Infopreneurship Journal (IJ)

Available online at **www.infopreneurship.net**
Infopreneurship Journal (IJ),
2014, Vol.1, No.2

How Credible is Information on the Web: Reflections on Misinformation and Disinformation

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Abstract

This paper seeks to investigate credibility, misinformation and disinformation as concepts highly correlated to the quality of information sources so as to encourage users to bear them in mind when searching for information via the web. Issues as to how users can make distinction among web information sources when confronting questionable ones are discussed. Exploring within an extensive, but not comprehensive, body of works related to the main issues, the paper attempts to integrate them into a conceptual framework and even to find criteria by which web resources could be evaluated. Using some information skills like checklists, critical thinking and information literacy, users can considerably lessen challenges posed by searching for credible information from the web. Aside from novelty of the two concepts misinformation and disinformation in the information behavior literature, the paper provides a framework for the concepts explored and a list of proposed solutions by which credibility of web information could be assessed.

Keywords: information, misinformation, disinformation, credibility, Word Wide Web, information literacy, critical thinking.

Introduction

It is said that because of its exponential growth, finding quality information on the web is similar to a nightmare (Fensel et al. 2005). Despite its impacts on every walk of life, especially on communication and information environments, this "vast wilderness" (Healey 1995) may be compared to a huge library in which books are strewn about the floor with no structure or organization (Bruce 2000; Minkel 1999).

The growth and the fast-changing nature of information resources on the web has made the evaluation of the quality of information a crucial task, especially when untrustworthy information is being posted to the web (Robins, Holmes and Stansbury 2010; Metzger 2007; Ernest, Level, and Culbertson 2005; Levine 2005; Fritch and Cromwell 2001). This problem, along with the fact that web searching is among the most popular activities of internet-based applications (Hsieh-Yee 2001), are motives for investigation and makes the study of credibility of information a worthwhile field of research and a moot point (Mansourian and Madden 2007).

Credibility: a continuous concern about the web

As a communication medium, the web is not only a great but also a questionable source of information (see for example: Robins, Holmes and Stansbury 2010; Metzger 2007; Rieh and Danielson 2007; Wathen and Burkell 2002; Bruce 2000). Metcalfe (1995) points out that as more people use a given network, its value will be increased. In the case of the web, its value lies in the ways it can open up our questions but there is a choice crisis (Lankes 2008a) whenever users are confronted with the wide range of information available.

The availability of different information on the web has made it difficult to determine what and whom to trust (Robins, Holmes and Stansbury 2010; Fisher et. al, 2008; Goldbeck 2008; Lankes 2008a; Huntington et al. 2004). In comparision with traditional print material, the content provision on the Web is no longer a prerequisite (Lankes 2008b; Metzger 2007; Liu 2004; Wathen and Burkell 2002; Bruce 2000) so that Warnick (2004) calls the web as an "authorless environment". This has led to the shift of quality assessment from authors and information providers to individual information seekers (Robins, Holmes and Stansbury 2010; Metzger and Flanagin 2008; Robins and Holmes 2008; Metzger 2007); a shift situated in a movement so called "information self sufficiency" (Lankes 2008a, b). As described by Errami and Garner (2008) duplication, co-submision and palagiarism are three weaknesses of modern publication; thus the assessment of credibilty is a pressing concern (Liu 2004).

Despite the high importance of information credibility on the web, researchers have not given adequate attention to this field (Flanagin and Metzger 2008; Lankes 2008a; Young and Hilligoss 2008). Credibility has long been a major consideration in many areas of research and practice, especially in commerce, health, and politic (Rieh and Danielson 2007; Liu 2004; Wathen and Burkell 2002). The history of credibility dates

back to Aristotle's writings on rhetoric and his notions of ethos, pathos and logos (Flanagin and Metzger 2008). But in new information environments, the users are responsible for credibility judgements about the information that they receive (Lankes 2008a; Mattus 2007; Metzger 2007; Liu 2004; Bruce 2000). As such, credibility assessment becomes a task for those who receive the information, not for those who provide it (Lankes 2008a; Mattus 2007; Hong 2006).

