trying to recruit Japanese individuals over the age of 18 who have taken the TOEIC exam within the last five years for my dissertation research.

I've been doing most of my recruiting via Facebook and LinkedIn—and some even on Mixi through a Japanese contact, but so far have not been able to recruit too many participants. From your LinkedIn Profile, it looks like you have taken the TOEIC. Would you consider taking my survey or do you have some Japanese colleagues who might be qualified and interested? I am looking for either ESL students or Japanese professionals working in multinational corporations who have taken the TOEIC (ALL levels of proficiency—from beginner to advanced).

My study is online and involves reading two short articles and answering some survey questions. Participants have the chance to enter a drawing at the end of the study to win some Amazon.com or Amazon.co.jp gift certificates. Looking forward to hearing back from you.
E-mail to Directors of TOEIC Test Centers

Dear Mr. Harper,

I am a Ph.D. student at the University of Washington in Seattle who is looking for Japanese ESL individuals over the age of 18 who have taken the TOEIC exam to participate in an online study for my dissertation research. I ran across your Web site as I was searching for TOEIC testing centers in the United States.

The purpose of my dissertation study is to use the input from my survey participants to help develop guidelines that improve English-language Web sites for nonnative English speakers.

I am wondering whether some of your students who have taken the TOEIC might be interested in participating in my study. The study is online and participants would read two short articles and then answer some survey questions. I am offering several incentives to those who participate. Participation is voluntary and all responses will be kept strictly confidential.

If you think some of them might be interested can you suggest a good way for me to contact them? I know you cannot give out names, but I am wondering if you would consider sending your students an e-mail I've prepared that contains details about the study as well as the URL to access it.

P.S. If you would like to get an idea about my background and credentials, I have a profile on LinkedIn at: http://www.linkedin.com/pub/sandy-bartell/6/10/7ab
Tweet on Researcher's Twitter Account

Home

eslresearcher Need Japanese ESL students >18 years who have taken TOEIC for online study. Incentives offered. Visit http://tinyurl.com/6bevrzt

Tweet on other Twitter Accounts

PhD student needs JAPANESE ESL students >18 years who have taken TOEIC for online study. Incentives offered: http://tinyurl.com/6bevrzt
Referral E-Mail from Former Japanese ESL Teacher

Dear Ashiro,

Your former English language teacher, Stephanie Fuccio, suggested I contact you because I am looking for participants for an online study and she thought you might qualify and possibly be interested. Stephanie asked me to say “hello” to you from her.

By way of introduction, I’m a Ph.D. student at the University of Washington in Seattle who is looking for JAPANESE ESL (English as a Second Language) individuals over the age of 18 who have taken the TOEIC exam within the last 5 years for an online study. I am looking for recruits with ALL LEVELS OF ENGLISH PROFICIENCY—from beginner to advanced. The purpose of my dissertation study is to use the input from survey participants to help develop guidelines that improve English-language Web sites for nonnative English speakers.

Participation is entirely voluntary. If you would like to participate you will need to submit your TOEIC score when you take the survey but all of your responses will be kept strictly confidential.

You would read two short articles and answer some survey questions. At the end of the study you would have the chance to enter a drawing for some Amazon.com or Amazon.co.jp (their choice) gift certificates.

To participate in the study, please go to the following URL and follow the directions to proceed with the study:

https://catalysttools.washington.edu/Webq/survey/sandybar/96958

If you end up participating, thank you very much!
Postings on Facebook and LinkedIn Group pages

Subject: Seeking Japanese ESL Individuals for Online Study

Hi! I'm a Ph.D. student at the University of Washington. Seeking Japanese ESL individuals over 18 who have taken the TOEIC exam within the last 5 years to participate in an online study. Read 2 short articles, answer some survey questions, and enter a drawing to win some Amazon.com gift certificates. Go to:

https://catalysttools.washington.edu/Webq/survey/sandybar/102698
Japanese Student Associations (colleges or universities)

Dear Japanese Friends,

I am a Ph.D. student at the University of Washington in Seattle who is looking for Japanese ESL individuals who have taken the TOEIC exam to participate in an online study for my dissertation research.

Perhaps some of your student members have taken the TOEIC and might be interested in participating in my study. The study is online and participants would read two short articles and then answer some survey questions. I am offering several incentives to those who participate.

If you think some of them might be interested can you suggest a good way for me to contact them? I would appreciate any suggestions or advice you can give me. Many thanks!

P.S. I have a prepared text that can be e-mailed to your students if you think this would be a good approach.
Flyer with Tear Strips

オンライン研究の為にTOEICを受けたことがある日本人募集中

A researcher from the University of Washington in Seattle is soliciting participants for an online study.

To participate in the study you must be a Japanese individual with ANY level (from beginner to advanced) of English-language proficiency. You must have taken the Test of English for International Communication (TOEIC) within the past 5 years and will be asked to submit your proficiency score. All of your responses will be confidential.

If you choose to participate, you will read two short articles and answer some survey questions. Your input will help develop guidelines that improve English-language Web sites for nonnative English speakers. Your participation will take about 20 minutes and at the end of the study you will have the chance to enter a drawing for some Amazon.com or Amazon.co.jp (your choice) gift certificates.

To access the study, please enter the following URL into Internet Explorer (or the browser of your choice):


Then follow the online instructions for completing the study.

Thank you for participating!
Recruiting E-Mail from Author's Dissertation Committee Members to Colleagues

Hello Jennifer,

I am forwarding an e-mail from a graduate student in our department who is working with me on her dissertation study. She is looking for some Japanese individuals who speak English as a second language to participate in her study. Participants will be given the chance to win a raffle for Amazon.com or Amazon.co.jp (their choice) gift certificates.

Please see below. Feel free to forward her solicitation to any colleagues or individuals you think might be interested.

Thanks,

[Committee Member Name]
Appendix B - Baseline Texts

Mayo Clinic (http://www.mayoclinic.com/)

Dengue fever is a disease—ranging from mild to severe—caused by four related viruses spread by a particular species of mosquito. Mild dengue fever causes high fever, rash, and muscle and joint pain. More severe forms of the disease—dengue hemorrhagic fever and dengue shock syndrome—can additionally cause severe bleeding, a sudden drop in blood pressure (shock) and death.

No specific treatment for dengue fever exists, and most people recover. But if you have a severe form of the disease, you need hospital care.

Millions of cases of dengue infection occur worldwide each year. Most often, dengue fever occurs in urban areas of tropical and subtropical regions. A few cases have been reported in the United States—particularly in Texas, along the border with Mexico, and in Hawaii.

Signs and symptoms of dengue fever vary, depending on the form and severity of the disease.

With the mild form of the disease, you may experience some or all of these signs and symptoms:

- High fever, up to 105 F (40.6 C)
- A rash over most of your body, which may subside after a couple of days and then reappear
- Severe headache, backache or both
- Pain behind your eyes
- Severe joint and muscle pain
• Signs and symptoms usually begin about four to seven days after being bitten by a mosquito carrying a dengue virus. Mild dengue fever rarely causes death, and your symptoms will usually subside within a week after starting.

WebMD (http://www.Webmd.com/)

Dengue fever is a painful, debilitating mosquito-borne disease caused by any one of four closely related dengue viruses. These viruses are related to the viruses that cause West Nile infection and yellow fever.

Each year, an estimated 100 million cases of dengue fever occur worldwide. Most of these are in tropical areas of the world, with the greatest risk occurring in

• The Indian subcontinent
• Southeast Asia
• Southern China
• Taiwan
• The Pacific Islands
• The Caribbean (except Cuba and the Cayman Islands)
• Mexico
• Africa
• Central and South America (except Chile, Paraguay, and Argentina)

Most cases in the United States occur in people who contracted the infection while traveling abroad. But the risk is increasing for people living along the Texas-Mexico border and in other parts of the southern United States. In 2009, an outbreak of dengue fever was identified in Key West, Florida.

Dengue fever is transmitted by the bite of an Aedes mosquito infected with a dengue virus. The mosquito becomes infected when it bites a person with dengue virus in their blood. It can’t be spread directly from one person to another person.
Symptoms, which usually begin four to six days after infection and last for up to 10 days, may include:

- A sudden, high fever
- Severe headaches
- Pain behind the eyes
- Severe joint and muscle pain
- Nausea
- Vomiting
- Skin rash, which appears three to four days after the onset of fever mild bleeding (such as a nose bleed, bleeding gums, or easy bruising)

National Institutes of Health (http://www.nih.gov/)

Dengue fever is an infectious disease carried by mosquitoes and caused by any of four related dengue viruses. This disease used to be called "break-bone" fever because it sometimes causes severe joint and muscle pain that feels like bones are breaking, hence the name. Health experts have known about dengue fever for more than 200 years.

Dengue fever is found mostly during and shortly after the rainy season in tropical and subtropical areas of

- Africa
- Southeast Asia and China
- India
- Middle East
- Caribbean and Central and South America
- Australia and the South and the Central Pacific
An epidemic in Hawaii in 2001 is a reminder that many locations in the United States are susceptible to dengue epidemics because they harbor the particular types of mosquitoes that transmit dengue virus.

Worldwide, 50 to 100 million cases of dengue infection occur each year. This includes 100 to 200 cases in the United States, mostly in people who have recently traveled abroad. Many more cases likely go unreported because some healthcare providers do not recognize the disease.

During the last part of the 20th century, many tropical regions of the world saw an increase in dengue cases. Epidemics also occurred more frequently and with more severity. In addition to typical dengue, dengue hemorrhagic fever (DHF) and dengue shock syndrome also have increased in many parts of the world. Globally, there are an estimated several hundred thousand cases of DHF per year.

Virtual Hospital (http://www.uihealthcare.com/vh/)

Dengue fever, also known as breakbone fever, is a viral illness caused by the bite of a mosquito. Dengue fever is found worldwide, but more frequently seen in Caribbean countries, central and South America, Mexico, the Pacific and tropical countries of Asia, and parts of tropical Africa.

Most of the cases in the United States are seen in people who have traveled to a tropical region. However, with the decrease in mosquito control programs, the numbers of cases of dengue fever have been rising.

The incubation period may range from three to 15 days, however symptoms usually begin 5 to 8 days after being bitten by an infected mosquito. Most dengue fever results in a relatively mild illness.

Symptoms include:

- Sudden onset of high fever
• Severe headache
• Rash
• Swollen glands
• Severe muscle and joint pain
• Nausea and vomiting
• Flushing of the face and
• Pain behind the eyes or with movement of the eyes

The first three symptoms are known as the "Dengue Triad." Dengue fever should be considered in any patient with these symptoms who has a history of traveling to tropical climates throughout the world. If dengue fever is suspected, your healthcare provider will order a blood test to confirm the diagnosis.

The treatment for dengue fever is supportive care with bed rest advised during the period of high fever. Acetaminophen is the preferred treatment for fever and headache because of the blood thinning properties of aspirin. Acetaminophen should not be taken by anyone with known liver or kidney disease.

Wrong diagnosis.com (http://www.wrongdiagnosis.com/)

Dengue fever, also called dengue, is a potentially serious disease caused by a virus. There are four types of dengue virus that can cause illness in humans. Dengue viruses are transmitted between humans by the bite of an infected Aedes mosquito.

Dengue is rare in the U.S., but is common and a serious public health threat in warm sub-tropical and tropical areas of the world. These include areas of Central and South America, Africa, Southeast Asia, China, India, the Middle East, Australia, the Caribbean and the South and Central Pacific. Dengue fever is most common in urban areas and outbreaks occur commonly during the rainy season when mosquitoes breed heavily in standing water.
The incidence of dengue fever is on the rise worldwide, and in some areas of Asia, complications of the disease are a leading cause of serious illness and death in children.

Mosquitoes pick up a dengue virus when they bite a human who is already infected with the virus. The mosquito then carries it in its own blood and spreads it when it bites other humans.

After a dengue virus enters the human bloodstream, it spreads throughout the body. Symptoms appear in about eight to ten days after a bite from an infected mosquito. Symptoms are flu-like and can include high fever, nausea, vomiting, body aches, and headache.

Most people can recover from dengue fever, but some cases can progress into a life-threatening complication called dengue hemorrhagic fever. Symptoms of this disease include severe, uncontrolled hemorrhage and shock.
Appendix C – Scoring Instructions and Guidelines

Instructions:

1. Read the articles.

2. Count the number of occurrences for each part of speech (e.g., number of verbs, number of nouns) in the article using the attached Scoring Rubric as a guide.

<table>
<thead>
<tr>
<th>Parts of Speech</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nouns</td>
<td></td>
</tr>
<tr>
<td>Verbs</td>
<td></td>
</tr>
<tr>
<td>Pronouns</td>
<td></td>
</tr>
<tr>
<td>Adjectives</td>
<td></td>
</tr>
<tr>
<td>Articles</td>
<td></td>
</tr>
<tr>
<td>Adverbs</td>
<td></td>
</tr>
<tr>
<td>Prepositions</td>
<td></td>
</tr>
<tr>
<td>Conjunctions</td>
<td>N/A</td>
</tr>
<tr>
<td>Interjections</td>
<td></td>
</tr>
<tr>
<td>Total Words</td>
<td></td>
</tr>
</tbody>
</table>

Note: Do not score conjunctions. They are included in the rubric only to differentiate them from other parts of speech.

Remember that many words can assume a different part of speech depending on their context in a sentence. For example the word “where” can be an adverb, noun, pronoun, or conjunction as shown in the following sentences:

- Adverb – Where is the boy?
- Noun – The how, when, and where should be considered in the solution.
- Pronoun – Where did the man say he was from?
- Conjunction – I will go where you go.

If in doubt about a particular word, consult http://dictionary.reference.com/. This online resource provides excellent examples of sentences where a word may assume different parts of speech depending on its relation to other words.

3. Use the following formula to calculate the formality score:

\[
F = \left( \frac{n_g + n_d + n_p + n_a - p_g - v_f - a_f - i_f + 100}{2} \right)
\]

...where frequency is the percentage of words belonging to a category (e.g.,
nouns, adverbs, adjectives). Calculate by dividing the number of words in the speech part category by the total number of words x 100.

