

Information Overload: An Overview

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Summary

For almost as long as there has been recorded information, there has been a perception that humanity has been overloaded by it. Concerns about “too much to read” have been expressed for many centuries, and made more urgent since the arrival of ubiquitous digital information in the late 20th century. The historical perspective is a necessary corrective to the often, and wrongly, held view that it is associated solely with the modern digital information environment and with social media in particular. However, as society fully experiences Floridi’s Fourth Revolution, and moves into hyper-history (with society dependent on, and defined by, information and communication technologies) and the infosphere (an information environment distinguished by a seamless blend of online and offline information activity), individuals and societies are dependent on and formed by information in an unprecedented way, and information overload needs to be taken more seriously than ever.

Overload has been claimed to be both the major issue of our time and a complete nonissue. It has, as will be noted later, been noted as an important factor in many areas, including politics and governance.. It has been cited as an important factor in a wide range of areas, from business to literature.

The information overload phenomenon has been known by many different names, including: information overabundance, infobesity, infoglut, data smog, information pollution, information fatigue, social media fatigue, social media overload, information anxiety, library anxiety, infostress, infoxication, reading overload, communication overload, cognitive overload, information violence, and information assault. There is no single generally accepted definition, but it can best be understood as the situation that arises when there is so

much relevant and potentially useful information available that it becomes a hindrance rather than a help. Its essential nature has not changed with evolving technology, although its causes and proposed solutions have changed significantly.

The best ways of avoiding overload, individually and socially, appear to lie in a variety of coping strategies, such as filtering, withdrawing, queuing, and “satisficing.” Better design of information systems, effective personal information management, and the promotion of digital and media literacies also have a part to play. Overload may perhaps best be overcome by seeking a mindful balance in consuming information and in finding understanding.

Keywords

information overload, information anxiety, information literacy, satisficing, big data, fake news, post-truth, digital media, infosphere, political decision making

Introduction

It is a very sad thing that nowadays there is so little useless information.

Oscar Wilde, “A Few Maxims for the Instruction of the Over-Educated”

Distringit librorum multitudo [the abundance of books is distraction].

Seneca, *Epistles*

Although information overload is a much-discussed concept, there is no single generally accepted definition or explanation for it. In this article, the most widely accepted approach is taken, and overload is regarded as the situation that arises when there is so much relevant and potentially useful information available that it becomes a hindrance rather than a help (Bawden, Holtham, & Courtney, 1999; Bawden & Robinson, 2009). Originally seen as a

problem primarily affecting scholars and academia, it was then claimed to afflict business and information-intensive professions, such as medicine. In the late 20th century it was seen to affect the whole of society, including education, government, home life and leisure, and citizenship.

It is not a new problem, but, as James Gleick (2011) points out, it has always *felt* new.

As Rosenberg (2003) puts it:

The notion of information overload appears everywhere in our popular media as a characterization of something specific and emblematic of our era, of life in a time of cell phones and web browsers and fax machines and innumerable other “information appliances” . . . [it] so much defines our self-understanding today that it is hard to remember that it has a history that stretches back to Vannevar Bush and the 1950s, much less to Samuel Johnson and the 1750s or to Conrad Gessner and the 1550s . . . Equally strange is the persistence of the rhetoric of novelty that accompanies so old a phenomenon. (pp. 1–2)

As will be discussed in detail in this article, there have been complaints about there being too much to read since classical times, but the idea of overload in a modern sense began with the advent of the digital information environment. More specifically, the problem in its modern guise first came to prominence in the 1990s, with a series of reports showing the waste of time, decrease in efficiency, and even ill health allegedly caused by information overload. It has, of course, been given an impetus by the focus on “big data” since the late 1990s (Floridi, 2014a; Gupta & Rani, 2018; McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012; Merendino et al., 2018).

Information overload has been claimed to be both the major issue of our time and a complete nonissue. It has been cited as an important factor in, inter alia, science, medicine, education, politics, governance, business and marketing, planning for smart cities, access to

news, personal data tracking, home life, use of social media, and online shopping. It has even influenced literature (Groes, 2017; Stephens, 2015).

A perspective may be gained by setting information overload in the framework due to Luciano Floridi, the originator of the Philosophy of Information, and in particular his concept of the “Fourth Revolution” (Floridi, 2014b). Floridi’s scheme describes three periods in humanity’s development: prehistory, before recorded information; history, when society was assisted by recorded information; and “hyper-history,” with society dependent on and defined by information and communication technologies. The move to hyper-history is paralleled by the development of the condition of “on-life,” whereby life is lived simultaneously online and offline in an “infosphere.” This is a dramatic change, and one that occurs only once in the lifetime of a species. For the generation that has lived through it, it is hardly surprising to find new problems and issues arising, and information overload can be understood as one of these.

The phrase *information overload* is attributed to the American social scientist Bertram Gross (1964), who used it to refer to the state in which the information inputs to any system exceed its information processing capabilities. Although this term has been the most commonly used, the phenomenon has been referred to by other names, including inter alia information overabundance, infobesity, infoglut, data smog, information pollution, information fatigue, social media fatigue, social media overload, information anxiety, library anxiety, infostress, infoxication, reading overload, communication overload, and cognitive overload (Bawden & Robinson, 2009; Gleick, 2011; Hartog, 2017; Johnson, 2012; Jones & Kelly, 2018). The phenomenon has, most dramatically, been discussed in terms of *information violence*, of which Piotr Chrzastowski wrote: “Information is merciless. It fills each gap it can penetrate, using every moment of our carelessness to encroach and occupy space wherever it can” (cited in translation by Babik, 2018, p. 291). Similarly, R. S. Wurman,

originator of the idea of *information anxiety*, wrote of an *information assault* (Hartog, 2017). The topic has been reviewed over time and from various perspectives (Batista & Marques, 2017; Bawden & Robinson, 2009; Bawden et al., 1999; Benselin & Ragsdell, 2015; Case & Given, 2016, pp. 122–127; Edmund & Morris, 2000; Eppler & Mengis, 2004; Hall & Walton, 2004; Hargittai, Neuman, & Curry, 2012; Jones and Kelly, 2018; Koltay, 2017; Levy, 2008; Roetzl, 2019; Wilson, 1996).

