From 'infoxication' to 'infosaturation': a theoretical overview of the cognitive and social effects of digital immersion

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Resumen

Este artículo explora los efectos cognitivos y relacionales de la inmersión digital. Desde trabajos anteriores sobre infoxicación, la sobrecarga de información resultante del empoderamiento que las tecnologías digitales proporcionan a los utilizadores, sugerimos la noción de 'infosaturación' como desarrollo teórico. Mientras las tecnologías digitales sufren un cambio paradigmático de enfoque en los utilizadores para la propia tecnología, sus efectos también cambian. Los individuos buscan informaciones que refuerzan sus creencias, y las tecnologías digitales les sugieren contenidos y acciones a partir de su comportamiento anterior y de perfiles. Esto resulta en la redundancia de contenidos y relaciones, esto es, 'infosaturación'.

Palabras clave

Infoxicación, infosaturación, tecnologías digitales, efectos cognitivos, efectos sociales.

Abstract

This paper explores the cognitive and relational effects of digital immersion. Drawing on previous work on 'infoxication', the information overload resulting from the empowerment provided by digital technologies to users, this paper suggests the notion of 'infosaturation' as a theoretical development. As digital technologies are undergoing a paradigmatic shift from user-centered to techno-centered, its effects are also changing. Individuals not only tend to look for information that reinforces their previous beliefs, but digital applications are increasingly suggesting contents and actions based on previous behavior and usage profiles. This results in the redundancy of both contents and social networks, i.e. 'infosaturation'.

Keywords

Infoxication, infosaturation, digital technologies, cognitive effects, social effects.

1. INTRODUCCIÓN

This paper explores the cognitive and relational effects of the widespread, frequent and intense use of contemporary information and communication technologies, i.e. digital media. Drawing on previous work on the concept of infoxication (Cornella, 2000; Benito-Ruiz, 2009; Urbano, 2010), the main argument explored is that the empowerment provided by digital technologies to users, for whom it has become easier to manage their social interactions and to have access to massive amounts of information, results in a process presented as 'infosaturation', as individuals tend to look for information that reinforces their opinions while discarding information related to other perspectives and also tend to tailor their social networks to include people with whom they share interests and affinities.

This process is enhanced by the fact that the selection and filtering are increasingly not controlled by users anymore but rather suggested by digital applications themselves, based on the registration of previous behavior and profiling, thus transforming the 'self-agenda-setting' facilitated by digital media in a 'techno-agenda-setting'.

These arguments are grounded on a theoretical framework that encompasses classic theories of effects, such

as agenda-setting theories, with more recent perspectives on the social effects of digital media, such as Barry Wellman's concept of networked individualism, Manuel Castells' theory of mass-self communication and mediatization theory. Furthermore, these theories are articulated with insights on cognitive effects of digital technologies and on digital and mobile mediation of social interaction.

The technologies studied are applications that can be defined as Web 3.0, i.e., that are based on the storage and analysis of previous user behavior, pattern recognition and personalization. The strategies found by each individual to deal with information overload are no longer strictly voluntary and conscious in these technologies. Examples are Google adapting its search results to our previous searches without asking us if we desire it to do so, and Facebook voluntarily suggesting us new connections, pages to like, games to play and products to consume according to our initial configurations, previous behavior and profiling.

Thus, this paper explores, from an interpretative and critical point of view, the implications of the cognitive and relational effects of this type of media, arguing that an 'infosaturation' process is undergoing, as the contents and relationships that individuals come to contact with become redundant due to the 'techno-agenda-setting' that occurs often without consent or awareness of users.

2. THE CONTEMPORARY DIGITAL LANDSCAPE

Contemporary society has often been described, within the social sciences, with references to digital technologies. Since Fritz Machlup's (1972 [1962]) first reference to an information society, several alternatives have been suggested, such as knowledge society (Drucker, 1003 [1993]), digital age (Levinson, 1999), network society (Castells, 2005 [1996]) or hyper-reality (Baudrillard, 1991 [1981]).