There is, however, no uniform definition of credibility among scholars (Flanagin and Metzger 2008; Hong 2006). It is usually believed that credibility or believability judgement is a technical, cognitive and iterative process by which information is filtered and selected (Rieh and Hilligoss 2008; Rieh and Danielson 2007; Liu 2004; Wathen and Burkell 2002) consisting of two dimensions – trustworthiness and expertise (see Metzger 2007). According to Rieh and Danielson (2007) credibility can be accomplished at three levels on the web: evaluation of the web as a medium, evaluation of websites, evaluation of information.

Research findings indicate that the issue of credibility is investigated most thoroughly at website or structural level (Rieh and Danielson 2007). In addition, in online environments, structural features are basically as important as content or message features and any assessment should concurrently takes them into consideration (Hong 2006). It is worth noting that recent research shows that the characteristics of a message are more important than its structure for credibility assessment by users. Hong (2006) believes that characteristics of source can determine perceptions of credibility. There exists thus a gap between message and structural features that needs to be bridged (Robins, Holmes and Stansbury 2010; Rieh and Danielson 2007; Hong 2006).

The current paper intends to explore the two concepts of misinformation and disinformation in the evaluation of credibility of information found on the web. It will also focus on characteristics of web information.

Misinformation and Disinformation: background and definition

Misleading information has been an important subject for many researchers since the beginning of the web (for example, Lankes 2008a; Metzger 2007; Doyle and Hammond 2006; Childs 2005; Huntington et al. 2004). Information may mislead accidentally through error or ignorance, or by intent to deceive. Misinformation and disinformation are subjects of several different fields of research. They are variably discussed in Political Science (for example, Rothkopf 1999), Psychology (for example, Abeles and Morton 1999; Burton 2002), Information Science (for example Capurro, 2003), Communication (for example, Wang and Lu 2007), Education (for example, Calvert 1999) and so on.

It is believed that misinformation mistakenly has been used for information, and/or misleading information (Tudjman and Mikelic 2003). Misinformation does not necessarily arise through the intention to deceive the users. Calvert (1999) uses the term misinformation to describe information that does not

match normative patterns of truth, i.e. misinformation can be information that is incomplete, out of date, confused, or knowledge, which is not commonly accepted.

In some cases, the use of correct information in a quite another context leads to a completely different sense (Vedder 2001). As a result, misinformation is the product of multiple interpretations (Banks 2003). Deliberate misinformation is a psychological control tactic created through a mixture of fact and fantasy and disseminated as correct information to audiences through the appropriate communication channels (Covacio 2003)).

Fitzgerald (1997) identified some types of online misinformation including incomplete information, pranks, contradictions, out-of-date information, improperly translated data, software incompatibilities, unauthorized revisions, factual errors, biased information and scholarly misconduct. Misinformation is subsequently adding inadequate information to knowledge communication, which, in turn leads to wrong idea and knowledge construction among people (Cartelli 2003).

Disinformation, on the other hand, has been defined as intentionally false information disseminated for the purpose of harming the receiver by the information provider (Tudjman and Mikelic 2003). It is used if the message is based on the contradictory data, on real conditions and if accepted by those for whom it is provided.

Fetzer (2004) has developed a “theory of disinformation” which is based on his longitudinal studies about, particularly involving the death of John F. Kenedy, the assassinated president of the USA. He has identified five types of disinformation from a political point of view. Overall, Fetzer defines disinformation as distribution, assertion, or dissemination of false, mistaken, or misleading information in an intentional, deliberate, or purposeful effort to mislead, deceive, or confuse. It might therefore be described as “misinformation with an attitude”. He equates disinformation with deliberate lying. Therefore disinformation, in contrast to misinformation, is produced deliberately to mislead its readers. Disinformation in its specific meaning is produced by opponents, often for political purposes.

Not all researchers use the term disinformation as necessarily deliberative or purposeful, but also involuntary dissemination of incorrect information. For example, Floridi (1996) points out that the increasing facility and speed of the internet results in easy creating, manipulating, reproducing, spreading and voluntary diffusion of disinformation. He calls the internet a potential "disinformation superhighway", in line with Kirk (2001) who believes that the internet is an "excellent vehicle of disinformation".

Misinformation and Disinformation on the web

Fitzgerald (1997) listed three distinct problems that lead to misinformation and disinformation on the internet: the nature of internet structure, the architecture of internet, and the traditional causes for

misinformation. Fitzgerald identifies data malleability and lack of central authority as the two of the challenges that are associated with the architecture of internet. He counts the "old problems in new form" as the most important causes of misinformation. These are human error, misconduct, removal of information from context, lack of currency and bias.