This article is based on a highly selective literature analysis. Selectivity is necessary because searching for materials on the subject of information overload gives an immediate demonstration of the phenomenon. In February 2020, a Google search for the phrase “information overload” produced more than three and half million items. A search in the *Web of Knowledge* database of academic literature retrieved more than 3,000 articles, and searches in bibliographic databases of subjects such as business, psychology, and social sciences typically found 1,000 items. For the most part, only a small number of relevant references are cited on any particular point; that the reference list for this article is still lengthy shows the extent of research and commentary on the subject and the breadth and diversity of issues with which it is associated.

Overload has been experienced and lamented over a very long period and this article considers the historical perspective. This should help place 21st-century ideas of information overload into context and dispel the notion that overload is associated solely with the modern digital information environment and with social media in particular.

The text that follows deals with the following aspects of information overload: its history; its nature; its causes; to what extent it is real; its opposite, information poverty; and its consequences. The article concludes with possible solutions for overload.

History of Overload

The history of information overload has been discussed by a number of writers. Detailed and scholarly treatment is not confined to the Western context and has been provided by Blair (2003, 2010), and by the contributors to a special issue of the *Journal of the History of Ideas* (Rosenberg, 2003; see also, Bawden & Robinson, 2009; Gleick, 2011; Neill, 1992). The concept of “information overload” is usually taken as originating at the end of the 19th century with George Simmel, a German sociologist and philosopher who was one of the first to analyze it in modern terms (Klapp, 1986; Savolainen, 2007), but its roots can be traced much farther back.

Almost from the beginning of writing, in the ancient and classical world, there were complaints of too many books and too much to read. Solutions immediately began to appear, in the form of summaries of texts and lists of collection holdings. In the European medieval age of handwritten manuscripts, the problem was perceived to become more serious, with Vincent of Beauvais lamenting “the multitude of books, the shortness of time, and slipperiness of memory” in 1255. “By the middle of the thirteenth century,” writes Blair (2010, p. 45), “the principle ingredients both of a perception of overload and of solutions to it were in place.” The solutions included reference works, compilations, indexes, concordances, and structured design of text.

The introduction of printing to Europe in early modern times exacerbated the problem. A tremendous acceleration in the production of texts throughout the 16th and 17th centuries amounted to a kind of information explosion (Rosenberg, 2003), with Leibnitz giving a typical lament in 1680 about “the horrible mass of books which keeps on growing.” (Rosenberg 2003, p.7) This was when what might be seen as the first systematic solutions to overload became widely used: skim reading, browsing, cutting and pasting, and annotating (Blair, 2003, 2010).

The volume of published material continued to escalate throughout the 18th century, which led to more innovations to control the flood. The first modern encyclopedias and dictionaries appeared (Yeo, 2003), together with indexes to periodicals and a greater use of summaries and reviews. The first approaches to systematic documentation practices appeared in the sciences. The great volume of descriptive natural history published in the 16th and 17th centuries (Ogilvie, 2003) was systematized by Linnaeus, through the intellectual means of his nomenclature and classification and documentary innovations that included filing systems, index cards, and structured text annotation (Müller-Wille & Charmantier, 2012). The eighteenth century saw the beginning of a much criticized trend, a reliance on skim reading: “the late eighteenth century boom in the number of publications . . . encouraged rapid scanning and skimming rather than intensive study of a few” (Secord, 2014, p. 128).

Overload in its modern sense began to be recognized with the communications revolution of the 19th century, with steam-powered presses multiplying the volume of material available and the widespread adoption of newspapers and magazines, learned journals, textbooks, and other new formats (Edmund & Morris, 2000). Around the beginning of the 20th century, the documentation movement and the development of tools for bibliographic control, such as abstracts, bibliographies, subject indexing, cataloguing rules, and classification schemes for the paper-based world, reached its peak (Csiszar, 2013; Wright, 2014).

Around the mid-20th century, complaints about overload in dealing with scientific information in particular was at its height. An influential article by Vannevar Bush (1945) noted that scientists were bogged down by a growing mountain of research.

Overload was explicitly acknowledged (though not under that name) at the Royal Society’s Scientific Information Conference in 1948, which was highly influential in dictating the pattern for academic and professional information services at the start of the

digital age. At that conference, “not for the first time in history, but more acutely than ever before, there was a fear than scientists would be overwhelmed, that they would no longer be able to control the vast amounts of potentially relevant material that were pouring forth from the world’s presses” and that “torrents and rivers of current literature pour themselves into libraries, adding, without cease, to what is already there” (Bawden et al., 1999; Bawden & Robinson, 2009).

The first scientific treatment of the overload phenomenon is ascribed to the American psychologist George Miller (1956, 1962), who detailed many examples of what would come to be called overload, based on psychological studies of the limits to human capacity to deal with information. Galbraith (1974) reflected on the relevance of these kinds of studies to dealing with practical problems of overload.

Information overload first became noted as a potential problem for business and government in the 1960s. As Wilensky (1968) noted:

Information has always been a source of power, but it is now increasingly a source of confusion. In every sphere of modern life, the chronic condition is a surfeit of information, poorly integrated or lost somewhere in the system. (p. 331)

Alvin Toffler’s (1970) influential book *Future Shock* brought the phenomenon to wide attention. He described overload as causing both physical and physiological distress due to overloading of perception, cognition, and decision-making processes by the technological advances that were transforming industrial society. By 1984, leading scientific publisher Eugene Garfield was writing of “the already well-defined disease *information overload*” (1984, p. 39).

Up to the 1970s, overload was largely a concern in journal and report literature for academics and professionals, and of consumer choice for the general public. It became a

major and general issue of concern and focus in the 1980s and 1990s, with the widespread adoption of digital sources and then the internet. A transformation had occurred: the fundamental problem was no longer finding information, but filtering and controlling it (Tenopir, 1990). As Popova (2011) put it: “While the old media fought against the scarcity of information, new media are fighting the overabundance of information” (p. 5). A widely noted Reuters report, based on a survey of 1,300 business managers worldwide, dramatically titled *Dying for Information*, revealed a number of startling statistics (Lewis, 1996). Two-thirds of the respondents believed that information overload had caused loss of job satisfaction, a similar proportion that it had damaged their personal relations, and one-third that it had damaged their health. Nearly half believed that it damaged the decision-making process, by causing delays and leading to poor decisions. This report was a major factor in bringing overload to the general public’s attention, and it has not been out of public consciousness since.

It may be concluded that a perception of information overload has existed for almost as long as information has been recorded, although its nature and causes have changed drastically over time.