The early theorizations established a relationship between the emergence and adoption of information and communication technologies and the start of a new economic cycle (e.g. Bel, 1973; Toffler, 1980; Drucker, 1964 [1949]; Castells, 2005 [1996]). Later, as digital technologies became widespread and frequently used, their social effects were highlighted by sociologists such as Anthony Giddens (1991), Ulrich Beck (1992 [1986]), Zygmunt Bauman (2000) and Manuel Castells (2005 [1996]). Most of these thinkers consider that digital technologies are connected to a profound shift in the social model usually described as modernity, having led to an exacerbated stage of modernity where the relationship between agents and structures became more flexible and loose. Others, such as Jean Baudrillard (1991 [1981]) and Gilles Lipovetsky (1989 [1983]), claim that digital technologies have pushed us into post-modernity, radically changing our social structure, our daily practices, our worldview and our mindset.

Whichever specific designation one finds more suitable, they all point to the notion that digital technologies are the most distinctive and influent characteristic of our times. In addition, digital technologies have also changed significantly since their early adoption in the late 70s of the 20th century, thus shaping society along with their own development.

Nowadays, we live in a world where 39% of the world's population is an internet user and 96% of the world's population has a mobile phone subscription (ITU, 2013). Plus, mobile internet access is increasing considerably, and smartphones' sales have surpassed cell phones' for the first time in 2013 (Google, 2012). The internet and mobile phones, the most representative digital technologies, have undergone profound changes since their early generalization. The informative World Wide Web has become the interactive and collaborative web 2.0, and quickly shifting into the artificially intelligent Web 3.0. At the same time, the traditional cell phones gave place to a panoply of portable smart devices which users choose to carry with them and use to access their cloud-stored data whenever and wherever they wish, in the way each one finds more convenient (Berman and Kesterson-Townes, 2011).

As digital media become increasingly pervasive and integrated in our daily lives, new concepts are suggested within the social sciences to describe them and their social impact. Terms such as digital media, web 2.0, new media and social media present considerable similarities but also express different approaches to fundamental assumptions. For instance, regarding the concept of media itself, some authors are exclusively referring to technology and its technical features as others understand as media the combination of a technological

infrastructure, its content, its use practices and its social effects (Kaplan and Haenlein, 2010; Flew, 2008 [2002]). Furthermore, regarding the notion of novelty, early approaches tended to argue that digital media are radically different from the traditional mass communication media, while more contemporary approaches highlight an articulation of new and preexisting media whether in analogical or digital format (Lister, Dovey, Giddings, Grant and Kelly, 2009 [2003]; Castells, 2009). Finally, every description of contemporary digital technologies is necessarily grounded on an assumption between the relationship of humans, technology and society. Current approaches tend to reject both technological determinism and social constructivism, unanimously accepting an interactive exchange of influences between these variables, although with different understanding of the power imbalance among them (Fuglsang, 2001).

Among these different perspectives and conceptualizations, we highlight David Jay Bolter and Richard Grusin's concept of remediation (2000), Henry Jenkin's notion of convergence culture (2006) and its more recent take on spreadable media (Jenkins, Ford and Green, 2013), and mediatization theory (Lundby, 2009; Hepp, 2012).

Developing a notion first suggested by Marshall McLuhan (1994 [1964]), Bolter and Grusin (2000) suggest that new media tend to reconfigure previous existing media by integrating them as their content. The remediation process ongoing in digital media is intense due to their immediacy, i.e., their ability to seamlessly integrate other media and ubiquitously be present in our daily lives. Thus, contemporary digital media are, at the same time, interactive and collaborative, but also capable of broadcasting and massive reach.

With his notion of convergence culture, Jenkins (2006) argued that the undergoing process of convergence went far beyond the technological dimension, being above all a convergence of cultural expressions and social practices. More recently, the author elected spreadability as the main feature of digital media (Jenkins et al., 2013), highlighting their ability to facilitate actions and impulses which are intrinsic to humans, such as communicating and relating to others.

Mediatization theory, originally devoted to studying the social effects of mass communication media, has more recently focused on digital media and their social impact. While some authors agree that the mediatization process consists of digital media, because of their widespread, frequent and intense use, becoming relevant enough to be considered an independent social structure, others claim that their influence is deeper as they are pervasive to every social structure and also to individual social agents (Lundby, 2009; Hepp, 2012). Thus, the mediation of digital media leaves nothing untouched in our contemporary mediatized society.