**Example:** \( \frac{135 \text{ nouns}}{1,044 \text{ total words}} \times 100 = 13\% \) (round up or down to nearest integer)
Other Scoring Guidelines:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Example(s)</th>
<th>How to Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infinitives</td>
<td>To + verb. Can be an adjective, noun, or adverb</td>
<td>• To steal is wrong (noun)</td>
<td>Score as one unit (i.e., as one verb, noun, or adverb)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• He used the key to open the door (adverb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• He uses a knife to cut his meat. (adjective)</td>
<td></td>
</tr>
<tr>
<td>Verbs</td>
<td>to be, is taken</td>
<td></td>
<td>Score as one unit (i.e., as one verb)</td>
</tr>
<tr>
<td>• Auxiliary verbs</td>
<td>Verb-like words that accompany verbs</td>
<td>• Should be washed</td>
<td>Score as one unit (i.e., auxiliary + verb = verb)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Can drink</td>
<td></td>
</tr>
<tr>
<td>Nouns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Gerunds</td>
<td>Verbals that end in -ing and function as nouns</td>
<td>The man is eating</td>
<td>Score as a noun</td>
</tr>
<tr>
<td>Acronyms</td>
<td>A word created with the first letters of a series of words</td>
<td>CDC (Centers for Disease Control)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do not score the acronym if it follows the spelled out word. Example: Post Traumatic Stress Disorder (PTSD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do score if the acronym appears by itself. Example: PTSD</td>
<td></td>
</tr>
<tr>
<td>Proper names of diseases or pathogens</td>
<td>English or Latin designations of illnesses or the pathogens that cause them</td>
<td>Methicillin Resistant Staphylococcus</td>
<td>Score as one unit (i.e., as one noun)</td>
</tr>
</tbody>
</table>

Continued on next page
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Example(s)</th>
<th>How to Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compound Adjectives</td>
<td>Two adjectives that modify a noun. They are always hyphenated.</td>
<td>Red-hot coals</td>
<td>Score as one unit (i.e., as one adjective)</td>
</tr>
<tr>
<td>Cardinal Numbers</td>
<td>Numeric ranges and multiple-word numbers that are spelled out</td>
<td>• 2.3 million</td>
<td>Score both a range of numbers and multiple word numbers that are spelled out as one unit (i.e., as one adjective or noun)</td>
</tr>
<tr>
<td>Latin Abbreviations</td>
<td>Abbreviations that indicate an example or clarify something</td>
<td>• e.g. (for example)</td>
<td>Do not score.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• i.e. (that is)</td>
<td></td>
</tr>
<tr>
<td>Numeric or Currency Symbols</td>
<td>Symbols such as those for indicating temperature or currency</td>
<td>• F, Fahrenheit</td>
<td>Score as nouns whether displayed in symbolic form or spelled out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• $, dollar</td>
<td></td>
</tr>
<tr>
<td>Punctuation</td>
<td>Periods, dashes, question marks</td>
<td>• . ? / .&quot;</td>
<td>Do not score.</td>
</tr>
<tr>
<td>Formatting Symbols</td>
<td>Symbols for items in a bulleted list</td>
<td>• * - • •</td>
<td>Do not score.</td>
</tr>
<tr>
<td>Geographic Areas</td>
<td>Names of countries or geographic areas composed of more than one word</td>
<td>• United States, The Czech Republic</td>
<td>Score as one unit (i.e., as one noun)</td>
</tr>
</tbody>
</table>
### Scoring Rubric

<table>
<thead>
<tr>
<th>Speech Part</th>
<th>Function</th>
<th>Examples</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noun</td>
<td>A person, thing, place, or idea</td>
<td>Apple, boy, concept, beauty</td>
<td>Poached salmon is my favorite food.</td>
</tr>
<tr>
<td>Verb</td>
<td>A word that describes an action or state of being</td>
<td>Walk, study, talk, be, enjoy</td>
<td>He thought he was prepared, but he wasn't.</td>
</tr>
<tr>
<td>Pronoun</td>
<td>A word that replaces a noun</td>
<td>I, you, me, my, they, their, your, nobody, who, which, her, him, we, ourselves, he, she</td>
<td>They walked her to the front gate. Nobody knew whether he or she committed the crime.</td>
</tr>
<tr>
<td>Adjective</td>
<td>A word that describes a noun or pronoun</td>
<td>Every, white, fat, intelligent, rough, silky</td>
<td>The river was clear and cold on that chilly fall day.</td>
</tr>
<tr>
<td>Article</td>
<td>A kind of adjective that is always used with a noun and further explains or delimits it</td>
<td>a, an, the</td>
<td>A man was attempting to cross the river with an old boat.</td>
</tr>
<tr>
<td>Adverb</td>
<td>A word that modifies an adjective or that describes how, when, or where an action was performed. Can be a verb, adjective, or adverb. If a word ends in <em>ly</em> it is usually an adverb.</td>
<td>Lovely, too, rarely, never, sometimes, very, carefully, neither</td>
<td>The doctor carefully removed the splinter. Uncle Jim was very concerned about his nephew. Sometimes he ran, but most of the time he walked briskly.</td>
</tr>
</tbody>
</table>

*Continued on next page*
<table>
<thead>
<tr>
<th>Speech Part</th>
<th>Function</th>
<th>Examples</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preposition</td>
<td>A word used before nouns or pronouns to indicate a spatial, temporal, or other relationship</td>
<td>As, At, by, About, of, before, between, for, from, after, into, during, under, over, beyond, in, on, until, from, across, toward, with, without, since, to</td>
<td>Look on the shelf before you look under the cabinets. It was neither here nor there.</td>
</tr>
<tr>
<td>Conjunction</td>
<td>Joins words, clauses, or sentences</td>
<td>And, but, or, nor, while, since, although, because, neither</td>
<td>While he was able to finish his Math homework, he couldn't start his History assignment.</td>
</tr>
<tr>
<td>Interjection</td>
<td>A brief exclamation</td>
<td>Ow! Say! Stop!</td>
<td>Run! Don't move!</td>
</tr>
</tbody>
</table>
The parts of speech for the manual deconstruction were identified with a color-coding scheme using the following legend:

**Parts of Speech:**
- Nouns
- Verbs
- Adjectives
- Adverbs
- Prepositions
- Conjunctions
- Interjections
Appendix D – Manual Deconstruction of Baseline Texts

Manual Deconstruction Results (Researcher)

Mayo Clinic (http://www.mayoclinic.com/)

Dengue fever is a disease—ranging from mild to severe—caused by four related viruses spread by a particular species of mosquito. Mild dengue fever causes high fever, rash, and muscle and joint pain. More severe forms of the disease—dengue hemorrhagic fever and dengue shock syndrome—can additionally cause severe bleeding, sudden drop in blood pressure (shock) and death.

Specific treatment for dengue fever exists, and most people recover. But if you have a severe form of the disease, you need hospital care.

Millions of cases of dengue infection occur worldwide each year. Often, dengue fever occurs in urban areas of tropical and subtropical regions. Few cases have been reported in the United States—particularly in Texas, along the border with Mexico, and in Hawaii.

Signs and symptoms of dengue fever vary, depending on the form and severity of the disease.

With a mild form of the disease, you may experience some or all of these signs and symptoms:

- High fever, $\geq 105 \text{ F (40.6 C)}$
- Rash over face, neck, body, ankle, arms and palms after 3 days and doesn't respond
- Severe headache, backache or pain
- Pain behind ear or eyes
• Fever and muscle pain

• Signs and symptoms usually begin about four to seven days after being bitten by a mosquito carrying dengue virus. Widespread dengue fever may cause death, and some symptoms will persist subsiding within a week after starting.

<table>
<thead>
<tr>
<th>Parts of Speech</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nouns</td>
<td>66</td>
</tr>
<tr>
<td>Verbs</td>
<td>27</td>
</tr>
<tr>
<td>Pronouns</td>
<td>8</td>
</tr>
<tr>
<td>Adjectives</td>
<td>39</td>
</tr>
<tr>
<td>Adverbs</td>
<td>18</td>
</tr>
<tr>
<td>Prepositions</td>
<td>37</td>
</tr>
<tr>
<td>Conjunctions</td>
<td>N/A</td>
</tr>
<tr>
<td>Interjections</td>
<td>0</td>
</tr>
<tr>
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Explicitness Level Formula

\[
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\]

\[
F = (32.1+19+8.7–3.9–13.1–4.8–0+100)/2
\]

Explicitness Level = 78
WebMD (http://www.Webmd.com/)

Dengue fever is a debilitating mosquito-borne disease caused by any one of four flavivirus-related tunga viruses. These viruses are related to viruses that caused West Nile infection and yellow fever.

Each year, an estimated 100 million cases of dengue fever occur worldwide. Most of these are in tropical areas of the world, with the greatest risk occurring in:

- The Indian subcontinent
- Southeast Asia
- Southern China
- Taiwan
- Pacific Islands
- Caribbean (except Cuba and Cayman Islands)
- Mexico
- Africa
- Central and South America (except Chile, Paraguay, and Argentina)

Most cases in the United States occur in people who contracted the infection while traveling abroad. But the risk is increasing for people living along the Texas-Mexico border and in other parts of southern United States. In 2009, an outbreak of dengue fever was identified in Key West, Florida.

Dengue fever spreads when a bite from an Aedes mosquito infected with a dengue virus. The mosquito becomes infected when it bites a person with dengue virus and then feeds on another person.

Symptoms, which begin lasting for six days after infection and last for up to 10 days, may include:

- Sudden, high fever
- Severe headaches
- Pain behind eyes
- Severe joint and muscle pain
- Nausea
- Vomiting
- Skin rash, which appears three to four days after onset of fever, mild bleeding
  (nose bleed, bleeding gums, or easy bruising)

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Explicitness Level Formula

\[
F = (\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100)/2
\]

\[
F = (35.4 + 19.9 + 17.4 + 11.1 - 2.4 - 10.6 - 2.9 - 0 + 100)/2
\]

Explicitness Level = 83.9
Dengue fever is an infectious disease carried by mosquitoes and caused by any of four related dengue viruses. This disease used to be called “break-bone” fever because it sometimes causes severe joint and muscle pain that feels like bones are breaking, hence the name. Health experts have known about dengue fever for more than 200 years. Dengue fever is found mostly during and right after the rainy season in tropical and sub-tropical areas.

- Africa
- Southeast Asia and China
- India
- Middle East
- Caribbean and Central and South America
- Australia and the South and Central Pacific

An epidemic in Hawaii in 2001 is a reminder that many locations in the United States are susceptible to dengue epidemics because they harbor particular types of mosquitoes that transmit the dengue virus.

Worldwide, 50 to 200 million cases of dengue infection occur each year. This includes 100,000 cases in the United States, 10 million people and 10,000 travelers abroad. Many more cases are unreported because some health care providers do not recognize dengue.

During the last part of the 20th century, many tropical regions of the world saw a dramatic increase in dengue cases. Epidemics occurred in Mexico and with severity. In addition to non-acute dengue, dengue hemorrhagic fever (DHF) and dengue shock syndrome have increased in many parts of the world. Indeed, there are estimated several hundred thousand cases of DHF per year.
### Parts of Speech

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### Explicitness Level Formula

\[
F = \frac{(\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100)}{2}
\]

Explicitness Level = 77.6
Dengue fever, also known as breakbone fever, is an illness caused by the bite of a mosquito. Dengue fever is found worldwide, but most frequently seen in Caribbean countries, central and South America, Mexico, Pacific and tropical countries of Asia, and parts of tropical Africa.

Most of the cases in the United States are seen in people who have traveled to a tropical region. However, with the decrease in mosquito control programs, the numbers of cases of dengue fever have been rising.

The incubation period may range from three to 15 days, however symptoms usually begin four to six days after being bitten by an infected mosquito. Most dengue fever results in a relatively mild illness.

Symptoms include:

- Sudden onset of high fever
- Severe headache
- Rash
- Swollen glands
- Muscle and joint pain
- Nausea and vomiting
- Flushing of the face and
- Pain behind the eyes or with movement of the eyes

A few symptoms are known as the "Dengue Triad." Dengue fever should be considered in any patient with these symptoms and a history of traveling to tropical climates throughout the world. If dengue fever is suspected, a healthcare provider will order a blood test to confirm the diagnosis.

The treatment for dengue fever is supportive care with bed rest advised during the period of high fever. Acetaminophen is preferred treatment for fever and headache.
because of its anti-inflammatory properties of aspirin. Acetaminophen should not be taken by anyone with known liver or kidney disease.
Dengue fever, also called dengue, is an extremely serious disease caused by a virus. There are four types of dengue virus that can cause illness in humans. Dengue viruses are transmitted between humans by a bite of an infected Aedes mosquito.

Dengue is rare in the U.S., but is common and a serious public health threat in warm sub-tropical and tropical areas of the world. These include areas of Central and South America, Africa, Southeast Asia, China, India, the Middle East, Australia, Caribbean and South and Central Pacific. Dengue fever is most common in urban areas and outbreaks occur constantly during the rainy season when mosquitoes breed in standing water. The incidence of dengue fever is on the rise worldwide, and in some areas of Asia, complications of the disease are a leading cause of serious illness and death in children.

Mosquitoes pick up dengue virus when they bite a human who is recently infected with the virus. The mosquito then carries the virus in its own blood and spreads it when it bites other humans.

After the virus enters the human bloodstream, it spreads throughout the body. Symptoms appear in about eight to 10 days after a bite from an infected mosquito. Symptoms are flu-like and can include high fever, nausea, vomiting, body aches, and headache.

Most people recover from dengue fever, but some cases can progress into the potentially life-threatening complication called dengue hemorrhagic fever. Symptoms of this disease include severe, uncontrollable hemorrhage and shock.
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**Explicitness Level Formula**

\[
F = (\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100)/2
\]

\[
F = (35+17.7+15.4+11.2-4.2-14.0-2.3-0+100)/2
\]

*Explicitness Level = 79.4*
Dengue fever is a disease — ranging from mild to severe — caused by four related viruses spread by a particular species of mosquito. Mild dengue fever causes high fever, rash, and muscle and joint pain. More severe forms of disease — dengue hemorrhagic fever and dengue shock syndrome — can lead to severe bleeding, sudden drop in blood pressure (shock) and death.

No specific treatment for dengue fever exists, and most people recover. But if you have a severe form of disease, you need hospital care.

Millions of cases of dengue infection occur worldwide each year. Most occur in urban areas of tropical and subtropical regions. Few cases have been reported in the United States — primarily in Texas, along the border with Mexico, and in Hawaii.

Signs and symptoms of dengue fever vary, depending on form and severity of disease.

With mild form of disease, you may experience some or all of these signs and symptoms:

- High fever, up to 105 F (40.6 C)
- Rash over most of your body. Itchy red spots, which may fade within 2-3 days and then reappear
- Severe headache, backache or pain
- Pain behind your eyes
• Severe joint and muscle pain
• Signs and symptoms usually begin about four to seven days after being bitten by a mosquito carrying dengue virus. Most dengue fever cases caused death, and usual symptoms will last subside within a week after starting.

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Explicitness Level Formula

\[ F = (\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100)/2 \]

\[ F = (37+16.4+17.3+9.8-2.3-14-2.8-0+100)/2 \]

Explicitness Level = 80.7
WebMD (http://www.Webmd.com/)

Dengue fever is a painful, debilitating mosquito-borne disease caused by any one of four closely related dengue viruses. These viruses are related to viruses that cause West Nile infection and yellow fever.

Each year, an estimated 100 million cases of dengue fever occur worldwide. Most of these are in tropical areas of the world, with the greatest risk occurring in:

- The Indian subcontinent
- Southeast Asia
- Southern China
- Taiwan
- The Pacific Islands
- The Caribbean (except Cuba and Cayman Islands)
- Mexico
- Africa
- Central and South America (except Chile, Paraguay, and Argentina)

Most cases in the United States occur in people who contracted the infection while traveling there. But the risk is increasing for people living near the Texas-Mexico border and in other parts of southern United States. In 2009, one outbreak of dengue fever was identified in Key West, Florida.

Dengue fever is transmitted by Aedes mosquito bites. Aedes mosquito becomes infected when it feeds on a person with dengue virus in their blood. It can spread the virus from one person to another person.

Symptoms, which usually peak four to six days after infection and last for two to 10 days, may include:

- Sudden high fever
- **Severe** headaches
- Pain **behind** eyes
- **Severe** joint and muscle pain
- Nausea
- Vomiting
- Skin rash, which appears three to four days after onset of fever, mild bleeding (such as nose bleed, bleeding gums, or **black** bruising)

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**Explicitness Level Formula**

\[ F = (\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100)/2 \]

\[ F = (42.6+13.2+17.5+9-2.3-12.7-2.3-0+100)/2 = 82.5 \]
Dengue fever is an infectious disease carried by mosquitoes and caused by any of four related dengue viruses. The disease is also called "break-bone" fever because it sometimes causes severe joint and muscle pain that feels like bones are breaking. The name. Health experts have known about dengue fever for more than 200 years.