The Nature of Overload

There is no single generally accepted definition of *information overload*. It is a slippery and highly contested concept. It is easy to give numbers to show the increasing volume of information, but the problem is not just the amount. It is also to do with diversity, complexity, choices, confusion, and harm caused by information. It is notable that these factors are present in metaphors often used for overload, which include *flood*, *deluge*, *smog*, and *explosion*.

There is a recurring question as to what exactly everyone is overloaded with. Is it information, data, documents, ideas, or ideologies? Commentators suggest that people are drowning in information (or data) but lack knowledge, and often quote T. S. Eliot's lines "Choruses from the Rock": "Where is the wisdom we have lost in knowledge?/Where is the knowledge we have lost in information?" This is not a new question. As noted previously, the information explosion in early modern Europe in the 16th and 17th centuries was variously regarded as a dramatic increase in the number of books, the amount of descriptive facts, and the number of authoritative voices (Rosenberg, 2003).

Overload has generally been explained and defined in rather pragmatic and informal terms; for example, Edmund and Morris (2000) and Eppler and Mengis (2004) give typical lists for their time, mainly characterized as an unmanageable volume of information (for other explanations drawing on the 21st-century context, see Bawden & Robinson, 2009; Jones & Kelly, 2018; Spier, 2016).

Relatively few have invoked a formal or philosophical approach. Floridi (2014a, 2014b) analyzes aspects of overload in terms of his Philosophy of Information. Spier (2016) examines overload using the ideas of Horkheimer and Adorno, concluding that overload is a feature of a capitalist culture industry, whereby "the increase in standardised cultural messages in the media leaves individuals with fewer capacities for reflection and critical thinking" (p. 394), and whereby individuals are active agents in their own overloading, in that they actively consume more information artefacts than they can interpret or understand. Capurro's (2013, 2014) analysis refers in part to Heidegger and Foucault.

A statement by the International Federation of Library Associations (2017, n.p.) suggests that: "The exponential growth in the availability of information brought to us by technological advances brings not only promise, but for many a sense of information overload and frustrations linked to a lack of confidence in using digital tools." Here, overload

is taken as being caused by technology delivering too much information, which is made worse by a sense that there is not adequate control over the flood.

More precisely, information overload is the situation that arises when an individual's efficiency and effectiveness in using information (whether for their work, studies, citizenship, or life generally) is hampered by the amount of relevant, and potentially useful, information available to them. The information must be of value or it could simply be ignored, and it must be known about and made accessible or the overload will only be potential; although the latter situation could certainly cause anxiety or fear of missing out, or FOMO (Dhir, Yossatorn, Kaur, & Chen, 2018; Jones & Kelly 2018; Przybylski, Murayama, deHann, & Gladwell, 2013). The feeling of overload is usually accompanied by a perceived loss of control over the situation, and often by feelings of being overwhelmed. Savolainen (2006, 2007) points out that these feelings are often related to a perceived lack of time to deal with all the information at hand. Wilson (1995) defined overload as the situation in which someone knows that relevant information exists, but knows that they cannot access and use it properly because of time constraints. Time pressures have been mentioned as a specific cause of overload in numerous studies, for example among health service managers (MacDonald, Bath, & Booth, 2011) and board level directors (Merendino et al., 2018). In the extreme, it seems clear that information overload may lead directly to problems of mental and physical health, as well as loss of efficiency at whatever tasks are being undertaken. Its significance should not be underestimated.

Information overload has generally been regarded as an issue that by definition affects the individual, but some authors have understood it as a problem that can affect an organization, a city, or even a society, albeit the summation of individual situations. For example, Wilson (2001, p. 113) wrote of overload at the organizational level as "a situation in which the extent of perceived individual information overload is sufficiently widespread

within the organization as to reduce the overall effectiveness of management operations” (see also Davis, 2011; Eppler & Mengis, 2004).

Causes of Information Overload

The causes of overload have been analyzed in a number of publications (see the reviews cited in the introduction). Eppler and Mengis (2004) give a detailed list of causes of information overload for the management disciplines in the early years of the millennium, categorized as personal factors, information characteristics, task and process parameters, organizational design, and information technology. In general, it can be said that the definition and perceived effects of overload have not changed much, if at all, over time, but its potential causes have multiplied with the arrival of new technologies and new information formats.

Hartog (2017) makes the perceptive point that “information overload is a bridging concept that merges the surplus of information (an external reality) with a psychological response of feeling overwhelmed (an internal reality)” (p. 46). Little progress will be made in assessing the causes of, and solutions to, overload if only the objective amount and nature of information and data, or only the subjective individual response to it, are considered; the two must be considered together.

The causes of overload can be considered under four headings: too much information; diversity, complexity, and novelty of information; pervasive and pushed information; personal factors and individual differences.

Too Much Information

Too much information (TMI) is a phrase often associated with overload. Other similar phrases include information explosion, information inundation, information excess, and

information tsunami (Hartog, 2017; Johnson, 2014; Rudd & Rudd, 1986; Tenopir, 1990). It is easy to quote statistics and examples to support this idea. To give just a few examples:

- A weekly edition of the *New York Times* in the early years of the 21st century contained more information than the average person was likely to come across in a lifetime in 17th-century England (Bawden & Robinson, 2009).
- More information was created in the last three decades of the 20th century than in the previous 5,000 years (Bawden & Robinson, 2009).
- In 2012 about 2.5 exabytes of data were created each day, with the amount doubling every 3 years, and more data were transmitted across the internet each second than were stored in the whole internet 20 years earlier (McAfee et al., 2012).
- In the late 1970s, it was estimated that it would take 700 years to read one year's worth of research literature on one subject (Bernier, 1978).
- By 2012, enough data were being generated each day to fill all the libraries in the United States eight times over (Floridi, 2014a).

Fraser and Dunstan (2010) provide a striking example of the TMI problem in a medical context. They show that it is literally impossible for someone to read all the relevant material, even within a narrow specialty. They envisage a trainee in the specialty of cardiac imaging setting out to read the directly relevant medical literature. Reading 40 papers a day 5 days a week, they would require more than 11 years to bring themselves up to date. By the time they had finished, another 82,000 relevant papers would have been published, requiring another 8 years of reading. Although it is unlikely that anyone in the past several decades has tried to read everything related to their specialty, and the calculation is therefore not realistic, this example does give an idea of the TMI concern.