3. THE EFFECTS OF DIGITAL INMERSION

3.1. Cognitive effects

Henry Jenkins (2006) defined as digital immersion the widespread, frequent and intense use of digital technologies, referring particularly to videogames, a process that, cumulatively, caused changes in the cognitive structures of users.

Earlier notions such as McLuhan's (1994 [1964]) conception of media as extensions of men, Martin Heidegger's (1977 [1949]) enframing as the essence of technology or Baudrillard's (1989 [1986]) hyper-reality as the ultimate stage of simulation already emphasized the strong effects of technology at a cognitive level.

More recent research has reinforced these insights by providing findings on concrete cognitive effects of digital immersion. Within Media Ecology, Paul Levison (1999) argued that McLuhan's electronic age has already given place to a new age, whose beginning was brought about by the internet. In contemporary the digital age, the convergence between the internet and mobile devices is enabling the full concretization of the global village and retribalization. Thus, in the same way that the print age enhanced the preponderance of the vision that began with the literacy age, digital media are even cooler than electronic media, therefore emphasizing its cognitive effects such as the acoustic space, mosaic thinking, or holistic perception.

The cognitive effects of digital immersion were first studied in relation to videogames (Prensky, 2001; Gee, 2005, 2007; Johnson, 2006 [2005]). Empirical research and experiments revealed, for instance, that frequent videogamers develop a better perception of tridimensional space (Green and Bavelier, 2006), have better eye-

hand coordination (Gee, 2005, 2007; Johnson, 2006 [2005]; Kutcher and Kutcher, 2007; Tapscott, 2008), perceive a greater amount of visual information and faster (Green and Bavelier, 2006), react quicker to stimuli (Gee, 2005, 2007; Johnson, 2006 [2005], Tapscott, 2008) have greater ability to multitask (Gee, 2005, 2007; Prensky, 2006; Tapscott, 2008), learn better through trial-and-error situations and easily improvise (Gee, 2005, 2007; Prensky, 2006; Johnson, 2006 [2005]; Tapscott, 2008) and have better abilities of connecting, networking and collaborating (Castells, 2005 [1996], 2009; Tapscott and Williams, 2006, 2010; Shirky, 2010). Both Marc Prensky (2001) and Lev Manovich (2002) observe a change from linear reasoning to parallel thinking, and observes that this new cognitive structure is best suited to the network structure of digital media. Research has shown that newspaper readers tend to go through the pages sequentially as readers of the same contents in the online edition follow more unstructured and random reading patterns (Michael, Keller, Carpenter and Just, 2001). Less enthusiastic approaches also observe negative cognitive effects of digital immersion such as the reduction of attention spans (Davenport and Beck, 2002; Scott, 2013 [2006]) and difficulties to deal with information overloads (Carr, 2010).

There are also more general approaches that consider digital immersion the main distinction between generations, such as Prensky's (2001) concept of digital natives, Don Tapscott's (2008) idea of net generation or Marc McCrindle's (2006) proposal of generation Y. On the other hand, Mark Baurelein (2008) considers this generation the dumbest ever, highlighting its lack of reading habits, for instance. Nicholas Carr (2010) observes how the cognitive effects of digital technologies have changed reading itself, which is currently more superficial and quick (skimming). Tapscott (2008) interposes by pointing out the good academic and professional performance of net geners. Shirky (2010) also argues that digital media stimulate the cognitive surplus that resulted from the passive interaction of receivers with mass media, i.e. a combination of attention, energy and time that is currently stimulated and engaged by digital media, resulting in greater collaboration, innovation and productivity. Concepts such as hipertextual brain (Prensky, 2001), participatory culture and distributed cognition (Jenkins, 2006) and collective intelligence (Flew, 2008 [2002]; Federman and de Kerckhove, 2003) reinforce this argument. Daniel Pink (2005) also agrees that technologies have released men from concrete, specific and repetitive tasks, thus freeing its cognitive resources, time and effort for more creative activities. Thus he observes the establishment of a new balance in the human cognitive structures as both the hemispheres of the brain (the left, more linear and sequential, and the right, more emotional and creative) are equally stimulated by digital media.