Misconduct in academic environments are one of the most common traditional causes. This is due to fabrication, falsification, and plagiarism in a study. Fabrication is the invention of data that is used in a study, and falsification means deliberate distortion of the result. Plagiarism is copying another's words and passing them off as one's own. These three forms of misconduct usually are the result of a desire to short-circuit the authorship of documents to gain instant reward, or to receive promotion in an academic institution (Calvert 2001).

The causes for disinformation are different. These are associated with the producer's intention for the falsification of information. The intention for disinformation may be political, malicious fun, (false) instructional (Piper 2001) or commercial. Disinformation is produced and disseminated to intentionally misdirect audiences.

Web information evaluation: a web literacy approach

Structural and content features need to be assessed for the credibility evaluation of web information. The online environments share speed, link structure, multimedia and interactivity, lack of referencing and organizational conventions. These make the evaluaton of web information different from the evaluation of traditional information sources (Lankes 2008a; Rieh and Danielson 2007; Walton and Archer 2004; Wathen and Burkell 2002). Furthermore, credibility assesment of information sources in areas like health (Robins, Holmes and Stansbury, 2010; Eisenach 2008; Fisher et al. 2008; Childs 2005; Huntington et al. 2004), e-commerce (Clewley, Chen and Liu 2009; Yeh and Li 2009) and political decisions (Gunter et al. 2009; Flanagin and Metzger 2008; Weingarten 2008) are very important because of the impact on people's individual and social lives (Weingarten 2008).

Moreover, evaluation skills vary among different users regarding according to their needs, context and abilities (Rieh and Danielson 2007; Nicholas et al. 2003). For example, youth often consider the authority of information instead of its structure while searching in the web (Flanagin, and Metzger 2008; Weiler 2004). The lack of evaluation skills is a consequence of variables such as experience, age, tasks and so on. How the information is made available also influences the assessment of credibility. For example, researchers found out that fee-based information tends to be perceived as more credible; a situation to which limited number of people have access (see Rieh and Danielson 2007; Liu 2004).

Increase in the number of resourses on the web together with the multidimensional construct of the credibility concept, have made it a real concern (Flanagin and Metzger 2008). However, as Metzger (2007)

pointed out, willingness of users to evaluate online information needs to be also taken into account when discussing credibility. Credibilty will be of the least importance when the user is not motivated to carefully examine the content in searches, for example in entertainment information.

Content evaluation is more associated with credibility asssessment (Robins and Holmes 2008; Hong 2006) and an extensive body of literature considers content credibility as the primary indicator of quality information (see Fallis 2004; Fink-Shamit; Bar-Ilan 2008). In fact, many users lack prior knowledge about the structure of web information and in its absence, evaluation of content alone predicts credibility (Hong 2006). Credibility assessment of content could be characterized when people are asked to evaluate information (Rieh and Danielson 2007). A variety of criteria has been put forward regarding the web environment, of which the following five criteria are foremost:

- Authority
- Accuracy
- Objectivity
- Currency
- Coverage or scope (Tate 2009; Meola 2004; Tudjman and Mikelic 2003; Fritch and Cromwell 2001; Kapoun 1998; Scholz-Crane 1998; Kapoun 1998; Beck 1997; Smith 1997; Smith 1997; Brandt 1996).

Other criteria like relevancy (Scheeder 2005; Zhu and Buchman 2003), durability (Zhu and Buchman 2003), accessibility (Zhu and Buchman 2003), privacy (Mortan-Martin and Anderson 2000), tailored to information needs (Scheeder 2005) and workability (Smith 1997) are also proposed by different researchers. Application of such criteria is often through checklists which could be prepared by information professionals ahead of the users' search process.

However, the checklist approach has limitations (Lankes 2008a; Metzger 2007; Meola 2004). In this approach, people are not instructed how to evaluate information but are provided with a list of criteria that may be hard to apply. These criteria are often time consuming and require effort so that users do not regard them as the basic evaluation criteria (Metzger 2007; Scholz-Crane 1998). However, there is not a set of criteria for information evaluation among researchers (Childs 2005; Sorapure, Inglesby and Yatchisin 1998).