In quite a different context, personal informatics systems, which track users and collect data relating to life elements such as health, well-being, diet, finance productivity, or reminiscence, may also be a cause of overload. This may be by virtue of the sheer amount of data collected, as well as the many possible correlations between data elements; for example, quality of sleep correlated with the weather, the amount of physical activity that day, and the duration and nature of music the user had listened to (Jones & Kelly, 2018).

It is worth noting that feelings of TMI in the 21st century, which are generally attributed to email, social media, big data, a publication explosion, and other manifestations of digital technology, bear a striking resemblance to the feelings evoked in early modern times by the development of printing. This era is analyzed by Blair (2003), who notes that in Gutenberg's time there were 30,000 handwritten books available in Europe, whereas 50 years after his death there were 10 million printed books. She quotes Conrad Gessner complaining of a "confusing and harmful abundance of books" in 1545 (Blair 2003, p.56), and Adrien Baillet a century later lamenting that "we have reason to fear that the multitude of books which grows every day in a prodigious fashion will make the following centuries fall into a state as barbarous as that of the centuries that followed the fall of the Roman Empire." (Blair, 2003, p. 59)

Diversity, Complexity, and Novelty

The phrase *data smog* (Shenk, 1997) is very telling, as it conjures up an image of a lack of clarity and accurate perception of what is there. The diversity and complexity of information, formats, and media are generally hidden by the homogenization provided by the ubiquitous, and of course highly convenient, web browser. This homogenizing effect makes it difficult to determine which information is useful or useless, accurate or inaccurate, reliable or unreliable, which increases the potential for overload (Bawden & Robinson, 2009; Cooke,

2017; Gamble, Cassenti, & Buchler, 2017; Schmitt, Debebeit, & Schneider, 2018). Donnelly (1986) notes that it is “the unconnected, excited nature” of information that causes overload (p. 186). The more diverse and complex a collection of information is, and the more alternatives it offers or appears to offer, the more likely it is to cause overload (Bawden & Robinson, 2009; Eppler & Mengis, 2004; Li, 2017; Roetzel, 2019). Interdisciplinary work, which requires an individual to deal with information from a variety of disciplines, has long been recognized as posing a particular overload problem (Wilson, 1996).

In regard to the novel content of incoming information, there is a “sweet spot” in relation to the amount of information presented and the decision made on it: adding information beyond that point leads to overload and a decline in the quality of decisions (Chewning & Harrell, 1990; Jones & Kelly, 2018). Kuhlthau (1993) expresses the same idea in slightly different terms. The balance between redundant (already known) information and unique new information is crucial; too much uniqueness leads to anxiety and overload, and too much redundancy leads to boredom.

Pervasive and Pushed Information

“Push” services, particularly on ambient mobile devices, have added greatly to the perception of overload, with information being constantly “imposed” without being sought (Walsh, 2012). The ubiquity of mobile devices has added to the “always-on” syndrome that is often associated with information overload.

Email was originally held to be a major cause of overload, if not the major cause, and is still often noted as a part of the problem (Bawden & Robinson, 2009; Benselin & Ragsdell, 2015; Terra, 2017; Waller & Ragsdell, 2012). Social media outlets, such as Facebook and Twitter, are now often considered to be the main sources of “overwhelming” media. These social network services are generally believed to be responsible for much, if not most,

overload because of the ease with which they allow the creation, duplication, and sharing of information (Bontceva, Gorrell, & Wessels, 2013; Hargittai et al., 2012; Jones & Kelly, 2018; Liang & Fu, 2017; Nawaz et al., 2018; Rader & Grey, 2015; Sasaki, Kawai, & Kitamura, 2015, 2016).

Doubt has been expressed as to whether push technology, because of its potential to send people the information they need and sparing them from having to search for it, might be a solution for overload (Edmund & Morris, 2000; Savolainen, 2007). With hindsight, it seems that push technology is largely a cause of overload.

The effect of mobile devices on overload, particularly smartphones, has been examined by numerous researchers (Feng & Agosta, 2017; Kneidinger-Müller, 2017). Specific overload issues with mobile devices include a perceived constant need to check for new information, especially from social media, and problems with easy assimilation of information on small screens. Mobile devices also encourage multitasking and attempting to process information in short periods of time while traveling or between other tasks. These inefficient behaviors may add to the perception of overload. The pervasive technologies and ambient information flows intrinsic to “smart cities” may also be associated with overload (Batista & Marques, 2018).

Individual Differences

Savolainen (2007) found some indications that overload might affect older people most, as younger people are more skilled in the use of information technologies, an assumption made by many at that time. Later studies have shown that this is not generally the case, and overload affects all age groups. With older people this is often due to problems with using technology, but younger people are just as likely, if not more likely, to be affected by overload because they are less familiar with various information environments, such as online

news, and because they may lack information literacy (Benselin & Ragsdell, 2015; Schmitt et al., 2018).

There is some evidence that individual and personality factors, such as self-efficacy, may play some part in whether and how a person perceives overload, but there is certainly no indication that an overload-prone personality type exists (Ge, 2010; Haase et al., 2014; Johnson, 2014; Kominiarczuk & Ledinska, 2014; Li, 2017; Schmitt et al., 2018).

Self-confidence may protect an individual from overload. A study of senior politicians found that they do not worry about possibly missing relevant information, nor do they suffer from the uncertainty that contributes to overload (Walgrave & Dejaeghere, 2017).

Is Overload Real?

Running alongside the expressed concerns about overload, there has always been a parallel stream of opinion to the effect that these are not “real” problems and that they are exaggerated. This exaggeration may be encouraged by professional groups seeking to magnify a problem to which they claim to have a solution. This has been a potential concern for the library and information professions (Bawden & Robinson, 2009).

Among the skeptics, Wilson (1976) regarded overload as a “phantom.” And when the modern conception of overload was being established, Tidline (1999, p. 486) argued that overload was unevidenced, and was a “myth of modern culture.” While this may be an extreme view, there is considerable evidence that many people are quite untroubled by the idea of overload. Rudd and Rudd (1986) suggest that there is potential for overload, due to the amount of available information, but actual overload is rare and occurs only in unusual circumstances. Bawden et al. (1999) note a number of rebuttals to overload at the end of the twentieth century. Savolainen (2007) points out that “information overload does not seem to

exist for many people since they tend to ignore what they do not need or that which is seen as irrelevant . . . simply avoiding or ignoring the excessive supply of information [or] may adopt a highly selective approach and seek information that supports their customary decision choices and practices” (p. 614). Others have made similar observations (Feng & Agosta, 2017; Hargittai et al., 2012; Jones & Kelly, 2018; Neill, 1992; Shachaf, Aharony, & Baruchson, 2016; Thompson, 2013; Wilson, 1976).