All these contributions reinforce the observation of effects of digital technologies, which affect their users individually, at a cognitive level, and also socially, by shaping their interaction and communication practices.

3.2. Networked individualism

Barry Wellman's (2012) concept of networked individualism argues that the networked structure of digital technologies, while promoting communication and connection, is managed by each individual according to his/hers goals, needs and preferences. Thus, digital users are the complete opposite of the first conceptualizations of audiences presented by effects theories. If newspapers readers and radio listeners were, in the 20s and 30s of the 20th century, believed to be passive receivers, directly and immediately influenced by messages broadcasted by mass communication media (Lasswell, 1948), contemporary new media users are empowered by digital technologies, which facilitate content production and sharing, communication and networking, access to massive amounts of content and freedom of choice, all articulated in unique media diets that articulate different devices and contents according to each one's needs and preferences.

Castells (2009) adds that this process is culminating in a new form of communication also centered on the user, i.e. mass-self communication, with potential for massive reach but managed by each individual.

This greater ability to choose, create and manage afforded by digital media does not translate in a wider diversity of practices and choices. On the contrary, as early effects theories suggest, users tend to look for contents that reinforce their previous opinions and beliefs (Berelson, Lazarsfeld and McPhee, 1986 [1954]; Katz, Lazarsfeld and Roper, 2005 [1955]; McCombs, Maxwell and Shaw, 1972; McCombs and Shaw, 1993). Thus, not only are users overloaded with information, they also choose to look for redundant content, i.e., information that confirms their intuitions and previous beliefs and others contents that match their interests and preferences.

The same promotion of redundancy is observed as a result of the digital mediation of social interactions, whether in social networks whether in mobile phones. Misa Matsuda (2005) suggested the concept of selective sociality to explain that people manage their social networks according to affinities, maintaining relationships with those they share interests with, regardless of time and place. This process, cumulatively, reinforces the internal homogeneity of social groups while causing their external heterogeneity, possibly leading to social fragmentation. Richard Ling (2008) has also observed that digital mediation tends to make social ties more flexible, decreasing bonding but increasing bridging and linking. Sherry Turkle (2011) also reflects on the paradox of being physically alone but in constant mediated communication.

Thus, several authors recognize as an effect of digital technologies' mediation, the redundancy increase of both contents users come into contact with and relationships they maintain.

4. THE EFFECTS OF DIGITAL INMERSION 3.0

4.1. After Web 2.0

Different concepts have been suggested to describe how the internet will evolve in a near future, such as the obvious web 3.0 (Markoff, 2006) but also alternatives as "the internet of things" (Ashton, 2009), "semantic web" (Berners-Lee, Hendler and Lassila, 2001) and "web intelligence" (Zhong, Liu-Yao, Yao and Ohsuga, 2000). These concepts, and others, refer to different features of the internet and of what it is expected to develop into, thus being complementary for the understanding of media development in a near future. The idea of 'intelligence' or 'smartness' has been picked up by marketing and brands, which are currently offering smartphones, smart TVs and a panoply of other smart devices.

In Media Studies, the more recent proposal to describe the evolution of media is the notion of spreadable media (Jenkins, Ford and Green, 2013), that highlights, on the one hand, the fact that media have always had as their main function the spreading of content, and on the other hand, the recognition that digital media are able to perform that function with unprecedented reach and complexity.

In spite of several positive perspectives on the effects of digital media, claiming that the net generation is smarter than previous ones (Tapscott, 2008) and emphasizing the empowerment that digital media afford to their users, enabling them to search, select, share and create the content they wish, as well as establish relationships and managing networks (Castells, 2009; Wellman, 2012), there is another side to the coin. Nicholas Carr (2008) observes that he used to be able to concentrate in reading or deep though and now finds difficulties in this type of activities, using the scuba diver and the surfer as metaphors for the difference between reading a book from beginning to end and surfing the web. The author adds that "Google is making us stupid" as it facilitates the access to broad but superficial knowledge and is replacing the users' selecting and critical skills by its own selection (Carr, 2012).