Dengue fever is found most during and shortly after the rainy season in tropical and subtropical areas of:

- Africa
- Southeast Asia and China
- India
- Middle East
- Caribbean and Central and South America
- Australia and South and Central Pacific

Several epidemics in Hawaii in 2001 remind us that many locations in the United States are susceptible to dengue epidemics because they harbor particular types of mosquitoes that transmit dengue virus.

Worldwide, 500 to 100 million cases of dengue infection occur each year. This includes 100 to 200 cases in the United States, from people who have recently traveled abroad. Many more cases are unreported because healthcare providers do not recognize the disease.

During the 20th century, many tropical regions around the world saw an increase in dengue cases. Epidemics have occurred more frequently and with more severity in recent years. Dengue, dengue hemorrhagic fever (DHF) and dengue shock syndrome can have increased in many parts of the world. As a result, there are an estimated seven hundred thousand cases of DHF per year.
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Explicitness Level Formula

\[
F = (\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + \frac{100}{2})
\]

\[
\text{Explicitness Level} = (37.4 + 16.2 + 9.8 + 7.8 - 4.4 - 18.2 - 5.9 - 0 + 100)/2
\]

\[F = 71.3\]
Dengue fever, also known as breakbone fever, is a viral illness caused by the bite of a mosquito. Dengue fever is found worldwide, but more commonly seen in Caribbean countries, Central and South America, Mexico, the Pacific islands, tropical countries in Asia, and parts of tropical Africa.

Most of the cases in the United States are seen in people who have traveled to a tropical region. However, with the decreased mosquito control programs, the number of cases of dengue fever have been rising.

The incubation period may range from three to 15 days, however symptoms usually begin 5 to 8 days after being bitten by an infected mosquito. Most dengue fever results in a febrile illness.

Symptoms include:

- Sudden onset of high fever
- Severe headache
- Rash
- Swollen glands
- Severe muscle or joint pain
- Nausea and vomiting
- Nausea and vomiting
- Rash on the face
- Pain behind the eyes or redness of the eyes

If these three symptoms are seen, it is called "Dengue Triad." Dengue fever should be suspected in any patient with these symptoms who has a history of traveling in tropical climates throughout the world. If dengue fever is suspected, a healthcare provider will order a blood test to confirm the diagnosis.

Treatment for dengue fever is supportive care with bed rest advised during the period of high fever. Acetaminophen is preferred treatment for fever and headache.
because of its blood thinning properties of aspirin. Acetaminophen should not be taken by anyone with known liver or kidney disease.
Dengue fever, also called dengue, is an acute serious disease caused by a virus. There are four types of dengue virus that can cause illness in humans. Dengue viruses are transmitted between humans by the infected Aedes mosquito.

Dengue is rare in the U.S., but a common and serious public health threat in warm sub-tropical and tropical areas of the world. These include areas of Central and South America, Africa, Southeast Asia, China, India, the Middle East, Australia, the Caribbean and the South and Central Pacific. Dengue fever is most common in urban areas and outbreaks occur commonly during the wet season when mosquitoes breed heavily in standing water.

The incidence of dengue fever is on the rise worldwide, and in some areas of Asia, complications of the disease are a leading cause of serious illness and death in children.

Mosquitoes pick up dengue virus in the saliva of a human who is already infected with the virus. The mosquito then buries its mouth in the human blood and spreads the virus in other humans.

After dengue virus enters the human bloodstream, it spreads throughout the body. Symptoms appear about eight to ten days after a bite from an infected mosquito. Symptoms are and can include fever, nausea, vomiting, body aches, and headache.

Most people can recover from dengue fever, but some cases can progress and be dangerous complication as dengue hemorrhagic fever. Symptoms of the disease include severe, uncontrolled hemorrhage and shock.
### Parts of Speech

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### Explicitness Level Formula

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F = (\text{noun frequency} + \text{adjective frequency} + \\
\text{preposition frequency} + \text{article frequency} - \\
\text{pronoun frequency} - \text{verb frequency} - \text{adverb} \\
\text{frequency} - \text{interjection frequency} + 100/2
\]

\[
\text{Explicitness Level} = 33.6 + 17.4 + 11.7 + 10.9 - 3.9 - 17.4 - 4.8 - 0 + 100/2 = 73.7
\]
Appendix E – Modified Penn Treebank Set

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<th>Corresponding Part of Speech</th>
<th>Example</th>
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<td>and, but, or</td>
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<tr>
<td>CD</td>
<td>Cardinal number</td>
<td>two, fourth, 127, mid-1900</td>
</tr>
<tr>
<td>DT</td>
<td>Determiner (article)</td>
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<td>EX</td>
<td>Existential there</td>
<td>there are</td>
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<td>FW</td>
<td>Foreign Word</td>
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</tr>
<tr>
<td>IN</td>
<td>Preposition or coordinating conjunction</td>
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<tr>
<td>JJ</td>
<td>Adjective</td>
<td>brown, beautiful, solar-powered</td>
</tr>
<tr>
<td>JJR</td>
<td>Adjective, comparative</td>
<td>better, smaller, harder</td>
</tr>
<tr>
<td>JJS</td>
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<td>Should, would, might, shall</td>
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<td>Noun, singular or mass</td>
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<td>Noun, plural</td>
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<td>Proper noun, singular</td>
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<td>NNPS</td>
<td>Proper noun, plural</td>
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<td>PDT</td>
<td>Predeterminer</td>
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<td>Possessive ending</td>
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<td>Personal pronoun</td>
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<tr>
<td>PRPS</td>
<td>Possessive pronoun</td>
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<td>However, larger, lonelier</td>
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<td>Verb, gerund or present participle</td>
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<td>VBN</td>
<td>Verb, past participle</td>
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Continued on next page
Appendix E – Modified Penn Treebank Set (continued)

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<td>Verb, third person singular present</td>
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<td>Wh-determiner</td>
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<td>WRB</td>
<td>Wh-adverb</td>
<td>How, however, whenever, why</td>
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SOURCES:


Appendix F – Infogistics Natural Language Processor Results for Baseline Texts

Mayo Clinic (http://www.mayoclinic.com/)

([ Dengue JJ fever NN ])

::< is VBZ ::>

([ a DT disease NN ]) — : ranging VBG from IN ([ mild NN ]) to TO severe JJ — :
caused VBN by IN ([ four CD related JJ viruses NNS ]) spread VBN by IN ([ a DT
particular JJ species NNS ]) of IN ([ mosquito NN ])._.

([ Mild JJ dengue NN fever NN ])

::< causes VBZ ::>

([ high JJ fever NN ]), , rash JJ, , and CC ([ muscle NN ]) and CC ([ joint NN
pain NN ])._.

([ More RBR severe JJ forms NNS ]) of IN ([ the DT disease NN ]) — : dengue FW ([
hemorrhagic JJ fever NN ]) and CC ([ dengue NN shock NN syndrome NN ]) — :
::< can MD additionally RB cause VB ::>

([ severe JJ bleeding NN ]), , ([ a DT sudden JJ drop NN ]) in IN ([ blood NN
pressure NN ]) (_) ([ shock NN ] :
_) and CC ([ death NN ])._.

([ No DT specific JJ treatment NN ]) for IN ([ dengue NN fever NN ])

::< exists VBZ ::>

_, , and CC ([ most JJS people NNS ])}
But if you have a severe form of the disease, you need hospital care.

Millions of cases of dengue infection worldwide each year.

Most often, dengue fever occurs in urban areas of tropical and subtropical regions.

A few cases have been reported in the United States, particularly in Texas along the border with Mexico, and in Hawaii.

Signs and symptoms of dengue fever vary.
depending on the severity of the disease. With a mild form of the disease, you may experience some or all of these signs and symptoms:

- High fever, up to 105°F (40.6°C)
- A rash over most of your body, which may subside after a couple of days and then reappear
- Severe headache or backache, or both
- Pain behind your eyes
- Severe joint and muscle pain

Signs and symptoms usually begin after a couple of days.
about_IN four_CD to_TO ([ seven_CD days_NNS ]) after_IN ([ being_VBG ]) bitten_VBN by_IN ([ a_DT mosquito_NN ]) carrying_VBG ([ a_DT dengue_NN virus_NN ]).

([ Mild JJ dengue_NN fever_NN ])

<: rarely RB causes_VBZ :>

([ death_NN ]),_, and_CC ([ your_PRPS symptoms_NNS ])

<: will_MD usually_RB subside_VB :>

within_IN ([ a_DT week_NN ]) after_IN ([ starting_NN ]).

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Explicitness Level Formula

\[
F = (\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100/2)
\]

Explicitness Level = 36.8 + 13.3 + 17.7 + 11.0 - 2.3 - 11.9 - 6.6 - 0 + 100/2 = 79.
WebMD (http://www.Webmd.com/)

([- Dengue_JJ fever_NN ])  
::< is_VBZ ::>
([- a_DT painful_JJ ,_, debilitating_JJ mosquito-borne_NN disease_NN ])  
::< caused_VBD ::>

by_IN ([ any_DT one_NN of_IN four_CD closely_RB related_VBN dengue_NN viruses_NNS ])_.

([- These_DT viruses_NNS ])  
::< are_VBP related_VBN ::>

to_TO ([ the_DT viruses_NNS ]) ([ that_WDT ])  
::< cause_VBP ::>

([- West_NNP Nile_NNP infection_NN ]) and_CC ([ yellow_NN fever_NN ])_.

([- Each_DT year_NN ]),_, ([ an_DT estimated_JJ 100_CD million_CD cases_NNS ]) of_IN
([- dengue_NN fever_NN ])  
::< occur_VBP worldwide_RB ::>

_.

Most_JJS of_IN ([ these_DT ])  
::< are_VBP ::>

in_IN ([ tropical_JJ areas_NNS ]) of_IN ([ the_DT world_NN ]),_, with_IN ([ the_DT greatest_JJS risk_NN ]) occurring_VBG in_IN

• :: ([ The_DT Indian_NNP subcontinent_NN ])


•: ([ Southeast_JJ Asia_NNP ])

•: ([ Southern_JJ China_NNP ])

•: ([ Taiwan_NNP ])

•: ([ The_DT Pacific_NNP Islands_NNPS ])

•: ([ The_DT Caribbean_NNP ]) (_( except_IN ([ Cuba_NNP ])) and_CC ([ the_DT Cayman_NNP Islands_NNP ])) :

•: ([ Mexico_NNP ])

•: ([ Africa_NNP ])

•: ([ Central_NNP ])) and_CC ([ South_NNP America_NNP ]) (_( except_IN ([ Chile_NNP ]), [ Paraguay_NNP ], and_CC ([ Argentina_NNP ])) :

•: ([ Most_JJS cases_NNS ]) in_IN ([ the_DT United_NNP States_NNPS ])

<: occur_VBP :

in_IN ([ people_NNS ]) who_WP

<: contracted_VBD :

([ the_DT infection_NN ]) while_IN ([ traveling_VBG ]) abroad_RB .

But_CC ([ the_DT risk_NN ])

<: is_VBZ increasing_VBG :

for_IN ([ people_NNS ]) living_VBG along_IN ([ the_DT Texas-Mexico_NNP border_NN

and in IN (the southern United States) of IN (other parts)

In IN (2009), an outbreak of dengue fever was identified in Key West, Florida.

Dengue fever is transmitted by the bite of an Aedes mosquito infected with a dengue virus.

The mosquito becomes infected when it bites a person with dengue virus.

It can't be spread directly from one person to another.

Symptoms usually begin...
four_CD to_TO ([ six_CD days_NNS ]) after_IN ([ infection_NN ]) and_CC ([ last_NN ])
for_IN ([ up_NN ]) to_TO ([ 10_CD days_NNS ])

::< may_MD include_VB :>

•_: ([ A_DT sudden_JJ ,_, high_JJ fever_NN ])

•_: ([ Severe_JJ headaches_NNS ])

•_

::< Pain_VB :>

behind_IN ([ the_DT eyes_NNS ])

•_: ([ Severe_JJ joint_NN ]) and_CC ([ muscle_NN pain_NN ])

•_: ([ Nausea_NN ])

•_: Vomiting_VBG

•_

::< Skin_VB :>
(rash_NN ) ,_, ([ which_WDT ])

::< appears_VBZ :>
three_CD to_TO ([ four_CD days_NNS ]) after_IN ([ the_DT onset_NN ]) of_IN ([
fever_NN ]),_, ([ mild_JJ bleeding_NN ]) (_, such_JJ as_IN ([ nose_NN ])

::< bleed_VBP :>
) ,_, bleeding_VBG ([ gums_NNS ]),_, or_CC easy_RB bruising_JJ ) _)
National Institutes of Health (http://www.nih.gov/)

([ Dengue_JJ fever_NN ])

<:: is_VBZ ::

([ an_DT infectious_JJ disease_NN ]) carried_VBN by_IN ([ mosquitoes_NNS ]) and_CC

<:: caused_VBD ::

by_IN ([ any_DT ]) of_IN ([ four_CD related_JJ dengue_NN viruses_NNS ])._

([ This_DT disease_NN ])

<:: used_VBD ::

<:: to_TO be_VB called_VBN ::

"_ ` (` ([ break-bone_JJ "_ ` fever_NN ]) because_IN ([ it_PRP ])"

<:: sometimes_RB causes_VBZ ::

([ severe_JJ joint_NN ]) and_CC ([ muscle_NN pain_NN ]) ([ that_WDT ])

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Explicitness Level Formula

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\[ \text{Explicitness Level} = 36.8 + 13.8 + 17.7 + 13.3 - 1.9 - 12.4 - 3.8 - 0 + 100)/2 = 81.7 \]
<: feels_VBZ :>
like_IN ([ bones_NNS ])
<: are_VBP breaking_VBG :>

,, hence_RB ([ the_DT name_NN ])._.

([ Health_NN experts_NNS ])
<: have_VBP known_VBN :>

about_IN ([ dengue_JJ fever_NN ]) for_IN ([ more_RBR than_IN 200_CD years_NNS ])._.

([ Dengue_JJ fever_NN ])
<: is_VBZ found_VBN mostly_RB :>
during_IN and_CC shortly_RB after_IN ([ the_DT rainy_JJ season_NN ]) in_IN ([
tropical_JJ and_CC subtropical_JJ areas_NNS ]) of_IN

• : ([ Africa_NNP ])

• : ([ Southeast_NNP Asia_NNP ]) and_CC ([ China_NNP ])

• : ([ India_NNP ])

• :

<: Middle_VB :>
East_JJ

• : ([ Caribbean_NNP ]) and_CC ([ Central_NNP ]) and_CC ([ South_NNP America_NNP ])

Australia and the South Pacific An epidemic in Hawaii in 2001 is a reminder that many locations in the United States are susceptible to dengue epidemics because they harbor the particular types of mosquitoes that transmit dengue virus.

Worldwide, between 50 to 100 million cases of dengue infection occur each year. This includes 100 to 200 cases in the United States, mostly in people who...
have_VBP recently_RB traveled_VBN abroad_RB :

... 

([ Many JJ more JJR cases NNS ])

likely_RB go_VBP :

unreported_VBN because_IN ([ some DT healthcare JJ providers NNS ])

do_VBP not RB recognize_VB :

([ the DT disease NN ]).

During_IN ([ the DT last JJ part NN ]) of_IN ([ the DT 20th JJ century NN ]), ([ many JJ tropical JJ regions NNS ]) of_IN ([ the DT world NN ])

saw_VBD :

([ an DT increase NN ]) in_IN ([ dengue NN cases NNS ]). 