It also has to be admitted that there is an element of fashion, of being on-trend, in expressing concern about these issues. The idea of TMI was much discussed in popular sources around the turn of the millennium, but seems to have receded from popular consciousness (Bawden & Robinson, 2009). In a review of Clive Thompson’s *Smarter Than You Think*, Maria Popova (2013) described information overload as “painfully familiar and trite-by-overuse.” (Popova 2013, np) This is not an argument for rejecting the whole idea of overload as mythical, but rather for a clearer analysis of its nature and applicability.

Others have tried to deny overload by saying that the problem is real, but is caused by other factors. One widely publicized example of this is American writer Clay Shirky’s dictum that “it’s not overload, it’s filter failure,” (discussed by Davis 2011, p. 46), since the problem is not the amount of information per se, but our inefficiency in dealing with it. It is perhaps more helpful to regard filter failure as an intrinsic part of the wider phenomenon of overload (Davis, 2011).

In the context of big data, the information philosopher Luciano Floridi remarks that “big data refers to an overwhelming sense that we have bitten off more than we can chew, that we are being force-fed like geese, that our intellectual livers are exploding” (Floridi, 2014b, p. 305). Instead, Floridi goes on to argue, we should regard ourselves as seated at a banquet where there is more food than we could ever eat, so why should we complain? There is no

easy technological solution, so we must, Floridi argues, think hard about the purposes for which the data are created and used, and thereby focus on information quality.

Similarly, Capurro (2013, 2014) regards overload as a paradoxical condition: information at hand is always the product of some selection process, guided by what an individual perceives they need. The paradox, for Capurro, lies in the great number of options provided by available information, and hence for the need to choose the criteria for selection. Spier (2016) expresses this paradox more generally: If we live in an information society whose main feature is, by definition, a growing informatization, how can such a society suffer from too much information?

One answer to this paradox may be another—the paradox of choice, as enunciated by American psychologist Barry Schwartz (2004). Put simply, while having little choice may be problematic, having too much choice may be equally or more so. Having too many options may cause anxiety and lead to a paralysis of decision making or irrational decisions to overload. And indeed, studies of online shopping behavior have shown that an increased choice of brand alternative causes feelings of overload among shoppers (Li, 2017).

A closely related viewpoint is that overload, assuming that it exists, is not caused by TMI because there is never a necessity for anyone to absorb all relevant information. Rather, it is caused by “filter failure,” an inability to identify which information is useful at any particular time (for a clear identification of this in the context of health information, see Klerings, Weinhandl, & Thaler, 2015).

As guests at Floridi’s banquet, we may feel it does not matter if we cannot consume all the food, or even try a majority of the dishes, as long as we get enough to eat. For most of us, most of the time, that may be a reasonable assumption; hence, the studies showing that many people successfully cope with overload and are unaware of its existence. But that does not mean that we should not be mindful of what information we consume and how we do it.

Information Poverty

It may seem odd for an article on information overload to devote space to what may seem to be its diametric opposite, *information poverty*. But in fact, information poverty is in a sense the evil twin of information overload, and the two are in many ways connected.

Information poverty, which in the simplest terms means that individuals, organizations, or communities have insufficient information to enable them to be effective, is a contested concept that has been understood in different ways (Haider & Bawden, 2007; Britz, 2004; Chatman, 1996; Lee & Butler, 2019). It is closely connected to the concept of the so-called digital divide, the idea that some individuals and groups are disconnected from an ability to access and use digital information (Bawden & Robinson, 2009; Flanagan, 2018).

Information poverty is not solely a feature of economically impoverished or ill-educated groups. For example, it was found to be a factor in a study of health service managers. The subjects had difficulty either because the required information did not exist, they were unable to access it, or they could not get it in time for it to be useful (MacDonald et al., 2011).

The particular relevance of information poverty to overload is that, seemingly paradoxically, the two problems may be identified in the same setting (MacDonald et al., 2011). The two pathologies may also have much the same effect. Those suffering from information poverty are unable to make good decisions or take effective action because they lack the information and data that would enable them to do so; the overloaded suffer the same fate because the surfeit of information causes fatigue and anxiety (Goulding, 2001).

Overload and poverty can be confused because their consequences are much the same. As with overload, there have been concerns that these may be false, or at least exaggerated, phenomena, focused on by professional groups wishing to offer solutions (Bawden & Robinson, 2009). In any event, the solutions to the two problems may have something in common.

Consequences of Overload

The consequences of overload have been enumerated by many commentators. For example, Eppler and Mengis (2004) give a detailed list of observed consequences in management disciplines up to the early 21st century, categorized as: limited information search and retrieval strategies, arbitrary information analysis and organization, suboptimal decisions, and strenuous personal circumstances. This section summarizes these as: effects on health, inefficiency, and misinformation and fake news.

Effects on Health

In the 1980s, researchers began to express concern that information overload could directly damage mental and physical health. The idea of *information anxiety* was introduced by Wurman (1989; for later treatment, see Girard & Allison, 2008; Hartog, 2017; Wurman, 2001). Information anxiety is caused by worries about the ability to find, access, understand, or use necessary information. It is related to pathologies such as technological anxiety, computer anxiety, library anxiety, and techno-stress, but is focused on the information itself, rather than the technology by which, or the environment within which, the information is accessed (Hartog, 2017). Overload is not the sole cause, but it is a major contributor. Anxiety in handling information is closely related to uncertainty; the problem may therefore not be the volume of information but rather the extent of novel information that cannot easily be understood or related to what is already known (Kuhlthau, 1993).

Infobesity is a term used to denote the harm caused by a surfeit of information, analogous to that caused by overindulgence in unhealthy food, and with a clear connection to overload. The cure is a “diet” of good information in the right quantity (Bell, 2004; Johnson, 2012; Rogers, Puryear, & Root, 2013; Serrano-Puche, 2017).

Fatigue is often mentioned as a health consequence of overload. This generally means a physical or mental tiredness in the usual sense of the word, although the phrase *information fatigue syndrome* was coined in 1996 to imply something more specific, which involves sleeplessness, a paralysis of the capacity for thought, anxiety, and self-doubt (Goulding, 2001). The related *technostress* (West, 2007) produces the same symptoms as other forms of stress, notably headache, anxiety, depression, stomach problems, high blood pressure, and heart disease.