As users become increasingly infoxicated (Benito-Ruiz, 2009; Urbano, 2010; de Haro, 2012), of suffering from informative anxiety (Fraganillo, 2010) not only with information but also with stimuli from other users and also organizations and brands, they easily give up some of the empowerment they have conquered in order to be able to make some sense of this overloaded and overstimulating environment, thus gladly adhering to smart technologies that help them find what they need, like and desire. Thus, smart technologies bring up some of the passiveness initially attributed to audiences by early media theories (Lasswell, 1948; Katz, Lazarsfeld and Roper, 2005 [1955]), as users deal with preselected information and suggestions, for which the main criteria are previous behavior and behavior patterns found through cross-profiling among related and unrelated users.

McLuhan is often referred as a technological determinist, even though he recognizes mutual influences between technology and society (McLuhan, 1994 [1964]). However, he stresses the fact that media effects are often imperceptible to users, as media have become integrated in our daily lives and we do not perceive them as a feature of our quotidian but as part of our environment. In this sense, the author claims that we are as unaware of media effects as fish are of the water. His work struggles to create awareness, as McLuhan believes than only when users are conscious of media effects are they able to relate responsibly and advantageously with technology. Jean Baudrillard (1991 [1981]) goes further on his take on media effects. The author conceptualizes three orders of simulacra and in each one signs drive further apart from their initial connection to the physical

world. Currently, we live in a third order simulacrum which the author describes as hyper-reality, in which there is no connection whatsoever between signs and reality. Baudrillard also describes contemporary society as the age of the code, claiming that the environment that surrounds us is a materialization of some kind of code, binary or genetic.

Thus, as the internet evolves into a support infrastructure that seamlessly interacts with users and devices, its ability to influence users increases, as well as the users' unawareness about it.

4.2. From mass-self communication to 'mass-techno communication'

Castells (2009) observed that the internet is supporting the concomitant existence of different types of communication in the same platforms and between the same users, namely interpersonal communication and mass communication. These types of communication are apparently antagonistic, as interpersonal communication is a one-to-one interaction and mass communication is a broadcasting process from one active sender to a mass of relatively passive receivers. However, Facebook users can exchange private messages on a one-to-one level, but this content is easily copy-pasted into a post accessible to a wider audience, and has the potential to become viral through shares.

Thus, Castells (2009) suggested the term mass-self communication to describe this new hybrid type of communication, characterized by a focus on the self, that selects information, creates content and chooses the audience in each communicative act, and also by a potential massive reach of each communicative act.

However, smart technologies are displacing the focus from the user into the technology. As smart media are increasingly able to select the content that appears in each users search results, news feeds, social updates and advertisements, and also to suggest relationships and actions similar to those performed by other users in our network or by other users with a similar profile to our own, the role of the self becomes less active.

In addition, as smart media converge and interact among themselves, they promote virality, making it easier to share content and integrate profiles across different platforms. Thus, we argue that mass-self communication is becoming a mass-techno communication, in which both the management of the communicative act and content and its viral potential are performed, or at least assisted, by technology.

4.3. From 'self-agenda-setting' to 'techno-agenda-setting'

The agenda-setting theory is a classic media effects theory first formulated by Max McCombs and Donald Shaw (McCombs, Maxwell and Shaw, 1972), who drew on previous writings by Walter Lippmann (1922) and Bernard Cohen (1963). The concept of agenda-setting claims that media, by selecting which issues are newsworthy, influence public opinion to at least consider those issues important. Subsequent developments of the theory, both by their original authors (McCombs and Shaw, 1993) and by other researchers, have found interdependent influences between three types of agendas: the media, the public and the politics. Furthermore, the audience is not only influenced by the selection of issues but also by the relevance given to them by media, and also by the framing given to each news story.