([ Epidemics NNS ])

also_RB occurred_VBD :

more_RBR frequently_RB and_CC with_IN ([ more JJR severity NN ]).

In_IN ([ addition NN ]) to_TO ([ typical JJ dengue NN ]), ([ dengue_RB hemorrhagic JJ fever NN ]) _(_ ([ DHF NNP ] :

_) and_CC ([ dengue NN shock NN syndrome NN ])

also_RB have_VB increased_VBN :

in_IN ([ many JJ parts NNS ]) of_IN ([ the DT world NN ]). 

Globally_RB , , there_EX

are_VBP :
an estimated several ([ hundred thousand cases ] of DHF per ([ year ]).
Virtual Hospital (http://www.uihealthcare.com/vh/)

([ Dengue JJ fever NN ]), also RB known VBN as IN ([ breakbone NN fever NN ]),

:< is VBZ :

([ a DT viral JJ illness NN ])

:< caused VBD :

by IN ([ the DT bite NN ]) of IN ([ a DT mosquito NN ]).

([ Dengue JJ fever NN ])

:< is VBZ found VBN worldwide RB :

., but CC more RBR frequently RB seen VBN in IN ([ Caribbean NNP countries NNS ]), central JJ and CC ([ South NNP America NNP ]), ([ Mexico NNP ]), ([ the DT Pacific JJP and CC tropical JJ countries NNS ]), of IN ([ Asia NNP ]), and CC ([ parts NNS ]), of IN ([ tropical JJ Africa NNP ])..

([ Most JJS of IN the DT cases NNS ]), in IN ([ the DT United NNP States NNPS ])

:< are VBP seen VBN :

in IN ([ people NNS ]), who WP

:< have VBP traveled VBN :

to TO ([ a DT tropical JJ region NN ]).

However RB , with IN ([ the DT decrease NN ]), in IN ([ mosquito NN control NN programs NNS ]), ([ the DT numbers NNS ]), of IN ([ cases NNS ]), of IN ([ dengue NN fever NN ])

:< have VBP been VBN rising VBG :

..
The incubation period may range from three to 15 days, however, symptoms usually begin from five to eight days after being bitten by an infected mosquito.

Most dengue fever results in a relatively mild illness. Symptoms include sudden onset of high fever, severe headache, rash, swollen glands, severe muscle and joint pain, nausea and vomiting, flushing of the face and other symptoms.

• Sudden onset of high fever
• Severe headache
• Rash
• Swollen glands
• Severe muscle and joint pain
• Nausea and vomiting
• Flushing of the face

Most dengue fever results in a relatively mild illness.
behind [the DT eyes NNS] or CC with IN ([ movement NN ]) of IN ([ the DT eyes NNS ]) ([ The DT first JJ three CD symptoms NNS ])

as IN the DT "_" Dengue UH ([ Triad NNP ]) _. "_"

([ Dengue JJ fever NN ])

<: should MD be VB considered VBN :>
in IN ([ any DT patient NN ]) with IN ([ these DT symptoms NNS ]) who WP

<: has VBZ :>
([ a DT history NN ]) of IN ([ traveling VBG ]) to TO ([ tropical JJ climates NNS ]) throughout IN ([ the DT world NN ])._

If IN ([ dengue NN fever NN ])

<: is VBZ suspected VBN :>

_, ([ your PRPS healthcare JJ provider NN ])

<: will MD order VB :>

([ a DT blood NN test NN ])

<: to TO confirm VB :>

([ the DT diagnosis NN ])._

([ The DT treatment NN ]) for IN ([ dengue NN fever NN ])

<: is VBZ :>

([ supportive JJ care NN ]) with IN ([ bed NN rest NN ])

·_

<: Pain VB :>

<: are VBP known VBN :>

<: should MD be VB considered VBN :>
<: advised_VBD :

during_IN ([ the_DT period NN ]) of_IN ([ high JJ fever NN ])._

([ Acetaminophen_NNP ])

<: is_VBZ :

([ the_DT preferred JJ treatment NN ]) for_IN ([ fever NN ]) and_CC ([ headache NN ])
because_IN of_IN ([ the_DT blood NN ]) thinning_VBG ([ properties NNS ]) of_IN ([
aspirin NNS ])._

([ Acetaminophen NNP ])

<: should_MD not_RB be VB taken_VBN :

by_IN ([ anyone NN ]) with_IN ([ known_VBN liver NN ]) or_CC ([ kidney NN
disease NN ])._

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Explicitness Level Formula

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Explicitness Level = 37.0+11.5+18.5+12.5− 1.3−15.2−3.7−0+100)/2=79.6
Wrong diagnosis.com (http://www.wrongdiagnosis.com/)

([ Dengue JJ fever NN ], also RB called VBN ([ dengue NN ]),

<: is_VBZ :>

([ a DT potentially RB serious JJ disease NN ])

<: caused_VBD :>

by IN ([ a DT virus NN ])._

There_EX

<: are_VBP :>

([ four CD types NNS ]) of IN ([ dengue NN virus NN ]) ([ that WDT ])

<: can_MD cause_VB :>

([ illness NN ]) in IN ([ humans NNS ])._

([ Dengue JJ viruses NNS ])

<: are_VBP transmitted_VBN :>

between IN ([ humans NNS ]) by IN ([ the DT bite NN ]) of IN ([ an DT infected JJ Aedes NNP mosquito NN ])._

([ Dengue NN ])

<: is_VBZ :

rare JJ in IN ([ the DT U.S. NNP ]), but CC

<: is_VBZ :

common JJ and CC ([ a DT serious JJ public JJ health NN threat NN ]) in IN ([ warm JJ sub-tropical JJ and CC tropical JJ areas NNS ]) of IN ([ the DT world NN ])._.
( [ These_DT ])

<!: include_VBP :>

( [ areas_NNS ] of_IN ( [ Central_NNP ] and_CC ( [ South_NNP America_NNP ]),_,_, ( [ Africa_NNP ]),_,_, ( [ Southeast_NNP Asia_NNP ]),_,_, ( [ China_NNP ]),_,_, ( [ India_NNP ]),_,_, ( [ the_DT Middle_NNP East_NNP ]),_,_, ( [ Australia_NNP ]),_,_, ( [ the_DT Caribbean_NNP ]),_,_, ( [ the_DT South_NNP ]),_ and_CC ( [ the_DT Central_NNP Pacific_NNP ]))._

( [ Dengue_JJ fever_NN ])

<!: is_VBZ :>

most_RBS common_JJ in_IN ( [ urban_JJ areas_NNS ] and_CC ( [ outbreaks_NNS ])

<!: occur_VBP commonly_RB :>

during_IN ( [ the_DT rainy_JJ season_NN ]) when_WRB ( [ mosquitoes_NNS ])

<!: breed_VBP heavily_RB :>

in_IN ( [ standing_VBG water_NN ])._

( [ The_DT incidence_NN ] of_IN ( [ dengue_NN fever_NN ])

<!: is_VBZ :>

on_IN ( [ the_DT rise_NN ]) worldwide_RB ,_ and_CC in_IN ( [ some_DT areas_NNS ])

of_IN ( [ Asia_NNP ]),_,_, ( [ complications_NNS ]) of_IN ( [ the_DT disease_NN ])

<!: are_VBP :>

( [ a_DT leading_JJ cause_NN ]) of_IN ( [ serious_JJ illness_NN ]) and_CC ( [ death_NN ])

in_IN ( [ children_NNS ]))._

( [ Mosquitoes_NNS ])

<!: pick_VBP :>
up_IN ([ a_DT dengue_NN virus_NN ]) when_WRB ([ they_PRP ])

::< bite_VBP :>

([ a_DT human_NN ]) who_WP

::< is_VBZ already_RB infected_VBN :>

with_IN ([ the_DT virus_NN ])._.

([ The_DT mosquito_NN ]) then_RB

::< carries_VBZ :>

([ it_PRP ]) in_IN ([ its_PRP$ own_JJ blood_NN ]) and_CC

::< spreads_VBZ :>

([ it_PRP ]) when_WRB ([ it_PRP ])

::< bites_VBZ :>

([ other_JJ humans_NNS ])._.

After_IN ([ a_DT dengue_NN virus_NN ])

::< enters_VBZ :>

([ the_DT human_JJ bloodstream_NN]),_, ([ it_PRP ])

::< spreads_VBZ :>

throughout_IN ([ the_DT body_NN ])._.

([ Symptoms_NNS ])

::< appear_VBP :>

in_IN about_IN eight_CD to_TO ([ ten_CD days_NNS ]) after_IN ([ a_DT bite_NN ])

from_IN ([ an_DT infected_JJ mosquito_NN ])._.
(Symptoms_NNS)

<: are_VBP:

flu-like_JJ and_CC

<: can_MD include_VB:

([high_JJ fever_NN]),_, ([nausea_NN]),_, vomiting_VBG ,_, ([body_NN aches_NNS]
)],_, and_CC ([headache_NN])._.

([Most_JJS people_NNS])

<: can_MD recover_VB:

from_IN ([dengue_NN fever_NN]),_, but_CC ([some_DT cases_NNS])

<: can_MD progress_VB:

into_IN ([a_DT life-threatening_JJ complication_NN])

<: called_VBD:

([dengue_NN]) ([hemorrhagic_JJ fever_NN])._.

([Symptoms_NNS]) of_IN ([this_DT disease_NN])

<: include_VBP:

([severe_JJ ,_, uncontrolled_JJ hemorrhage_NN]) and_CC ([shock_NN])._.
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Explicitness Level Formula

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\]

Explicitness Level = 36.0 + 13.0 + 13.9 + 12.6 - 3.6 - 15.7 - 13.0 - 0 + 100/2 = 71.6
Incidence of Dengue Fever

With more than one-third of the world's population living in areas at risk for transmission, Dengue infection is a leading cause of illness and death in the tropics and subtropics. As many as 100 million people are infected yearly. Dengue is caused by any one of four related viruses transmitted by mosquitoes. Currently, there are no vaccines to prevent infection with Dengue virus (DENV) and the most effective protective measures are those that avoid mosquito bites. When a human becomes infected, early recognition and prompt supportive treatment by medical professionals can substantially lower the risk of developing severe disease.

Dengue has emerged as a worldwide problem only since the 1950s. Although Dengue rarely occurs in the continental United States, it is endemic (occurs yearly) in Puerto Rico and in many popular tourist destinations in Latin America and Southeast Asia; periodic outbreaks occur in Samoa and Guam.
Dengue Fever Origin

The four Dengue viruses originated in monkeys and independently jumped to humans in Africa or Southeast Asia between 100 and 800 years ago. Dengue remained a relatively minor, geographically-restricted disease until the middle of the 20th century. The second world war—in particular the unintended transport of *Aedes* mosquitoes around the world in cargo—is thought to have played a crucial role in the dissemination of the viruses. Dengue Hemorrhagic Fever (DHF), the most severe form of Dengue Fever, was first documented only in the 1950s during epidemics in the Philippines and Thailand. It was not until 1981 that large numbers of DHF cases began to appear in the Caribbean and Latin America, where highly effective *Aedes* control programs had been in place until the early 1970s.

Today about 2.5 billion people, or 40% of the world’s population, live in areas where there is a risk of Dengue transmission. Dengue is endemic (occurring yearly) in at least 100 countries in Asia, the Pacific, the Americas, Africa, and the Caribbean. The World Health Organization (WHO) estimates that 50 to 100 million infections occur yearly, including 500,000 DHF cases and 22,000 deaths, mostly among children.

Transmission of the Dengue Virus

Dengue is transmitted between people by the *Aedes aegypti* and *Aedes albopictus* mosquitoes, which are found throughout the world. Insects that transmit disease are called vectors. Symptoms of infection usually begin 4-7 days after the mosquito bite and typically last 3-10 days. In order for transmission to occur the mosquito must feed on a person during a five-day period when large amounts of virus are in that person’s blood; this period usually begins a little before the person become symptomatic. Some people never have significant symptoms but can still infect mosquitoes. After entering the mosquito from the ingested blood, the virus will require an additional 8-12 days of incubation before it can then be
transmitted to another human. The mosquito remains infected for the remainder of its life, which might be days or a few weeks.

In rare cases, Dengue can be transmitted in organ transplants or blood transfusions from infected donors, and there is evidence of transmission from an infected pregnant mother to her fetus. But in the vast majority of infections, a mosquito bite is responsible.

In many parts of the tropics and subtropics, Dengue occurs every year, usually during a season when *Aedes* mosquito populations are high and often when rainfall is optimal for breeding. These areas are, however, additionally at periodic risk for epidemic Dengue when large numbers of people become infected during a short period. Dengue epidemics require a coincidence of large numbers of vector mosquitoes, large numbers of people with no immunity to one of the four virus types (DENV 1, DENV 2, DENV 3, DENV 4), and the opportunity for contact between the two. Although *Aedes* mosquitoes are common in the southern United States (U.S.), Dengue is endemic in northern Mexico and the U.S. population has no immunity. The lack of Dengue transmission in the continental U.S. is primarily because contact between people and the vectors is too infrequent to sustain transmission.
Symptoms of Dengue Fever

The principal symptoms of Dengue are:

- High fever and at least two of the following symptoms:
  - Severe headache
  - Severe eye pain (behind the eyes)
  - Joint pain
  - Muscle and/or bone pain
  - Rash
  - Mild bleeding manifestation (e.g., nose or gum bleed, tiny hemorrhages in the skin or mucous membranes, or easy bruising)
  - Low white cell count

Generally, younger children and those with their first Dengue infection have a milder illness than older children and adults.

Warning signs may appear as temperature declines 3-7 days after symptoms begin.

The appearance of any of the following symptoms requires an immediate visit to the emergency room or health care provider:

- Severe abdominal pain or persistent vomiting
- Red spots or patches on the skin
- Bleeding from nose or gums
- Vomiting of blood
- Black, tarry stools (feces, excrement)
- Drowsiness or irritability
- Pale, cold, or clammy skin
• Difficulty breathing

The most serious form of the disease is Dengue hemorrhagic fever (DHF), which is characterized by a fever that lasts from two to seven days with general signs and symptoms similar to Dengue fever. When the fever declines, warning signs may develop. This marks the beginning of a 24-48 hour period when the smallest blood vessels (capillaries) become excessively permeable ("leaky"), allowing the fluid component to escape from the blood vessels into the membrane lining the abdominal cavity (causing the accumulation of excess fluid which may cause abdominal distension) and the membranes between the lungs and chest wall (creating excess fluid which may impair breathing). This may lead to failure of the circulatory system and shock, and possibly death without prompt, appropriate treatment. In addition, the patient with DHF has a low platelet count and hemorrhagic manifestations, tendency to bruise easily or have other types of skin hemorrhages, bleeding nose or gums, and possibly internal bleeding.

Treatment

There is no specific medication for treatment of a Dengue infection. Persons who think they have Dengue should use analgesics (pain relievers) with acetaminophen and avoid those containing ibuprofen, Naproxen, aspirin, or aspirin-containing drugs. They should also rest, drink plenty of fluids to prevent dehydration, avoid mosquito bites while feverish, and consult a physician.

As with Dengue, there is no specific medication for DHF. If a clinical diagnosis is made early, a health care provider can effectively treat DHF using fluid replacement therapy. Adequate management of DHF generally requires hospitalization.
Reducing the Risk of Contracting Dengue

There is no vaccine available against Dengue and there are no specific medications to treat a Dengue infection. This makes prevention the most important step, and prevention means avoiding mosquito bites if people live in or travel to an endemic area.