Mental health problems associated with overload, which may cause physical symptoms, include attention deficit traits (Hallowell, 2005) and cognitive overload (Kirsch, 2000).

In short, while there may be room for debate as to the exact cause and effect (too much information or too much work? information anxiety or social anxiety?), the general consensus is that people with a high level of information overload will experience lowered well-being, and the more information stress someone feels the less happy they are in general (Kominiarczuk & Ledinska, 2014).

Inefficiency

Inefficiency, waste of time, and loss of productivity are among the longest standing concerns about overload. Their validity and seriousness are a matter of debate.

There is concern that the availability of information and communication sources leads to an inability to focus or concentrate: a state termed *continuous partial attention* (Rose, 2010). This has led a number of commentators to bemoan the increasingly superficial information and knowledge is dealt with for example Carr, 2010). It is alleged that deep engagement with information and knowledge—reading a book from start to finish, for example—has been largely supplanted by a scanning of snippets (i.e., articles are supplanted by blog postings are supplanted by tweets).

Certainly more reliance is placed by academic and professional readers on abstracts and summaries than on a reading of the full document (Nicholas, Huntington, & Jamali, 2007). While this is a reasonable and long-established way of coping with excessive documentation, it is potentially troubling. Studies have shown that typically 20% of abstracts contain significant inaccuracies (Hartley & Betts, 2009) and usually present the subject matter of the main document in an unreasonably positive light. It is likely that policy makers and administrators rely to a large extent on similar means of avoiding long-form reading .

Misinformation and Fake News

Arguably, the main difference between the influence of overload in the 21st century and in previous times is the way in which overload is now perceived to cause problems for social cohesion and political action, including loss of social cohesion, political polarization, and a loss of vitality of the public sphere (Hargittai et al., 2012). As noted by Harari (2017):

In the past, censorship worked by blocking the flow of information. In the twenty-first century, censorship works by flooding people with irrelevant information. We just don't know what to pay attention to, and often spend our time investigating and debating side issues. In ancient times having power meant having access to data. Today having power means knowing what to ignore. (p. 462)

There is a particular concern about finding reliable information from news sources when there are so many online and social media sources competing for the limited time and attention of their users, many of which are of dubious validity (Anderson & Raine, 2017; Kovach & Rosenstiel, 2011; Schmitt et al., 2018). Popkin (1993) found that voters in U.S.

elections used a variety of shortcuts to obtain and evaluate news and information about political parties, candidates, and issues, even in pre-internet days. The same applies even more strongly in the age of the internet and social media, with simple and unreliable rules for selection being applied, and with information being avoided through *filter bubbles*, in which people seek only the political information and news that confirms their existing views (Case & Given, 2016, pp. 115–116; Cooke, 2017). Overload also leads to unhelpful communication behavior, such as sharing information and links to information without first reading the content carefully, if at all. Not for nothing has TLDR (too long, didn't read) become a commonly-used acronym.

Solutions to Overload

“... there is no cure [for information overload]. Information breeds information as one thought leads to another and as answers lead to questions.”
Neill (1992, p. 117)

As noted previously, perceptions of overload have long been accompanied by suggestions and practical advice on how to overcome it. It seems reasonable to suggest that there has always been a balance: as the forces creating overload have increased, solutions have been developed, so overload has been kept in check without being banished. In the manuscript age, the solutions included silent reading, punctuation, and the codex format. In the early years of print, indexes, reference books, bibliographies, note taking, criticism, and reviews were developed. Solutions have continued to chase technologies and information formats to the present day.

Bawden and Robinson (2009) summarize the solutions proposed since the modern worries about overload surfaced in the 1990s. Most often these have involved either good

organizational or personal information management or the promotion of information and digital literacy.

Solutions for overload have generally be proposed at the level of the individual, but recently it has been recognized that they may be required at the organizational level, such as information provided to senior politicians (Walgrave & Dejaeghere, 2017) and big data in the hospitality industry (Saxena & Lamest, 2018). There have been numerous management-oriented proposals, generally based on the idea that overload is solved by processes and systems to give people the right information at the right time to make a decision (Merendino et al., 2018; Rogers et al., 2013). Hartog (2017) reviews pragmatic cures for information anxiety, several of which involve some form of information filtering.

The following discussion of solutions to overload are organized into six categories: coping strategies (further divided into avoiding and withdrawing, filtering, and satisficing); information architecture; technical solutions; information management and literacy; slowing down and understanding; and forgetting and destroying.

Coping Strategies

Two general pragmatic strategies for coping with information overload have been identified: filtering information and avoiding, or withdrawing from, information. Taken together, these may be regarded as a satisficing strategy, although this is treated by some writers as a distinct third approach. Manheim (2014) argues that all three may be seen as a kind of nonseeking of information. Certainly they are used for the most part instinctively, and not by any conscious strategy formulation (Bawden & Robinson, 2009; Jones & Kelly, 2018; Manheim, 2014).

Avoiding and Withdrawing

The rather crude heuristic of *information avoidance* relies on simply ignoring potentially useful information and sources of information, either because there is just too much to deal with (Savolainen, 2007) or because it is incongruent and difficult to fit with the user's existing knowledge (Neben, 2015; Sweeny, Melnyk, Miller, & Shepperd, 2010). As Johnson (2014) points out, avoidance, or escape, may be a perfectly rational response to overload if one cannot make any use of the information obtained. Manheim (2014), somewhat similarly, argues, that *not* seeking information may be a perfectly reasonable course of action in some circumstances, and will certainly prevent, or at least minimize, overload.

However, more negatively, avoidance may lead to circumventing disquieting or discordant information, which can lead to escaping, or seeking simple solutions to complex issues by avoiding information that may be challenging or unsettling, or even by turning to demagogues (Johnson, 2014). Case and Given (2016, pp. 115–116) use the term *selective exposure* to describe a similar strategy.

A more nuanced approach, identified by Savolainen (2007) is *information withdrawal*, which is a conscious decision to minimize the number of sources to be considered, ideally combined with a filtering of intake and rapid weeding of relevant material of limited usefulness. This approach has been identified in other studies: (Feng & Agosta, 2017; Liang & Fu, 2017; Sasaki et al., 2016; Saxena & Lamest, 2018; Shachaf et al., 2016). The senior politicians studied by Walgrave and Dejaeghere (2017) relied on this approach, focusing on information that matched their ideology (party leaders) or their specialist brief (ministers).