More recent contributions have emphasized, on the one hand, the depth of media effects, claiming that the agenda-setting by the media not only influences the audience regarding which issues they perceive as important and give attention to but also influence their opinion about them – drawing on the framing provided by the media – and in some cases consequent action – priming (Holbrook and Hills, 2005; McCombs, 2005; Scheufele and Tewksbury, 2007). On the other hand, other contributions point out the interactivity of the agenda-setting process. For instance, the concept of agenda-building describes the ability of activists, interest groups and policymakers to bring issues into the public, political and mediatic agendas (Rogers and Dearing, 1988; Berkowitz, 1992). The notion of audience effects also highlights that the agenda-setting process interacts with individual and group features of the audience, such as personality, previous experiences, culture, values and symbols. These characteristics interact with the messages proposed by the mass media, resulting in individually negotiated perceptions and understandings (Cobb and Elder, 1971; Zucker, 1978; Erbring, Goldenberg and Miller, 1980). The most influential features are the relevance of a certain issue and the degree of uncertainty about the same issue (McCombs and Shaw, 1993; Weaver, 2007).

Researchers have also applied the concept of agenda-setting to news consumption on the internet. Most results point to a greater ability of internet users to select, research, confirm and scrutinize the agenda proposed by online mass media, causing a reversed agenda-setting (Lee, Lancendorfer and Lee, 2005; Kim and Lee, 2006). Another concept suggested to describe what goes on online is agenda-melding, which emphasizes the role of communities in the agenda-setting process. According to Ragas and Roberts (2009), users tend to blend their personal agendas with others who share the same interests and opinions, forming communities. In addition, each user is empowered to build his/her own agenda searching for information that reinforces their previous beliefs and opinions and finding others who share them and with whom they can collaborate to give greater visibility to those issues, thus placing them in other and others' agendas. Drawing on Castells' terminology, this process could be described as a self-agenda-setting, as individuals play a more active role in setting their own agenda and in influencing others'.

However, we argue that smart technologies are leading to a techno-agenda-setting. Smart technologies enable users to subscribe to feeds and to aggregate information in personal dashboards. By allowing so, and adding suggestions that also reinforce the users' preferences and beliefs, one's agenda becomes more redundant. In addition, is it not set or managed exclusively by the self, but by technology, and it becomes less permeable to the influence of the mediatic, public or political agendas. Thus, this techno-agenda-setting contributes to enhance homogeneity within communities and heterogeneity among them (Matsuda, 2005).

4.4. From infoxication to 'infosaturation'

So far, we have presented the notion of smart media as an alternative to Web 3.0, describing the course of evolution that digital media have been taking, becoming increasingly more active, adjusted to their users, seamless and infrastructural. We have also suggested the notions of techno-self communication and techno-agenda-setting to emphasize that the empowerment initially afforded by digital technologies to their users is being limited by digital technologies themselves which have become more active in selecting and filtering information and in suggesting actions according to their users' previous behavior and to cross-profiling. Users' adherence to these media, abdicating of their newly conquered active role, is motivated, on the one hand, by their general unawareness of this process, and on the other hand, by infoxication, as users willingly give up some of their empowerment in exchange for some help in dealing with the overload of information and stimuli they are confronted with daily, online and offline.

We argue that this process is resulting in a cognitive and relational 'infosaturation', as the conjugation of intoxication, techno-self communication and techno-agenda-setting contributes to enhance redundancy, both in the content one comes across with and in the relationships one initiates and maintains. Smart digital media are assisting users in exclusively contacting with content they are interested in, reinforcing their preferences and opinions, and decreasing the amount of opportunities for contacting with dissonant contact, for experiencing something unexpected and out of their comfort zone, for learning something new. Regarding relationships, smart digital media are enhancing selective sociality (Matsuda, 2005), reinforcing social capital within homogeneous and tight communities aggregated around common interests and values, increasingly different from other tight communities, and consequently less tolerant to difference. Thus, this process culminates in the saturation of content and relationships, as we continuously learn more about the same and contact with others similar to ourselves.

5. CONCLUSION

Infosaturation intends to describe a very recent phenomenon, whose contours are still being outlined as users learn to interact with smarter technologies. Thus, more work is needed in order to accompany the development of this trend and fully understand it.

In future research, we intend to test the theoretical framework we are proposing for understanding this phenomenon with empirical work. We consider that qualitative research, using online ethnography, in depth interviews and focus groups, is the most adequate approach for better understanding how users are interacting with smart media and the cognitive and relational effects occurring. In addition, we intend to explore if there is a saturation threshold where users become aware and overwhelmed by redundancy, and conduct research on

their reaction.

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