The best way to reduce mosquitoes is to eliminate the places where the female mosquito lays her eggs such as artificial containers that hold water in and around the home. Outdoors, water containers like pet and animal watering containers or flower planter dishes should be cleaned and water storage barrels should be covered. Containers with standing water indoors such as vases with fresh flowers should be cleaned at least once a week.

Adult mosquitoes will bite inside as well as outside homes, during the day and even at night when the lights are on. People in affected areas should protect themselves by using insect repellent on their skin while indoors or outside, wearing long sleeves and pants when possible, sleeping under mosquito bed nets, and ensuring that windows and door screens are secure and without holes. If available, air-conditioning should be used.

If someone in a household is ill with Dengue, extra precautions should be taken to prevent mosquitoes from biting the patient and infecting others in the household.
Credibility Perceptions Article (Implicit Version)

Incidence

Over one-third of the world risks getting Dengue, which sickens and kills people. Mosquitoes that transmit viruses infect people yearly. Currently, there are no vaccines preventing it and measures that most effectively protect people are those that avoid bites. When someone becomes infected, recognizing it and treating it quickly can substantially lower the risk of developing it.

It has been problematic only since the 1950s. It rarely occurs in the United States but occurs yearly in Puerto Rico, Latin America, and Southeast Asia. Samoa and Guam also have it periodically.

Origin

Monkeys began Dengue, which independently jumped to humans in Africa or Southeast Asia 100-800 years ago. It remained relatively minor until the 1950s. World War II—in particular, the transportation of mosquitoes unintentionally—is thought to have helped disseminate it. Dengue Hemorrhagic Fever (DHF), its severest form, was documented in the 1950s in Thailand and the Philippines. Cases appeared in the Caribbean and Latin America where programs had existed until the 1970s.

Fifty percent of the world currently lives where there is risk. It occurs yearly in at least 100 countries in Asia, the Pacific, the Americas, Africa, and the Caribbean. The World Health Organization (WHO) estimates that 50-100 million get infected yearly. 500,000 are DHF cases; 22,000 die, mostly children.
Transmission

Mosquitoes, found everywhere, transmit Dengue. Insects that transmit disease are called vectors. Symptoms usually begin after biting and typically last days. Mosquitoes must feed when viruses are in their blood, which usually begins slightly before people become symptomatic. Some never have symptoms but can still infect mosquitoes. After entering, viruses require days to be transmitted. Mosquitoes remain infected for their lives, which might be days or weeks.

Rarely, transplants or transfusions can transmit Dengue, and evidently those who are pregnant can transmit it to fetuses, but mosquitoes are largely responsible.

In the tropics and subtropics, it occurs yearly when mosquitoes abound and rainfall optimizes breeding. These areas are, however, additionally risky when people become infected quickly. Epidemics require that mosquitoes coincide with people who have no immunity as well as contact opportunities. Although mosquitoes commonly live in the United States (U.S.), Dengue occurs yearly in Mexico and the U.S. has no immunity. Transmission in the U.S. is lacking primarily because infrequent contact does not sustain transmission.

Symptoms

Symptoms are mainly fever and at least two of these:

- Headache
- Eye pain (behind eyes)
- Joint pain
- Muscle or bone pain
- Rash
- Bleeding (e.g., bleeds, hemorrhages, or bruising that occurs easily)
- Low white cell count
Generally, children and those with their first infection have milder illnesses than those who are older.

Signs may appear as temperature declines and symptoms begin. Victims must visit the emergency room or health provider immediately when they:

- Vomit persistently or have pain
- Display spots or patches
- Bleed from nose or gums
- Vomit blood
- Pass black stools
- Show drowsiness or irritability
- Have pale, cold, or clammy skin
- Breathe with difficulty

The most serious is Dengue hemorrhagic fever (DHF), which is characterized by fever that lasts days. Its symptoms are generally similar to Dengue. When the fever declines, warnings may develop. When capillaries become excessively permeable ("leaky"), allowing fluid to escape into the abdominal membrane (accumulating fluid excessively, which may cause distension) and lung and chest membranes (creating fluid, which may impair breathing). This may lead to failure and shock, and possibly death if treatment is not promptly and appropriately given. Those with it have low platelets, bruise easily, or have hemorrhages, bleeding noses or gums, and possibly internal bleeding.

Treatment

Nothing specifically treats Dengue. Those who think they have it should use acetaminophen analgesics (pain relievers) and avoid ibuprofen, Naproxen, aspirin, or
aspirin-containing drugs. They should also rest, drink to prevent dehydration, avoid bites, and consult a physician.

Nothing specifically treats DHF. If health providers diagnose it early, they can effectively treat it using hydration. Managing it adequately generally requires hospitalization.

Reducing Risk

There is no vaccine and nothing specifically treats it. Preventing it is most important and that means avoiding mosquitoes if people live or travel where it occurs yearly.

Reducing mosquitoes involves eliminating where they lay their eggs like containers that hold water. Containers or planters should be cleaned and barrels should be covered. Containers should be cleaned weekly.

Biting occurs inside and outside, during the day and at night. Those in affected areas should use repellent, wear sleeves and pants when possible, sleep under nets, and secure windows and screens and ensure that they don’t have holes. If available, air-conditioning should be used. If someone is ill, precautions should be taken to prevent mosquitoes from biting and infecting others.
Appendix H – Manual Deconstruction of Experimental Texts

Manual Deconstruction (Explicit Version)

Incidence of Dengue Fever

With more than one-third of the world’s population living in areas at risk for transmission, Dengue infection is the leading cause of illness and death in the tropics and subtropics. As many as 100 million people are infected yearly. Dengue is caused by any one of four related viruses transmitted by mosquitoes. Currently, there are no vaccines to prevent infection with Dengue virus (DENV) and the most effective protective measures are those that avoid mosquito bites. When a human becomes infected, early recognition and prompt supportive treatment by medical professionals can substantially lower the risk of developing severe disease.

Dengue has emerged as a worldwide problem since the 1950s. Although Dengue was once a continental United States problem, a pandemic (second wave) in Puerto Rico and other Pacific islands destinations in Latin America and Southeast Asia; periodic outbreaks were in Samoa and Guam.

Dengue Fever Origin

In the infected mosquitoes are monkeys and humans. Africa or Southeast Asia between 105 and 200 years ago. Dengue resided in mainland, geographically-restricted disease while the 20th century. Second World War—particular unintended transport of aerial mosquitoes around the world. Cargo—thought to have played crucial role in dissemination of viruses. Dengue Hemorrhagic Fever (DHF), most severe form of Dengue Fever, was documented in the 1950s during epidemics in the Philippines and Thailand. It was not until 1981 that
Large numbers of DHF cases began to appear in Caribbean and Latin America, where effective Aedes control programs had been in place until the early 1970s.

Focus on about 2.5 billion people, or 40% of the world’s population, live in areas where there is a risk of dengue transmission. Dengue is endemic (occurring yearly) in at least 100 countries in Asia, Pacific, Americas, Africa, and Caribbean. The World Health Organization (WHO) estimates that 50 to 100 million infections occur yearly, including 500,000 DHF cases and 22,000 deaths, mostly among children.

Transmission of Dengue Virus

Dengue is transmitted between people by the Aedes aegypti and Aedes albopictus mosquitoes, which are found throughout the world. Insects that harbor the disease are called vectors. Symptoms of infection usually begin 4-7 days after the mosquito bite and typically last 5-10 days. In order for transmission to occur, the mosquito must feed on a person during a 5-day period when large amounts of virus are in the person’s blood; this period begins little before the person becomes symptomatic. Some people may have significant symptoms but can still infect mosquitoes. After entering the mosquito from the ingested blood, the virus will replicate inside the mosquito 9-18 days of incubation before it can be transmitted to a new human. The mosquito remains infectious for the remainder of its life, which might be days or few weeks.

In some cases, Dengue can be transmitted in organ transplants or blood transfusions from infected donors, and there is evidence of transmission from infected pregnant mother to her fetus. But the vast majority of infections, mosquito bite is responsible.

In many parts of tropics and subtropics, Dengue occurs every year, especially during the season when Aedes mosquito populations are high, and when rainfall is optimal for breeding. These areas are known, particularly at periodic risk for epidemic Dengue when large numbers of people become infected during a short period. Dengue epidemics require...
coincidence at large numbers of infected mosquitoes, large numbers of people with immunity to one of four virus types (DENV 1, DENV 2, DENV 3, DENV 4), and the opportunity for contact between the two. Although Aedes mosquitoes are common in the United States, Dengue is endemic in southern Mexico and the United States population has no immunity. The lack of Dengue transmission in the continental United States is because contact between people and vectors is infrequent to sustain transmission.

Symptoms of Dengue Fever

The principal symptoms of Dengue are:

- High fever and at least two of the following symptoms:
  - Severe headache
  - Severe eye pain (behind the eyes)
  - Joint pain
  - Muscle or bone pain

- Rash

- Bleeding manifestation (e.g., nose or gum bleed, tiny hemorrhages on skin or membranes, or bruising)

- Low white cell count

Dengue, younger children and those with a history of Dengue infection have milder illness than older children and adults.

Warning signs may appear as temperature declines 3-7 days after symptoms begin. Appearance of these symptoms requires immediate visit to emergency room or health care provider:

- Abdominal pain or persistent vomiting
- Red spots or patches on the skin
Bleeding nose or gums

Vomiting blood

Black, tarry stools (feces, excrement)

Drowsiness or irritability

Pale, cool, or clammy skin

Difficult breathing

A more serious form of Dengue disease is Dengue Hemorrhagic Fever (DHF), which is characterized by fever that lasts from two to seven days with general signs and symptoms similar to Dengue fever. When fever declines, warning signs may develop. This marks the beginning of a 24-48 hour period when smallest blood vessels (capillaries) become excessively permeable ("leaky"), allowing fluid component to escape from blood vessels into membrane lining abdominal cavity (causing accumulation of excess fluid, which may cause abdominal distension) and membranes between lungs and chest wall (creating excess fluid, which may impair breathing). This may lead to failure of circulatory system and shock, and death without prompt, appropriate treatment. In addition, a patient with DHF has a decreased count and hemorrhagic manifestations, tendency to bruise easily, or have other types of skin hemorrhages, bleeding nose or gums, and internal bleeding.

Treatment

There is no specific medication for treatment of Dengue infection. Persons with suspected Dengue should use analgesics (pain relievers) with acetaminophen and avoid ibuprofen, Naproxen, aspirin, or nonsteroidal drugs. They should drink plenty of fluids to prevent dehydration, avoid mosquito bites while outdoors, and consult a physician.
As with Dengue, there is no specific medication for DHF. If a clinical diagnosis is made early, a health care provider can initiate early DHF therapy using pulse steroid therapy. Adequate management of DHF results in resolution hospitalization.

Reducing Risk of Contracting Dengue

There is no vaccine available against Dengue and there are no specific medications to treat Dengue infection. This makes prevention the most important step, and prevention means avoiding mosquito bites if people live in or travel to an endemic area.

The best way to reduce mosquitoes is to eliminate the places where they breed. Mosquito larvae lay their eggs in artificial containers that hold water in and around the home. Outdoors, water containers like birdbaths, watering containers or even plant dishes should be cleaned and water storage barrels should be covered. Containers with standing water indoors and vases with fresh flowers should be cleaned at least once a week.

Adult mosquitoes will bite inside as well as outside homes, during the day and even at night when lights are on. People in affected areas should protect themselves by using insect repellent on the skin while indoors or outside, wearing long sleeves and pants when possible, sleeping under mosquito netting, and ensuring that windows and doors screens are intact and without holes. If necessary, air-conditioning units can be used.

If someone in a household is sick with Dengue, extra precautions should be taken to prevent mosquitoes from biting the patient and infecting others in the household.
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### Explicitness Level (F)

\[
F = (\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + \frac{100}{2}
\]

\[
F = 33.7 + 20.7 + 14.8 + 9.7 - 3.5 - 10.9 - 6.7 + \frac{100}{2}
\]

\[
\text{Explicitness Level} = 78.9
\]
Manual Deconstruction (Contextual Version)

Incidence

Two-thirds of the world takes getting Dengue, which sickens and kills people. Mosquitoes can transmit viruses that infect people. Currently, there are no vaccines preventing and measures that most effectively protect people are those that avoid bites. When someone becomes infected, recognizing and treating illness can substantially lower the risk of developing DHF.

It has been problematic only since the 1950s. It now occurs in the United States but occurs yearly in Puerto Rico, Latin America, and Southeast Asia. Samoa and Guam also have endemic cases.

Origin

Monkeys began Dengue, which recently jumped to humans in Africa or Southeast Asia 100–300 years ago. It remained a river virus until the 1950s. World War II—in particular, transporting mosquitoes to other countries—has thought to have human transmission. Dengue Hemorrhagic Fever (DHF), a severe form, has documented a recent spike in Thailand and the Philippines. Cases are seen in Caribbean and Latin America where programs have been put in place since 1970s.

Forty percent of the world lives in areas where there is risk. Mosquitoes are a problem in 100 countries in Asia, Pacific, Americas, Africa, and Caribbean. World Health Organization (WHO) estimated that 50–100 million get infected every year, 500,000 are DHF cases; 22,000 die, mostly children.

Transmission

Mosquitoes, found everywhere, transmit Dengue. Insects that transmit disease are called vectors. Symptoms start a few days after biting and last up to 10 days. Mosquitoes must
blood, which some have symptoms but can still infect mosquitoes. After entering, viruses require days to be transmitted. Mosquitoes remain infected for their lives, which might be days or weeks.

Here, transplants or transfusions can transmit Dengue, and evidence those who are pregnant can transmit it to fetuses, but mosquitoes are largely responsible.

In the tropics and subtropics, it occurs mostly when mosquitoes abound and rainfall optimizes breeding. These areas are, however, additionally risky when people become infected nearby. Epidemics require that mosquitoes coincide with people who have no immunity as well as contact opportunities. Although mosquitoes commonly live in the United States, Dengue occurs near in Mexico and the United States. have no immunity.

Transmission in the United States is lacking because infrequent contact does not sustain transmission.

**Symptoms**

Symptoms are high fever and a rash. We have:

**Headache**

Eye pain (red, eyes)

Joint pain

Muscle or bone pain

**Rash**

Bleeding (e.g., bleeds, hemorrhages, or bruising)

White cell count

Children and those with recent infection have more illnesses than those who are older.
Signs may appear as temperature declines and symptoms begin. Victims must visit an emergency room or provider immediately when they:

- Vomit, diarrhea, or have pain
- Display spots or patches
- Bleed from nose or gums
- Vomit blood
- Pass black stools
- Show drowsiness or irritability
- Have pale, cold, or clammy skin
- Breathe with difficulty

It is more serious is Dengue Hemorrhagic Fever (DHF), which is characterized by fever that lasts days. Its symptoms are nearly identical to Dengue. When the fever declines, warnings may develop. This is when capillaries become excessively permeable (“leaky”), allowing fluid to escape into blooming membrane accumulating fluid excessively, which may cause distension) and impede blood flow (leading to bleeding) and preventing breathing). This may lead to failure and shock, and possibly death if treatment is not immediate and the problem is severe. Those with a history of diabetes, obesity, or lupus, or have hemorrhages, bleeding noses or gums, and have a main bleeding.

Treatment

Nothing can cure Dengue. Treat for fever and pain. Avoid use of analgesics (pain relievers) and avoid ibuprofen, naproxen, aspirin, or aspirin-containing drugs. Treat for fever, pain, and dehydration, avoid bites, and contact a physician.

Nothing can cure DHF. If providers diagnose DHF, they may recommend hospitalization.
Reducing Risk

There is no vaccine and nothing specifically treats it. Preventing is very important and this means avoiding mosquitoes if people live or travel where they occur.