Examples of withdrawal include: customizing social media to limit the number of notification received; unfriending or unfollowing social media accounts; turning off mobile devices, or ignoring email or social media, for a period; focusing solely on information that matches existing knowledge or frame of reference; and leaving a social media platform entirely.

Filtering

Filtering, understood as leaving certain types of information unprocessed, appears to have first been mentioned by Miller (1962), and is one of the most frequently observed ways of reducing overload.

Savolainen (2007) identifies filtering as a valuable mechanism for reducing overload. He denoted a filtering strategy as a disciplined and systematic attempt to focus on relevant information from chosen sources, by specifying criteria for immediately removing items from consideration. These criteria will necessarily be different for each source, and may be applied intellectually or algorithmically. Manheim (2014), Shachaf et al. (2016), Feng and Agosta (2017), Saxena and Lamest (2018), and Jones and Kelly (2018) also identify filtering as a major strategy for avoiding overload. The behavioral decision theory literature assumes that decision makers do not consider everything in making choices (Lau, 2019).

Filters determine whether information is relevant to a user according to some scheme of importance or priority, and weed out information presumed to be irrelevant or of less importance. The intention is to draw attention to the most valuable or interesting information, and hence use time more effectively. Filtering may involve a variety of processes for selecting, omitting, and ranking information (Belkin & Croft, 1992; Rader & Grey, 2015; Saxena & Lamest, 2018). A distinction is sometimes made between *active filtering*, or seeking useful information and drawing it to the user's attention, and *passive filtering*, which is omitting less useful material from what is presented to the user.

Filtering may be done automatically on the basis of explicitly asking for user preferences. Alternatively, it may be done algorithmically, by simple means, such as noting what kinds of email messages are deleted unread, or by more complex means, such as using machine learning (Jones & Kelly, 2018). Successful filtering can be achieved by means of organizational procedures. Elite politicians, for example, were noted to filter incoming

information through procedures and the use of assistants as information intermediaries (Walgrave & Dejaeghere, 2017).

Filtering is always a trade-off. It helps reduce overload by allowing users to concentrate on useful information, but may cause them to miss serendipitous encounters with novel information and may discourage exploration. There is also an ethical question about who, or what, is controlling the information a user sees. An antidote to this may be to ensure that filtering is always done transparently (Jones & Kelly, 2018; Rader & Grey, 2015). Examples of filtering include: ignoring emails and social media notifications from certain people and about certain topics; unfollowing accounts on social media; examining only the most recent, or the most relevant, items from a long list; and examining only items in languages in which one is fluent, rather than seeking a translation for others.

Satisficing

Satisficing, also known as *bounded rationality*, is a way of making decisions and choices when it is not feasible to fully compare the benefits of possible options; in essence, it is a way to efficiently obtain something that, while not necessarily optimal, is good enough for the purpose (Gigerenzer & Selten, 2001; Simon, 1955; Stevens, 2019). In the information context, provided that there is a good rationale for the decisions made, this can be a good heuristic for getting good enough information without being overloaded. Indeed, such behavior, which is often quite sophisticated and usually involves withdrawing and filtering approaches, is commonly observed (Agusto, 2002; MacDonald et al., 2011; Manheim, 2014; Mansouran & Ford, 2007; Prabha, Connaway, Olszewski, & Jenkins, 2007; Savolainen, 2007; Shachaf et al., 2016; Warwick, Rimmer, Blandford, Gow, & Buchanan, 2009). Satisficing is sometimes clearly the predominant method to avoid overload, as shown in the study of Belgian politicians by Walgrave and Dejaeghere (2017). It is often suggested that

satisficing is an expression of Zipf's Principle of Least Effort, but Mannheim (2014) produces examples to show that this may not always be so; people do not always follow, in information terms, the path of least effort.

Bawden and Robinson (2009) distinguish good satisficing from bad satisficing. The former requires a clear (to its user) rationale for why decisions are being made, whereas the latter reduces to an essentially random and contingent selection of sources and material, and to an avoidance of information. The former is a good solution to perceived overload; the latter, while it may ease anxiety, is unlikely to be effective where the information carries any real significance for its user's, life, work, or study. Cooke (2017) points to the danger of bad satisficing in relation to problems of post-truth and alternative facts, and in particular to the spreading of fake news.

Information Architecture

Information architecture can help prevent overload by structuring information spaces (Davis, 2011; Koltay, 2011a). This is essentially done through the medium of user experience interface design, in such a way as to minimize the chances that the user will be subjected to excessive information (too much text, too many images, too many messages, etc.) or too much choice (too many features, too many options). This is a particular issue on the small screens of mobile devices. Effective information architecture and design initiatives to help overcome overload should be based on and support users' natural coping strategies.

Through clear signposting and use of taxonomies, the architecture may help the user to effectively filter information. Interactive dashboards for presenting filtered information streams have been widely adopted as a way of coping with big data (Saxena & Lamest, 2018). Principles of information design, and its newer sibling information visualization, may also be applied to prevent overload. The prescriptions here are typically practical and

arguably self-evident, but frequently are not observed. A typical set of summary recommendations might be to keep the displayed information simple, relevant, and clear; provide supporting and balanced information; and make it clear what should be done with the information and how a user can take action (Interaction Design Foundation, 2018).

Technical Solutions

As Floridi (2014a) points out, better technical capabilities are likely, first and foremost, to produce a greater amount of data. This echoes Postman's (1992, p.72) warning that when technology increases the amount of available information, control measures intended to help this situation are typically themselves technical, and in turn further increase the supply of information. A specific instance of this is given by Shapiro (2018), in the context of the introduction of web-scale discovery systems in academic libraries. Shapiro (2018) notes that "librarians' efforts at using technology to tame information overload . . . are mostly futile and counterproductive" (p. 672), and a better approach would be for librarians to focus on library instruction to improve the information and digital literacies of their users and help them deal with the information tsunami.

This is not a new idea. In relation to the indexes, bibliographies, and encyclopedias created in the 16th and 17th centuries, Rosenberg (2003) writes that "it may be that the very devices created to 'contain' information overload are the devices that 'create' it in the first place" (p. 9). The widespread use of reviews of books in the new periodicals of the 18th century removed a necessity to read the original, but created its own form of overload (Blair, 2010, p. 167), while Linnaeus's innovations in documentation increased and ameliorated overload for natural historians (Müller-Wille & Charmantier, 2012).