Critical thinking and information literacy are two basic skills of which users should be aware. The terms are related and are often used interchangeably, to the point that Elmborg (2006) coined the term "critical information literacy". In fact, they are the most prescribed strategies to access quality information from the web (Mattus 2007; Kirk 2001; Vedder 2001; Mortan-Martin and Anderson 2000; Fitzgerald 1997; Floridi 1996). The skills required for credibility assessment can be achieved by developing critical thinking and

information literacy, which are necessary in both the evaluation and effective use of information (Weiler 2004).

There is not universal agreement about the definition of information literacy and critical thinking in the relevant literature. Users are frequently advised to deal critically with information they found. Critical thinking has long been discussed in many fields of study and has been regarded as a key evaluation skill to the point that Gilster (1997) regards it as the core competency demanded from internet users. On the other hand, information literacy is well described by Sundin and Francke (2009) as a "socio-technical practice, incorporating knowledge of the epistemological aspects of the information sources as well as of the technology and systems that make up their material dimension". It is found that users do not care about the information literacy and critical thinking in actual information seeking (Sundin, and Francke 2009). As a result, some critical views are starting to emerge among researchers about the accurate definition and dimensions of information literacy (see Sundin 2008) and critical thinking (see Cody 2006).

Fortunately, websites offering information, misinformation and disinformation can be identified. Some researchers (for example Tudjman and Mikelic 2003) have attempted to propose key indicators by which such sites could be classified. They proposed the following criteria:

- "Informational websites give the factual information. They prove the authorship, point at the source and at the owner of the information and they have valid information; that information is accurate, without errors and subjectivity, and completely up-to-date.
- Misinformation brings confusion and disorder because they are misrepresented, opposite to the previous information or modified in the communicational process. Misinformation carries errors and out-of-date subjective information. They are not always intentional attempt to convince in the incorrectness, because they express views that can be extremely subjective.
- Disinformation intentionally wants to misdirect, deceive or delude. It is not clear who the actual author is. There is no contact address and as a rule, there is no actual reference to the information source, no date when it is written or updated, or a description of its author".

Floridi (2004, 2005) has suggested three methods to identify misinformation and disinformation in the web: quality certification of information sources, limiting monopolies controlling information resources, and greater information literacy among web users. He has stated that for quality certification, some institutions such as universities ought to exercise some measure of testing and certification of information without becoming censors. Otherwise, reducing the great monopolies controlling information resources may increase plurality of information and finally, information literacy will make receivers more aware of the potential for misinformation, and more able to identify it. Banks (2003) also believes that a useful first step in dealing with potential or actual misinformation is to gather as much data as possible and to critically

examine that data. In the case of web searching, every web page or system is unique and should be evaluated along with its related ones. As a result, users are advised to search the web on a case by case basis (Sorapure, Inglesby and Yatchisin 1998), and consequently, corroboration of related websites is a critical step in credibility assessment (Fallis 2004; Metager 2007).

For misinformation and disinformation to be filtered out, a number of models have also been proposed by different researchers. For example, Koohang and Weiss (2003) developed an evaluation model entitled as "misinformation prevention framework" which can be applied by users in the process of information seeking. They state in their model that users may consider themselves to be situated in one of three stages when assessing information resources: information identification, information analysis, information organization. At each stage, users have to keep some considerations in mind.

There seems to be a pressing need to develop a “web literacy” approach especially with the emergence of technologies like social software, wikis, blogs, open source systems and what is known as the Web 2.0 movement. Web literacy, a term first coined by Sorapure, Inglesby and Yatchisin (1998), has been defined as “an ability to recognize and assess a wide range of rhetorical situations and an attentiveness conveyed in a source’s non-textual features. Teaching such a literacy means supplementing the evaluative criteria traditionally applied to print sources with new strategies for making sense of diverse kinds of texts presented in hyper textual and multimedia formats” (Sorapure, Inglesby and Yatchisin, 1998).

Kuiper, Volman and Terwel (2008) derived three major components for web literacy from the literature: web searching skills, web reading skills and web evaluating skills. Some university programs (see Kuiper, Volman and Terwel 2008; Walton and Archer 2004) regard web literacy as a course in the academic literacy curriculum. Dialectical reading as first proposed by Kaufmann (1977) and then refined by Bruce (2000) to be applied on the web could be a solution for users to achieve web literacy. It is not only related to the skills like searching and evaluating but to a “deep experience” captured from critically reading. Dialectical reading develops a relationship between reader and an information resource in the web to make meaning from reading. Meaning making is not a static process but an evolving one composed of repeatedly thinking and doing as well as exploring other related resources from the broader web. In dialectical reading, users should not consider search results as an arrival but a first step into a journey to make meaning from reading a matrix of related web resources.