Reducing mosquitoes involves eliminating where they lay their eggs, like containers they hold water. Containers or planters should be cleaned and barrels should be covered. Containers should be cleaned weekly.

Biting occurs everywhere and always. Those in affected areas should use repellent, wear sleeves and pants when possible, sleep under nets, and secure windows and screens and ensure that they don't have holes. If available, air-conditioning should be used. If someone is ill, precautions should be taken to prevent mosquitoes from biting and infecting others.

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<th>Total</th>
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<td>Total Words</td>
<td>613</td>
</tr>
</tbody>
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Explicitness Level (F)

\[
F = \text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100/2
\]

\[
F = 34.7 + 10.8 + 6.8 + 3.6 - 11.0 - 21.5 - 11.6 + 100/2
\]

Explicitness Level = 55.9
Appendix I - Infogistics Natural Language Processor Results for Experimental Texts

Explicit Version

([ Incidence_NN ]) of_IN ([ Dengue_NNP Fever_NNP ])

With_IN ([ more_RBR than_IN one-third_CD of_IN the_DT world_NN ])?_.

([ s_NN population_NN ]) living_VBG in_IN ([ areas_NNS ]) at_IN ([ risk_NN ])

for_IN ([ transmission_NN ]),_., ([ Dengue_NNP infection_NN ])

:< is_VBZ :>

([ a_DT leading_JJ cause_NN ]) of_IN ([ illness_NN ]) and_CC ([ death_NN ]) in_IN ([

the_DT tropics_NNS ]) and_CC ([ subtropics_NNS ])._.

As_RB many_JJ as_IN ([ 100_CD million_CD people_NNS ])

:< are_VBP infected_VBN yearly_RB :>

_:.

([ Dengue_NNP ])

:< is_VBZ caused_VBN :>

by_IN ([ any_DT one_NN of_IN four_CD related_JJ viruses_NNS ]) transmitted_VBN

by_IN ([ mosquitoes_NNS ])._.

Currently_RB ,_, there_EX

:< are_VBP :>

([ no_DT vaccines_NNS ])

to prevent infection with the Dengue virus and to prevent the most effective protective measures are those that avoid mosquito bites.

When a human becomes infected, early recognition and prompt supportive treatment by medical professionals can substantially lower the risk of developing severe disease.

Dengue has emerged as a worldwide problem only since the 1950s. Although it rarely occurs in the continental United States, it is endemic yearly.
in_IN ([ Puerto_NNP Rico_NNP ]) and_CC in_IN ([ many_JJ popular_JJ tourist_NN destinations_NNS ]) in_IN ([ Latin_NNP America_NNP ]) and_CC ([ Southeast_NNP Asia_NNP ]):_: ([ periodic_JJ outbreaks_NNS ])

in_IN ([ Samoa_NNP ]) and_CC ([ Guam_NNP ])._.

([ Dengue_NNP Fever_NNP Origin_NN ])

([ The_DT four_CD Dengue_NNP viruses_NNS ])

in_IN ([ monkeys_NNS ]) and_CC independently_RB jumped_VBN to_TO ([ humans_NNS ]) in_IN ([ Africa_NNP ]) or_CC ([ Southeast_NNP Asia_NNP ]) between_IN ([ 100_CD and_CC 800_CD years_NNS ]) ago_RB ._.

([ Dengue_NNP ])

([ a_DT relatively_RB minor_JJ ,_ , geographically-restricted_JJ disease_NN ]) until_IN ([ the_DT middle_NN ]) of_IN ([ the_DT 20th_JJ century_NN ])._. ?_.

([ The_DT second_JJ world_NN war_NN ])?_.

in_IN particular_JJ ([ the_DT unintended_JJ transport_NN ]) of_IN ([ Aedes_NNP mosquitoes_NNS ]) around_IN ([ the_DT world_NN ]) in_IN ([ cargo_NN ])?_.

<: is_VBZ thought_VBN :>

<: to_TO have_VB :>

<: occur_VBP :>

in_IN ([ Samoa_NNP ]) and_CC ([ Guam_NNP ])._.

([ Dengue_NNP Fever_NNP Origin_NN ])

([ The_DT four_CD Dengue_NNP viruses_NNS ])

in_IN ([ monkeys_NNS ]) and_CC independently_RB jumped_VBN to_TO ([ humans_NNS ]) in_IN ([ Africa_NNP ]) or_CC ([ Southeast_NNP Asia_NNP ]) between_IN ([ 100_CD and_CC 800_CD years_NNS ]) ago_RB ._.

([ Dengue_NNP ])

([ a_DT relatively_RB minor_JJ ,_ , geographically-restricted_JJ disease_NN ]) until_IN ([ the_DT middle_NN ]) of_IN ([ the_DT 20th_JJ century_NN ])._. ?_.

([ The_DT second_JJ world_NN war_NN ])?_.

in_IN particular_JJ ([ the_DT unintended_JJ transport_NN ]) of_IN ([ Aedes_NNP mosquitoes_NNS ]) around_IN ([ the_DT world_NN ]) in_IN ([ cargo_NN ])?_.

<: is_VBZ thought_VBN :>

<: to_TO have_VB :>
played_VBN ([ a_DT crucial_JJ role_NN ]) in_IN ([ the_DT dissemination_NN ]) of_IN ([ the_DT viruses_NNS ])._

([ Dengue_NNP Hemorrhagic_NNP Fever_NNP ]) (_ ( ([ DHF_NNP ] :>
_) _, ([ the_DT most_RBS severe_JJ form_NN ]) of_IN ([ Dengue_NNP Fever_NNP ]),_
<: was_VBD first_RB documented_VBN only_RB :>
in_IN ([ the_DT 1950s_CD ]) during_IN ([ epidemics_NNS ]) in_IN ([ the_DT
Philippines_NNP ]) and_CC ([ Thailand_NNP ])._

([ It_PRP ])

<: was_VBD not_RB :>
until_IN ([ 1981_CD ]) that_IN ([ large_JJ numbers_NNS ]) of_IN ([ DHF_NNP
cases_NNS ])
<: began_VBD :>
<: to_TO appear_VB :>
in_IN ([ the_DT Caribbean_NNP ]) and_CC ([ Latin_NNP America_NNP ]),_
where_WRB ([ highly_RB effective_JJ Aedes_NNP control_NN programs_NNS ])
<: had_VBD been_VBN :>
in_IN ([ place_NN ]) until_IN the_DT early_JJ 1970s_SYM ._.

([ Today_NN ]) about_IN ([ 2.5_CD billion_CD people_NNS ]),_, or_CC ([ 40_CD
])%_SYM of_IN ([ the_DT world_NN ])?._
(s_NN population_NN), live_JJ in_IN (areas_NNS) where_WRB there_EX
<: is_VBZ :>
(a_DT risk_NN) of_IN (Dengue_NNP transmission_NN).

(Dengue_NNP)
<: is_VBZ :>
endemic_JJ (occurring_VBG yearly_RB) in_IN (least_JJS 100_CD countries_NNS) in_IN (Asia_NNP), (the_DT Pacific_NNP), (the_DT Americas_NNP), (Africa_NNP), and_CC (the_DT Caribbean_NNP).

(The_DT World_NNP Health_NNP Organization_NNP) estimates_VBP that_IN (50_CD to_TO (100_CD million_CD infections_NNS)) yearly_RB:
<: occur_VBP yearly_RB :>
including_VBG (500,000_CD DHF_NNP cases_NNS) and_CC (22,000_CD deaths_NNS), mostly_RB among_IN (children_NNS).

(Transmission_NN) of_IN (the_DT Dengue_NNP Virus_NNP)

(Dengue_NNP)
<: is_VBZ transmitted_VBN :>
between_IN (people_NNS) by_IN (the_DT Aedes_NNP aegypti_NN) and_CC (Aedes_NNP albopictus_NN mosquitoes_NNS), (which_WDT)
<: are_VBP found_VBN :

throughout_IN ([ the_DT world_NN ])._.

([ Insects_NNS ]) ([ that_WDT ])

<: transmit_VBP :

([ disease_NN ])

<: are_VBP called_VBN :

([ vectors_NNS ])._.

([ Symptoms_NNS ]) of_IN ([ infection_NN ])

<: usually_RB begin_VB :

([ 4-7_CD days_NNS ]) after_IN ([ the_DT mosquito_NN bite_NN ]) and_CC ([
typically_RB last_JJ 3-10_CD days_NNS ])._.

In_IN ([ order_NN ]) for_IN ([ transmission_NN ])

<: to_TO occur_VB :

([ the_DT mosquito_NN ])

<: must_MD feed_VB :

on_IN ([ a_DT person_NN ]) during_IN ([ a_DT five-day_JJ period_NN ]) when_WRB ([
large_JJ amounts_NNS ]) of_IN ([ virus_NN ])

<: are_VBP :

in_IN ([ that_DT person_NN ])?_.

([ s_NN blood_NN ]);_: ([ this_DT period_NN ])

<: usually_RB begins_VBZ :>
(a little) before (the person)

<: become:

symptomatic.

(Some people)

<: never have:

(significant symptoms) but

<: can still infect:

(mosquitoes).

After entering (the mosquito) from (the ingested blood), (the virus)

<: will require:

(an additional 8-12 days) of (incubation) before (it)

<: can then be transmitted:

to (another human).

(The mosquito remains for its life),

<: infected:

for (the remainder) of (its life), (which)

<: might be:

(a few weeks).


In (rare cases), (Dengue)

can be transmitted in (organ transplants) or (blood transfusions) from (infected donors), and there is evidence of transmission from an infected pregnant mother to her fetus.

But in (the vast majority) of infections, (a mosquito bite) is responsible.

In many parts of the tropics and subtropics, (Dengue) occurs every year, usually during (Aedes mosquito populations) when rainfall is optimal.

These areas
however, additionally, when large numbers of people become infected during a short period. (Dengue epidemics)

Require a coincidence of large numbers of vector mosquitoes, large numbers of people with no immunity to one of the four virus types (DENV 1, DENV 2, DENV 3, DENV 4), and the opportunity for contact between the two.

Although common in the southern United States (U.S.), Dengue is endemic in northern Mexico and the U.S. population.)
<: has\_VBZ :
([\ no\_DT\ immunity\_NN ])._.

([\ The\_DT\ lack\_NN ]) of\_IN ([\ Dengue\_NNP transmission\_NN ]) in\_IN ([\ the\_DT continental\_JJ U.S\._NNP ])
<: is\_VBZ primarily\_RB :

because\_IN ([\ contact\_NN ]) between\_IN ([\ people\_NNS ]) and\_CC ([\ the\_DT vectors\_NNS ])
<: is\_VBZ :

too\_RB infrequent\_JJ
<: to\_TO sustain\_VB :

([\ transmission\_NN ])._.

([\ Symptoms\_NNS ]) of\_IN ([\ Dengue\_NNP Fever\_NNP ])

([\ The\_DT\ principal\_JJ symptoms\_NNS ]) of\_IN ([\ Dengue\_NNP ])
<: are\_VBP :

:::

([\ High\_JJ fever\_NN ]) and\_CC at\_IN least\_JJS ([\ two\_CD\ of\_IN\ the\_DT\ following\_VBG symptoms\_NNS ]):_: 

\_\_\_

\_\_\_
o\_IN ([\ Severe\_JJP headache\_NN ]) o\_IN ([\ Severe\_JJP eye\_NN pain\_NN ]) (_) behind\_IN ([\ the\_DT\ eyes\_NNS ] :

_) o\_IN ([\ Joint\_NNP pain\_NN ]) o\_IN ([\ Muscle\_NNP ]) and\_CC /\_CC or\_CC ([\ bone\_NN pain\_NN ]) o\_IN ([\ Rash\_NNP ]) o\_IN ([\ Mild\_NNP bleeding\_NN
manifestation (e.g., nose or gum)

bleed (e.g., tiny hemorrhages in the skin or mucous membranes), or easy bruising of low white cell count

Generally, younger children and those with their first Dengue infection have a milder illness than older children and adults.

Warning: signs may appear as temperature declines 3-7 days after symptoms begin.

The appearance of any of the following symptoms requires an immediate visit to the emergency room or health care provider:

an immediate visit to the emergency room or health care provider:
*SYM ([ Severe JJ abdominal JJ pain NN ]) or CC persistent JJ vomiting VBG

*SYM ([ Red JJ spots NNS ]) or CC ([ patches NNS ]) on IN ([ the DT skin NN ])

*SYM Bleeding VBG from IN ([ nose NN ]) or CC ([ gums NNS ])

*SYM Vomiting VBG of IN ([ blood NN ])

*SYM ([ Black JJ ,_, tarry JJ stools NNS ]) ( ([ feces NNS ]),_, ([ excrement NN ] :>

*SYM ([ Drowsiness NN ]) or CC ([ irritability NN ])

*SYM Pale JJ ,_, cold JJ ,_, or CC ([ clammy JJ skin NN ])

*SYM ([ Difficulty NNP breathing NN ])

([ The DT most RBS serious JJ form NN ]) of IN ([ the DT disease NN ])

<: is VBZ :>

([ Dengue NNP hemorrhagic NN fever NN ]) ( ([ DHF NNP ] :>

_) ,_, ([ which WDT ])

<: is VBZ characterized VBN :>

by IN ([ a DT fever NN ]) that IN ([ lasts NNS ]) from IN two CD to TO ([ seven CD
days NNS ]) with IN ([ general JJ signs NNS ]) and CC ([ symptoms NNS ]) similar JJ
to TO ([ Dengue NNP fever NN ])._.
When WRB ([the DT fever NN declines NNS]), warning VBG ([signs NNS])
<: may MD develop VB :

<.

([This DT])
<: marks VBZ :

([the DT beginning NN]) of IN ([a DT 24-48 CD hour NN period NN]) when WRB
([the DT smallest JJ blood NN vessels NNS]) (_) ([capillaries NNS] :>
_)
<: become VBP :

excessively RB permeable JJ (_) .

leaky JJ .), , allowing VBG ([the DT fluid JJ component NN])
<: to TO escape VB :

from IN ([the DT blood NN vessels NNS]) into IN ([the DT membrane NN])
lining VBG ([the DT abdominal JJ cavity NN]) (_) causing VBG ([the DT
accumulation NN]) of IN ([excess JJ fluid NN]) ([which WDT])
<: may MD cause VB :

([abdominal JJ distension NN] :>
_) and CC ([the DT membranes NNS]) between IN ([the DT lungs NNS]) and CC ([
chest NN wall NN]) (_) creating VBG ([excess JJ fluid NN]) ([which WDT])
<: may MD impair VB :

([breathing NN] :
_) .

<: may MD develop VB :

<.

([This DT])
<: marks VBZ :

([the DT beginning NN]) of IN ([a DT 24-48 CD hour NN period NN]) when WRB
([the DT smallest JJ blood NN vessels NNS]) (_) ([capillaries NNS] :>
_)
<: become VBP :

excessively RB permeable JJ (_) .

leaky JJ .), , allowing VBG ([the DT fluid JJ component NN])
<: to TO escape VB :

from IN ([the DT blood NN vessels NNS]) into IN ([the DT membrane NN])
lining VBG ([the DT abdominal JJ cavity NN]) (_) causing VBG ([the DT
accumulation NN]) of IN ([excess JJ fluid NN]) ([which WDT])
<: may MD cause VB :

([abdominal JJ distension NN] :>
_) and CC ([the DT membranes NNS]) between IN ([the DT lungs NNS]) and CC ([
chest NN wall NN]) (_) creating VBG ([excess JJ fluid NN]) ([which WDT])
<: may MD impair VB :

([breathing NN] :
_) .