However, technical solutions, such as more effective information systems, are still recommended (Klerings et al., 2015). By the end of the 20th century, "intelligent agents"

were being regarded as a useful tool for overcoming overload (Edmund & Morris, 2000). Filtering and systems based on artificial intelligence are a newer generation of this kind of tool; the extent to which they will reduce without also, in different ways, adding to overload is yet to be seen.

Information Management and Literacy

In an influential and frequently cited report, Paul Zurkowski (1974) noted that “we experience an overabundance of information whenever available information exceeds our capacity to evaluate it. This is a universal condition today” (p. 1). His recommended solution was a national program to achieve universal *information literacy*; the first time the phrase had been used. Since then, there has been a close relation between the problem of information overload and the proposed solution of information literacy.

There is a somewhat confusing array of what might be called “literacies of information,” of which the most commonly cited are information literacy, digital literacy, and media literacy (Bawden, 2001; Koltay, 2011b). These literacies are frequently recommended, particularly in the context of library and information management, as providing personal solutions to overload by improving an individual’s ability to control their own information (Bawden & Robinson, 2009, 2011; Hall & Walton, 2004; International Federation of Library Associations, 2017; Koltay, 2011a).

A typical formulation of this is given by Ge (2010) in a discussion of ways to help college students overcome information overload: “Effective searching requires planning, attention to detail, and successful search strategies. Faced with an overload of information, it is important to find out which sources are useful, and to discover effective and simple search procedures” (Ge, 2010, p. 449). Such commendable recommendations for good rational

information practice may perhaps be naive and doomed to failure in the face of the attractions of satisficing and the lure of the Google search box.

If people have confidence in their information sources, they are less likely to suffer from overload, even with a high volume of information (Gamble et al., 2017). Choosing reliable sources is a key aspect of information literacy, especially for dealing with news (Kovach & Rosenstiel, 2011). Cooke (2017) recommends this aspect of digital literacy and critical information literacy as a way of ameliorating the effects of fake news, whereas Klerings et al. (2015) recommend it for health literacy to help patients manage their treatment.

Good personal information management practice has often been recommended as a solution to overload. This entails taking control of one's information environment, combining the kind of coping strategies mentioned in this article with traditional techniques for time and desk management, and delegating (Bawden et al., 1999; Bawden & Robinson 2009). Harzing (2018) provides a detailed example of what this might mean in practice, integrating several of the strategies already noted into a coherent plan for avoiding overload. A shorter list of pragmatic solutions is given by the Interaction Design Foundation (2018): feel free to ignore information; feel free to take action without having all the facts; create an information queue and tackle it regularly; filter information ruthlessly; delegate information responsibly; and learn to skim read.

The last of those recommendations is a reminder that skimming and scanning have been regarded as a solution to overload for centuries, and have been joined over time by excerpts and abstracts, speed reading, quick reads, microblogs, and the rest. As has been noted, there are concerns about reliance on this form of information access and a surmised loss of close reading, but there is little doubt that this is now more than ever a part of personal information management approaches to avoiding overload.

Slowing Down and Understanding

Time factors are often mentioned in connection with information overload. In addition to the time required to deal with a large volume of information, the need, actual or perceived, for rapid decision making means that the necessary information cannot be processed quickly enough.

Perhaps paradoxically, slowing things down has been proposed as a means of defeating overload. This was first suggested by Miller (1962), who proposed a strategy of *queuing*, or delaying the review of some information to a less busy time. Wilson (1995) incorporated this idea into a priority-based information strategy that incorporated avoidance, with information categorized as follows: to be dealt with immediately, to be dealt with when time permits, to be filed for use when needed, and to be ignored. Queuing as a strategy has been observed by Feng and Agosta (2017), and the politicians studied by Walgrave and Dejaeghere (2017) commonly adopted a wait-and-see approach, avoiding immediate action, even on relevant information. There are some similarities between the information diet idea (Johnson, 2012) and the time management aspects of personal information management. Examples of queuing include putting materials into “read later” areas, such as using lists on social media, and adopting a policy of always waiting a specific amount of time before acting on information.

More ambitiously, it has been suggested that overload may be prevented by adopting some of the tenets of the so-called Slow movement, allowing a mindful approach to information handling (Poirier & Robinson, 2013). This involves taking control of information, taking time to comprehend and use it, establishing a balance in taking in and using information (analogous to the “sweet spot” mentioned in the section “Diversity, Complexity, and Novelty”), and generally acting as a rational consumer of information.

A related approach is to use information to create a connected understanding, which will necessarily develop over time, rather than simply processing individual information items.

Lack of an overall understanding has been noted as a feature of overload (Spier, 2016), and therefore enhancing understanding can be an effective antidote (Bawden & Robinson, 2016).

Forgetting and Destroying

We have shifted from the problem of what to save to the problem of what to erase.

Something must be deleted or never recorded in the first place.

Floridi (2014a)

One way of dealing with a surfeit of information is to forget or destroy it. Like many ideas relating to overload, this is not a new concept. In the 18th century, luminaries such Samuel Johnson and Edward Gibbon contemplated the destruction of books as a good thing to some degree (Yeo, 2003).

In the digital age, the issue is made more pressing by the possibility of *perfect remembering*, which is brought about by the preservation of our thoughts and actions in digital media. Mayer-Schönberger (2009) extols the virtues of forgetting and advocates an explicit place for it in a digital world, and Johnson (2014) and Kluge and Gronau (2018) recommend careful and thoughtful discarding of information from consideration as a tool for overcoming overload, in both personal and organizational contexts, .

Conclusion

Information overload is real. It is not a myth or a phantom. For almost as long as there has been information, there has been a perception that humanity has been overloaded by it. The essential nature of overload has not changed with evolving technology, although its causes and proposed solutions have been altered. The people and mechanisms that suffer from

overload are by and large the same as those that cause it. The problem has never completely overwhelmed individuals, organizations, or societies, but it has never gone away. The best ways to avoid overload, individually and socially, appear to lie in coping strategies that enable satisficing and in seeking a mindful balance between consuming information and finding understanding.

The difference in the 21st century is that the move to hyper-history and the infosphere means that individuals and societies depend on, and are formed by, information in an unprecedented way. Information overload needs to be taken more seriously than ever.

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