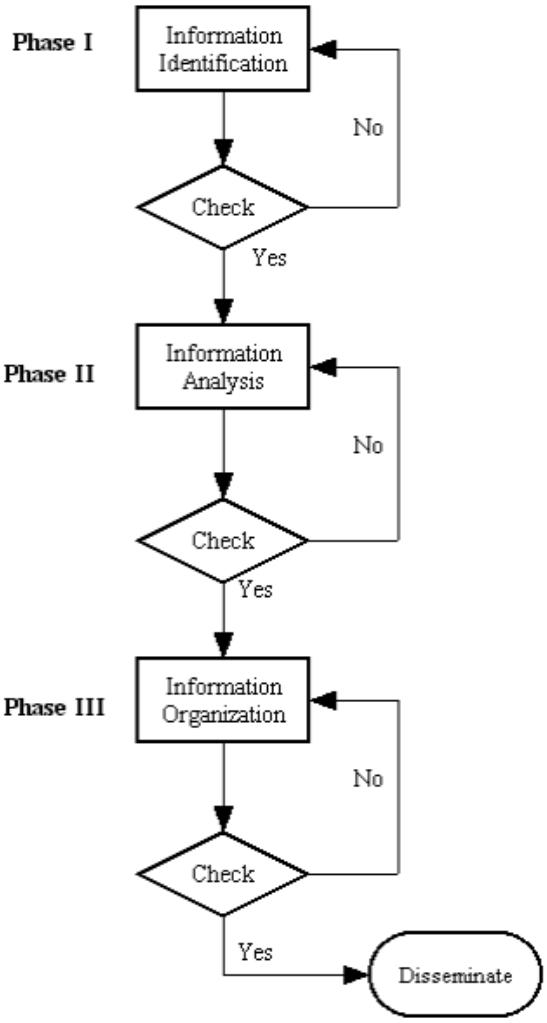

Figure 1. Misinformation prevention framework (Koohang and Weiss 2003)

Last but not least, evaluation judgments on the web should not be considered merely from an general point of view. For example, motives for information seeking (Metzger 2007), and the characteristics of the web as a media and means of social interaction (Burbules 2001) provide such evaluations with new and greater dimensions. Limits of time for information seeking, inability of users to gather as many online resources as possible, and the rapid growth and changing nature of the web pose serious challenges for users to evaluate credibility of online resources perfectly and independently. As a result, an important ethical dimension can be considered in emerging evaluation judgments.

Ethical dimension to web information evaluation should be thought of as a subject area in information ethics (Carbo & smith 2008) and media ethics (Pavlik 2012). Specifically, freedom to produce, or access to information, both of which triggered the advent of information ethics in digital environments (Capurro 2006, 2000), could be taken as issues in evaluation and credibility judgments. Evaluation issues in the

context of information ethics are not just user-related but are also related to producers and communities (Floridi 2008).

Generally speaking, characteristics of the web as a medium and information environment on the one hand, and users' situations regarding their tasks, contexts, limits of time, knowledge and energy on the other hand, will overwhelmingly change how to evaluate the credibility and trustworthiness of web information. It is exactly where ethical issues related to users' credibility judgments come to surface. How values and worth are assigned to a piece of information found on the web is a matter beyond merely checking information against some undefined or predefined set of criteria frequently used to judge the credibility. It is up to users to keep in mind that information evaluation can be looked at as an ethical undertaking rather than one of mechanically cross-checking information against evaluation criteria at hand.

Conclusion

The worldwide web, as the world's largest information gold mine, plays simultaneously the roles of source, message, and media in which a variety of credibility features exist. Furthermore, with the prevalence of web resources in research and education, traditional skills of information evaluation are no longer fully effective in responding to this credibility crisis. There need to be new information skills developed in such a setting to cope with the daily digital information problems. Different strategies should be implemented by people engaged in design, presentation and evaluation of web resources on one hand, and users on the other hand. Particularly, the user of information has to think critically so as to identify true from untrue information. Training users with critical thinking and information literacy skills are two pressing concerns. In doing so, web literacy is an important strategy in the battle against misinformation and disinformation – the rotten apples in the huge web barrel!

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