When WRB ([the DT fever NN declines NNS]), warning VBG ([signs NNS])
<: may MD develop VB :

<.

([This DT])
<: marks VBZ :

([the DT beginning NN]) of IN ([a DT 24-48 CD hour NN period NN]) when WRB
([the DT smallest JJ blood NN vessels NNS]) (_) ([capillaries NNS] :>
_)
May lead to failure of the circulatory system and shock, and possibly death without prompt, appropriate treatment.

In addition, the patient with DHF has a low platelet count and hemorrhagic manifestations, with tendency to bruise easily or have other skin hemorrhages, bleeding of the nose or gums, and possibly internal bleeding.

Treatment

There is no specific medication for treatment of a Dengue infection.
Persons who think they have Dengue should use analgesics (pain relievers) with acetaminophen and avoid those containing ibuprofen, Naproxen, aspirin, or aspirin-containing drugs. They should also rest, drink plenty of fluids to prevent dehydration while feverish, and consult a physician.
As_IN with_IN ([ Dengue_NNP ]) there_EX

<: is_VBZ :>

([ no_DT specific_JJ medication_NN ]) for_IN ([ DHF_NNP ])._

If_IN ([ a_DT clinical_JJ diagnosis_NN ]) made_VBN early_RB :

<: can_MD effectively_RB treat_VB :

([ DHF_NNP ]) using_VBG ([ fluid_JJ replacement_NN therapy_NN ])._

([ Adequate_JJ management_NN ]) of_IN ([ DHF_NNP ])_

<: generally_RB requires_VBZ :

([ hospitalization_NN ])._

Reducing_VBG ([ the_DT Risk_NNP ]) of_IN ([ Contracting_NNP Dengue_NNP ])_

There_EX

<: is_VBZ :>

([ no_DT vaccine_NN ]) available_JJ against_IN ([ Dengue_NNP ]) and_CC there_EX

<: are_VBP :

([ no_DT specific_JJ medications_NNS ])_

<: to_TO treat_VB :

([ a_DT Dengue_NNP infection_NN ])._

([ This_DT ])

<: makes_VBZ :>
prevention means avoiding avoiding mosquito bites if people live in or travel to an endemic area. The best way to reduce mosquitoes is to eliminate the places where the female mosquito lays her eggs such as artificial containers that hold water in and around the home. Outdoors, like pet and animal watering dishes, should be cleaned and water storage barrels should be covered.
Containers with standing water, such as vases, should be cleaned at least once a week.

Adult mosquitoes will bite inside as well as outside homes, during the day and even at night when the lights are on.

People in affected areas should protect themselves by using insect repellent on their skin while indoors or outdoors, wearing long sleeves and pants when possible, sleeping under mosquito bed nets, and ensuring that windows and door screens are secure and without holes.
If _IN available _JJ, ( [ air-conditioning _NN ] )

::< should _MD be _VB used _VBN :>

::<

If _IN ( [ someone _NN ] ) in _IN ( [ a _DT household _NN ] )

::< is _VBZ :>

ill _JJ with _IN ( [ Dengue _NNP ] ), ( [ extra _JJ precautions _NNS ] )

::< should _MD be _VB taken _VBN :>

::< to _TO prevent _VB :>

([ mosquitoes _NNS ]) from _IN biting _VBG ( [ the _DT patient _JJ and _CC infecting _JJ others _NNS ] ) in _IN ( [ the _DT household _NN ] ).

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Explicitness Level Formula

\[
F = (\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} + \text{article frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100/2
\]

\[
\text{Explicitness Level} = 37.7 + 14.6 + 16.9 + 11.0 - 1.7 - 12.6 - 5.2 - 0 + 100/2 = 80.35
\]
Implicit Version

([ Incidence_NNP ])

Over_IN ([ one-third_NN ]) of_IN ([ the_DT world_NN risks_NNS ]) getting_VBG ([ Dengue_NNP ]), ([ which_WDT ])

[: sickens_VBZ and_CC kills_VBZ :

([ people_NNS ])."

([ Mosquitoes_NNS ]) ([ that_WDT ])

[: transmit_VBP :

([ viruses_NNS ])

[: infect_VBP :

([ people_NNS ]) yearly_RB ."

Currently_RB ,__, there_EX

[: are_VBP :

([ no_DT vaccines_NNS ]) preventing_VBG ([ it_PRP ]) and_CC

[: measures_VBZ :

that_IN most_JJS

[: effectively_RB protect_VB :

([ people_NNS ])

[: are_VBP :

([ those_DT ]) that_WP

[: avoid_VBP :

([ bites_NNS ])."
When someone becomes infected, recognizing and treating can substantially lower the risk of developing.

It has been problematic only since the 1950s. Rarely does it occur in the United States but yearly in Puerto Rico, Latin America, and Southeast Asia. Samoa and Guam also have periodically.

Origin

Monkeys began the Dengue, which
Independently jumped to humans in Africa or Southeast Asia 100-800 years ago.

It remained relatively minor until the 1950s. In particular, the transportation of mosquitoes unintentionally:

Thought to have helped disseminate (Dengue Hemorrhagic Fever, its severest form) in Thailand and the Philippines in the 1950s.

Cases appeared in the Caribbean and Latin America where...
( [ programs_NNS ] )

$: had_VBD existed_VBN :$

until_IN the_DT 1970s_SYM .

( [ Forty_CD percent>NN ] ) of_IN ( [ the_DT world>NN ] )

$: currently_RB lives_VBZ :$

where_WRB there_EX

$: is_VBZ :$

( [ risk>NN ] ).

( [ It_PRP ] )

$: occurs_VBZ :$

yearly_JJ in_IN at_IN ( [ least_JJS 100_CD countries>NNS ] ) in_IN ( [ Asia>NNP ] ), ( [ the_DT Pacific>NNP ] ), ( [ the_DT Americas>NNP ] ), ( [ Africa>NNP ] ), and_CC ( [ the_DT Caribbean>NNP ] ).

( [ The_DT World>NNP Health>NNP Organization>NNP ] ) ( ( [ WHO>NNP ] :)

$: estimates_VBZ :$

that_IN ( [ 50-100_CD ] ) million_CD

$: get_VBP infected_VBN yearly_RB :$

$\_\_\_\_\_\_$

( [ 500,000_CD ] )

$: are_VBP :$
Transmission

Mosquitoes, found everywhere, transmit Dengue. Insects that transmit disease are called vectors. Symptoms usually begin after biting and typically last days. Mosquitoes must feed on viruses.
in [ their_PRPS blood_NN ] a ( [ which_WDT ] )
<: usually_RB begins_VBZ slightly_RB :
before_IN ([ people_NNS ])
<: become_VBP :
symptomatic_JJ _.

([ Some_DT ])
<: never_RB have_VBP :
([ symptoms_NNS ]) but_CC
<: can_MD still_RB infect_VB :
([ mosquitoes_NNS ])._

After_IN ([ entering_VBG ]), ( [ viruses_NNS ])
<: require_VBP :
([ days_NNS ])

<: to_TO be_VB transmitted_VBN :
._._
([ Mosquitoes_NNS ])
<: remain_VBP :
infected_VBN for_IN ([ their_PRPS lives_NNS ]), ( [ which_WDT ])
<: might_MD be_VB :
([ days_NNS ]) or_CC ([ weeks_NNS ])._.
Rarely, or or CC (transplants) or transfusions

<: can transmit:

(Dengue, and evidently) who are pregnant
can transmit

(who to fetuses, but mosquitoes)
largely responsible.

In (the tropics and subtropics), (it) occurs yearly when mosquitoes abound and rainfall optimizes

(These areas)

however, additionally risky when people become infected quickly.

(Epidemics)

.require:

(that mosquitoes)
with IN ([ people NNS ]) who WP

( [ no DT immunity NN ] ) as IN well RB as IN ( [ contact JJ opportunities NNS ]).

Although IN ([ mosquitoes NNS ]) commonly RB live JJ in IN ([ the DT United NNP States NNPS ]) ( [ U.S. NNP ] :

._ ( [ Dengue NNP ]

 occurrences VBZ :

 yearly JJ in IN ([ Mexico NNP ]) and CC ([ the DT U.S. NNP ])

( [ no DT immunity NN ]).

([ Transmission NN ]) in IN ([ the DT U.S. NNP ])

because IN ([ infrequent JJ contact NN ])

because IN ([ infrequent JJ contact NN ])

( [ transmission NN ])._

Symptoms

([ Symptoms NNS ])

( [ Symptoms NNS ])

( [ Symptoms NNS ])

*: SYM ([ Headache NN ])

*: SYM ([ Headache NN ])
*SYM ([Eye NN pain NN]) (_( behind_IN ([eyes NNS]) =>
_
)

*SYM ([Joint JJ pain NN])

*SYM ([Muscle NN]) or_CC ([bone NN pain NN])

*SYM ([Rash NN])

*SYM ([Bleeding NN]) (_( e.g. FW ,_, bleeds VBZ =>
_,_, ([hemorrhages NNS]) ,_, or_CC bruising VBG that WP
<?, occurs_VBZ easily RB =>
_)

*SYM ([Low RB white JJ cell NN count NN])

Generally RB ,_, ([children NNS]) and_CC ([those DT]) with_IN ([their PRPS
first JJ infection NN])
<?, have_VBP =>
([milder JJR illnesses NNS]) than_IN ([those DT]) who WP
<?, are_VBP =>
older JJR _.

([Signs NNS])
<?, may MD appear VB =>
as_IN ([temperature NN declines NNS]) and_CC ([symptoms NNS])
must visit emergency room or health provider immediately when they:

* vomit persistently or
* have pain

* display spots or patches

* bleed from nose or gums

* vomit blood
*SYM

<: Pass_VB :>

([ black_JJ stools_NNS ])

*SYM ([ Show_NN drowsiness_NN ]) or_CC ([ irritability_NN ])

*SYM

<: Have_VBP :>

([ pale_NN ], cold JJ, or_CC ([ clammy JJ skin_NN ])

*SYM

<: Breathe_VB :>

with_IN ([ difficulty_NN ])

The_DT most_RBS serious_JJ

<: is_VBZ :>

([ Dengue_NNP hemorrhagic_NN fever_NN ]) (_( ([ DHF_NNP ] :

_) , , ([ which_WDT ])

<: is_VBZ characterized_VBN :>

by_IN ([ fever_NN ]) ([ that_WDT ])

<: lasts_VBZ :>

([ days_NNS ]) .

([ Its_PRPS symptoms_NNS ])

<: are_VBP :>

generally_RB similar_JJ to_TO ([ Dengue_NNP ]).
When WRB ([ the DT fever NN declines NNS ]), ([ warnings NNS ])
<: may MD develop VB :

...

When WRB ([ capillaries NNS ])
<: become VBP :

excessively RB permeable JJ (_(" \` leaky JJ \"")_), _, allowing VBG fluid JJ
<: to TO escape VB :

into IN ([ the DT abdominal JJ membrane NN ])(_ accumulating VBG ([ fluid NN ])
excessively RB , _, ([ which WDT ])
<: may MD cause VB :

([ distension NN ] :

_) and CC ([ lung NN ]) and CC ([ chest NN membranes NNS ])(_ creating VBG ([
fluid NN ]), _, ([ which WDT ])
<: may MD impair VB :

([ breathing NN ] :

_) .

([ This DT ])
<: may MD lead VB :

to TO ([ failure NN ] and CC ([ shock NN ]), _, and CC possibly RB ([ death NN ])
if IN ([ treatment NN ])
<: is VBZ not RB promptly RB :

and CC appropriately RB given VBN ._.
with low platelets, bruise easily, or have hemorrhages, bleeding noses or gums, and possibly internal bleeding.

Treatment

Nothing treats specifically Dengue.

Those who think they should use acetaminophen analgesics and avoid pain relievers.
([ ibuprofen_NN ]), ( [ Naproxen_NNP ]), ( [ aspirin_NNS ]), or CC ([ aspirin-containing JJ drugs_NNS ]).:

([ They_PRP ])

<: should_MD also_RB rest_VB :>

,

<: drink_VB :>

<: to_TO prevent_VB :>

([ dehydration_NN ]),

<: avoid_VBP :>

([ bites_NNS ]), and_CC

<: consult_VB :>

([ a_DT physician_NN ]).

([ Nothing_NN ])

<: specifically_RB treats_VBZ :>

([ DHF_NNP ]).:

If_IN ([ health_NN providers_NNS ])

<: diagnose_VBP :>

([ it_PRP ]) early_RB , ([ they_PRP ])

<: can_MD effectively_RB treat_VB :>

([ it_PRP ]) using_VBG ([ hydration_NN ]).:
Managing VBG ([it_PRP ])

<: adequately_RB generally_RB requires_VBZ :

([hospitalization_NN ]).

Reducing VBG ([Risk_NN ])

There_EX

<: is_VBZ :

([no_DT vaccine_NN ]) and_CC ([nothing_NN ])

<: specifically_RB treats_VBZ :

([it_PRP ]).

Preventing VBG ([it_PRP ])

<: is_VBZ :

most_RBS important_JJ and_CC that_IN ([means_NNS ]) avoiding_VBG ([mosquitoes_NNS ]) if_IN ([people_NNS ])

<: live_VB or_CC travel_VB :

where_WRB ([it_PRP ])

<: occurs_VBZ yearly_RB :

```
```

Reducing VBG ([mosquitoes_NNS ])

<: involves_VBZ :

eliminating_VBG where_WRB ([they_PRP ])

<: lay_VBD :>
(their_PROPS eggs_NNS) like_IN (containers_NNS) that_IN (hold_NN water_NN)

(Containers_NNS) or_CC (planters_NNS)

<: should_MD be_VB cleaned_VBN >
and_CC (barrels_NNS)

<: should_MD be_VB covered_VBN >

.<.

(Containers_NNS)

<: should_MD be_VB cleaned_VBN weekly_RB >

.<.

Biting_VBG

<: occurs_VBZ :>
inside_JJ and_CC outside_RB ,_, during_IN ([the_DT day_NN]) and_CC at_IN ([night_NN]),_.

(Those_DT in_IN ([affected_JJ areas_NNS])

<: should_MD use_VB :>
(repellent_NN),_, ([wear_NN sleeves_NNS]) and_CC ([pants_NNS]) when_WRB ([possible_NN]),_, ([sleep_NN]) under_IN ([nets_NNS]),_, and_CC ([secure_JJ windows_NNS]) and_CC ([screens_NNS]) and_CC

<: ensure_VB :>
that_IN ([they_PRP])
::< do_VBP n't_RB have_VB :>
([ holes_NNS ]).

If_IN available_JJ, ([ air-conditioning_NN ])
::< should_MD be_VB used_VBN :>
::<

If_IN ([ someone_NN ])
::< is_VBZ :>
ill_JJ, ([ precautions_NNS ])
::< should_MD be_VB taken_VBN :>
::< to_TO prevent_VB :>
([ mosquitoes_NNS ]) from_IN ([ biting_VBG])

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**Explicitness Level Formula**

\[
F = (\text{noun frequency} + \text{adjective frequency} + \\
\text{preposition frequency} + \text{article frequency} - \\
\text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} - \text{interjection frequency} + 100/2
\]

*Explicitness Level* = 34.3+9.7+9.3+5.6–6.1–23.1–11.5–0+100)/2=59.1
Appendix J – Survey Questionnaires

Demographic Survey

Question 1.
In general, how comfortable do you feel using computers?

- Very uncomfortable
- Somewhat uncomfortable
- Neutral
- Somewhat comfortable
- Very comfortable

Question 2.
In general, how comfortable do you feel using the World Wide Web (the Web)?

- Very uncomfortable
- Somewhat uncomfortable
- Neutral
- Somewhat comfortable
- Very comfortable

Question 3.
How many years have you used the Web?

- 1-3
- 4-6
- 7-9
- More than 10
Question 4.

How often do you use the Web to look up **general** information?

- Never
- A few times a month
- About once a month
- About once a week
- More than once a week

Question 5.

How often do you use the Web to look up **medical** information?

- Never
- A few times a month
- About once a month
- About once a week
- More than once a week

Question 6.

What is the highest level of **general** education you have completed in Japan?

- Junior high school
- Senior high school
- Vocation/technical school
- Several years of college or university (no degree)
- Junior college
- Graduate school
- Other: ____________________________
Question 7.

How many years of general education have you completed in the United States at the following levels? (Answer all that apply)

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<th>Level</th>
<th>1 year</th>
<th>2 years</th>
<th>3 years</th>
<th>4 years</th>
<th>5 years</th>
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<tr>
<td>Vocation/Technical School</td>
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<tr>
<td>Several years of college (no degree)</td>
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</tbody>
</table>

Question 8.

If you completed a college program in the United States, did you major in English at the Bachelor's level?

☐ Yes
☐ No

Question 9.

If you completed a college program in the United States, did you major in English at the graduate school level?

☐ Yes
☐ No

Question 10.

What is your gender?

☐ Male
☐ Female
Question 11.

What is your age?

- Under 18
- 18-25
- 26-35
- 36-45
- 46-55
- Over 56

Question 12.

Are you a medical professional?

- Yes
- No

Question 13.

If you have worked in a medical setting, what job have you held?

- Physician
- Nurse
- Paramedic
- Administration
- Research Scientist
- Other (Please specify):

Question 14.

Are you a native English speaker?

- Yes
- No
Question 15.

How would you rate your English reading ability?

- Very low
- Low
- Medium
- High
- Very High

Question 16.

If you are not a native English speaker, how many years of English language education do you have?

Enter an integer (without commas). Limit response to two characters.

Question 17.

Have you taken the Test of English for International Communication (TOEIC)?

- Yes
- No

Question 18.

If you answered YES to question 15, what was your score?

Enter an integer (without commas). Limit response to three characters.
Credibility Perceptions Survey

**Question 19.**

Please indicate your level of agreement or disagreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The information in this article is correct.</td>
<td></td>
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<tr>
<td>The article is objective.</td>
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<tr>
<td>I can believe the information in the article.</td>
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<tr>
<td>The article seems like it has been written by someone who is an authority on this topic.</td>
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<tr>
<td>The information in this article is well-organized.</td>
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<td>The information in this article is clearly written.</td>
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<tr>
<td>The information in this article is of high quality.</td>
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<tr>
<td>The information in this article seems up-to-date.</td>
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<tr>
<td>The information in this article seems to be similar to what other authorities say about this topic.</td>
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</tr>
<tr>
<td>I can trust the information in this article.</td>
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<tr>
<td>The article's author seems to have the patient's best interests in mind.</td>
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<tr>
<td>The amount of information about this topic seems to be complete.</td>
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<tr>
<td>The meaning of this article is confusing to me.</td>
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<tr>
<td>The words used in this article provide enough detail to understand the topic.</td>
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<tr>
<td>The article does not favor only one type of viewpoint.</td>
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</tr>
</tbody>
</table>
Question 20.

If you knew SOMEONE who had or was at risk of getting [MEDICAL CONDITION], would you recommend that he or she read this article?

If YOU had or were at risk of getting [MEDICAL CONDITION], would you be willing to use information in this article to make decisions about your health care?

Question 21.

How interesting was the information?

- Very uninteresting
- Uninteresting
- Neutral
- Interesting
- Very interesting

Question 22.

How difficult was the article?

- Very difficult
- Difficult
- Neutral
- Easy
- Very easy

Question 23.

How familiar were you with the information in this article?

- Very unfamiliar
- Unfamiliar
- Neutral
- Familiar
- Very familiar
Question 24.

What characteristics of a Web site would most influence your decision to use the health information you read on it? (Rank the importance by marking 1, 2, 3, 4, with 1 being the most important).

- Credentials of the author(s)
- Contact information (for example, street address, e-mail, or phone number)
- The information itself
- The name of the institution sponsoring the information
- Other: 

Question 25.

Do YOU have [MEDICAL CONDITION]?

Do you have a FRIEND or RELATIVE who has [MEDICAL CONDITION]?

Yes No

English Language Comprehension Survey

Question 26.

Which area is typically not affected by rheumatoid arthritis?

- The low back.
- The neck.
- The shoulders.

Question 27.

Which statement is most true of rheumatoid arthritis?

- It goes into spontaneous remission.
- Joints affected tend to be in a symmetrical pattern.
- Rheumatoid arthritis is most common in the elderly.
Question 28.

Which of the following might increase joint pain in rheumatoid arthritis?

- Decreased muscle mass.
- Excess joint fluid.
- Thinning of the synovium.

Question 29.

Which of the following is most likely to occur in people with rheumatoid arthritis?

- Glaucoma.
- Inflamed lymph nodes.
- Inflamed tear ducts.

Question 30.

Which condition would most likely be caused by another form of arthritis rather than rheumatoid arthritis?

- Hip arthritis.
- Low back arthritis.
- Neck arthritis.

Question 31.

A common condition related to rheumatoid arthritis might require the use of:

- Cough expectorants.
- Eye lubricants.
- Laxatives.
Appendix K – Catalyst Survey

The following screen captures show each screen participants were asked to read and/or complete.

Welcome

Perceptions of Online Medical Information

Welcome!

Thank you for your help with this research study. This study is being conducted by a graduate student in the Department of Human Centered Design & Engineering at the University of Washington.

The study investigates factors that affect the perceptions of online medical information for users who are nonnative English speakers. Your participation will help develop guidelines that improve English-language medical web sites for these users.

The study will take approximately [X] minutes to complete, depending on your reading speed. Please take your time to carefully read the study article and answer the survey questions; this is not a test of reading speed. To participate in the study you will:

1. Read two short articles about medical information.
2. Take some short surveys.
3. If you wish, enter a drawing to win one of three Amazon.com gift certificates ($15, $25, $50). This step is optional.

Your name will not be associated with any of the study data. If you enter the drawing at the end of the survey, your e-mail address will be kept confidential and separate from your answers. You can skip any question you do not wish to answer or you can leave the study at any time by closing your browser. Participating in this study should cause you no more discomfort than reading other information on the Web and answering questions about it.

By clicking on the "Next" Link, you are agreeing to participate in this study and are affirming that you are at least 18 years old. Please feel free to print a copy of this consent form for your records.

Next >>
Study Instructions

Perceptions of Online Medical Information

Study Instructions

• Please maximize your browser window for better viewing of the study Web pages.
• Complete a brief survey about your use of the Web.
• Read two short medical articles and answer survey questions afterward.
• Enter your e-mail address if you wish to enter the drawing for one of the Amazon.com gift certificates.

Please Note:

In order for your study data to count

• Please maximize your browser window for better viewing of the study Web pages
• Do not open multiple windows or tabs for the study site
• Do not return to the articles after you have entered the surveys following them

To begin your participation in the study, please click the "Next" link below. Thank you for participating.
Demographic Survey

Perceptions of Online Medical Information

Question 1.
In general, how comfortable do you feel using computers?
- Very uncomfortable
- Somewhat uncomfortable
- Neutral
- Somewhat comfortable
- Very comfortable

Question 2.
In general, how comfortable do you feel using the World Wide Web (the Web)?
- Very uncomfortable
- Somewhat uncomfortable
- Neutral
- Somewhat comfortable
- Very comfortable

Question 3.
How many years have you used the Web?
- 1-3
- 4-6
- 7-9
- More than 10

Note: Appendix J contains the complete demographic survey.

Instructions for First Medical Article

Perceptions of Online Medical Information

Please read the following medical article. When reading it, imagine...

You or a loved one has [medical condition] and you want to find out about its symptoms and treatment options. You want to learn as much as you can about this condition so you decide to read an article about it on the Web.

After you read the article, please respond to the survey questions. Please do not revisit the medical article after you start the survey.
First Medical Article

Perceptions of Online Medical Information

Credibility Perceptions Survey

Perceptions of Online Medical Information

Question 19.
Please indicate your level of agreement or disagreement with the following statements:

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Note: Appendix J contains the complete credibility perceptions survey.
English Language Comprehension Article

Perceptions of Online Medical Information

Rheumatoid Arthritis

What are the early signs of rheumatoid arthritis?

Initial symptoms of rheumatoid arthritis (RA) are generally pain and stiffness in the morning and a few symptoms with activity.

The pain and swelling will usually progress on to obvious joint swelling and the level of stiffness in the morning increases. Other symptoms include fatigue and difficulty sleeping due to joint stiffness.

What are common symptoms of rheumatoid arthritis?

Rheumatoid arthritis can be distinguished from other forms of arthritis by the location and number of joints involved. The areas affected include the neck, shoulders, elbows, wrists, and hands, especially the joints at the base and middle of the fingers but not the joints at the end of the fingers. In the lower extremities, RA can affect the hips, knees, ankles, and the joints at the base of the toes. RA tends to spare the low back. The joints affected tend to be involved in a symmetrical pattern. That is, if knuckles on the right hand are inflamed, it is likely that knuckles on the left hand will be inflamed as well. This symmetry is not found as often in most other types of arthritis.

Fatigue in RA is due to many factors. It can be due to the inflammation which produces chemicals called cytokines that commonly cause fatigue. People with RA might have a mild anemia that also might contribute to fatigue and the sleep disturbance from night time pain may also be a factor. Finally, people with RA tend to decrease their exercise and thus lose stamina and strength and this might also play a role in their fatigue.

Note: Appendix L contains the complete text of the English language comprehension article.
Question 26. Which area is typically not affected by rheumatoid arthritis?
- The low back.
- The neck.
- The shoulders

Question 27. Which statement is most true of rheumatoid arthritis?
- It goes into spontaneous remission.
- Joints affected tend to be in a symmetrical pattern.
- Rheumatoid arthritis is most common in the elderly.

Question 28. Which of the following might increase joint pain in rheumatoid arthritis?
- Decreased muscle mass.
- Excess joint fluid.
- Thinning of the synovium.

Question 29. Which of the following is most likely to occur in people with rheumatoid arthritis?
- Glaucoma.
- Inflamed lymph nodes.
- Inflamed tear ducts.

Note: Appendix J contains the complete English language comprehension survey.
Thank you for participating in this study!

If you would like to enter a drawing for one of three Amazon.com gift certificates ($15, $25, $50), please enter your e-mail address in the space below. Your e-mail information will be kept in a separate and confidential database and will not be connected in any way at all to your survey responses. Winners of the gift certificates will be notified by [DATE].

After entering your e-mail address, click the SUBMIT RESPONSES button at the bottom of the screen.

If you do not wish to enter the drawing, leave the e-mail field blank and click the SUBMIT RESPONSES button.

**Question 32.**

E-mail address:
Appendix L – English Language Comprehension Article

Rheumatoid Arthritis

What are the early signs of rheumatoid arthritis?

Initial symptoms of rheumatoid arthritis (RA) are generally pain and stiffness in the morning and a few symptoms with activity.

The pain and swelling will usually progress on to obvious joint swelling and the level of stiffness in the morning increases. Other symptoms include fatigue and difficulty sleeping due to joint stiffness.

What are common symptoms of rheumatoid arthritis?

Rheumatoid arthritis can be distinguished from other forms of arthritis by the location and number of joints involved. The areas affected include the neck, shoulders, elbows, wrists, and hands, especially the joints at the base and middle of the fingers but not the joints at the end of the fingers. In the lower extremities, RA can affect the hips, knees, ankles, and the joints at the base of the toes. RA tends to spare the low back. The joints affected tend to be involved in a symmetrical pattern. That is, if knuckles on the right hand are inflamed, it is likely that knuckles on the left hand will be inflamed as well. This symmetry is not found as often in most other types of arthritis.

Fatigue in RA is due to many factors. It can be due to the inflammation which produces chemicals called cytokines that commonly cause fatigue. People with RA might have a mild anemia that also might contribute to fatigue and the sleep disturbance from night time pain may also be a factor. Finally, people with RA tend to decrease their exercise and thus lose stamina and strength and this might also play a role in their fatigue.
How do the symptoms of rheumatoid arthritis change over time?

About one in 10 people with RA will have a single episode of disease activity (or joint inflammation) and a spontaneous long-lasting remission. However, in almost all people with RA, inflammation of the joints will persist for a long period of time. The way RA acts will vary from person to person. In some people the disease will be mild with periods of activity (worsening joint inflammation) called "flares." In other cases the disease will be continuously active and appear to get worse, or progress, over time.

Inflamed joints will be warm, swollen, tender, often red, and painful or difficult to move. These physical signs of arthritis are due to inflammation of the lining of joints and tendons in a layer of tissue that is called synovium. The cells of the immune system within the synovium appear active and capable of causing tissue damage. If this inflammation persists or does not respond well to treatment, destruction of nearby cartilage, bone, tendons, and ligaments can follow. This may lead to deformity and disability that can be permanent. However, many patients with rheumatoid arthritis are able to get improved function and pain relief from surgical reconstruction of the damaged joints, such as total hip arthroplasty, total knee arthroplasty, and total shoulder arthroplasty.

Rheumatoid nodules

About one-fifth of people with RA also develop the rheumatoid nodules, which are lumps of tissue that form under the skin, often over bony areas. These occur most often around the elbow but can be found elsewhere on the body and even in internal organs. Occasionally, people with RA will develop inflammation of the membranes that surround the heart (pericarditis) and lung (pleuritis). RA can also cause an emphysema-like condition called rheumatoid lung that can affect a person's ability to breathe comfortably. People with RA often develop dry eyes and a dry mouth due to inflammation of tear glands and salivary glands (called sicca syndrome). Occasionally, a low white blood cell count may occur
because of the rheumatoid arthritis. Rarely, people with RA develop vasculitis inflammation of blood vessels that can cause illness affecting the skin, nerves and other organs or tissues. An unusual condition called Felty's syndrome is rheumatoid arthritis, low white blood cell counts, and enlargement of the spleen. All of the above conditions are rare with the exception of rheumatoid nodules. The nodules tend to occur in people with more serious forms of RA.
Bibliography


Bannert, M. (2002). Managing cognitive load--recent trends In cognitive load theory. Learning and Instruction, 12, 139-146.


McAllister, D. J. (1995). Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations


VITA

Alexandra L. Bartell was born on an island in the southwest Pacific Ocean near the eastern coast of Australia. As the daughter of a Foreign Service Officer, she lived the first 18 years of her life in New Caledonia, the Dominican Republic, Nicaragua, and Morocco. She graduated from high school knowing how to hunt iguanas and ride camels but not how to cross a busy roadway in America.

After returning to live in the United States, she continued her education by earning a Bachelor's degree in Psychology from Hollins University; an MBA from Monmouth University; a Master of Science in Technical Communication from the University of Washington; and three certificates from the University of Washington in Technical Writing and Editing, Digital Production in Graphic Design, and User Centered Design. Alexandra is also an accomplished skydiver and scuba diver. In her spare time, she enjoys fishing, camping, and mushroom hunting with friends in the Washington state forests.

She currently resides in Seattle, Washington where she has worked at the Boeing Company for 22 years as a technical communicator.