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The Information Searching Behaviour
in the Digital Age[*]

Abstract: This paper focuses on the information searching behaviour of scholars in the digital age. The inflation of the scientific publication puts a hard pressure on the academics; in this respect, they developed new digital practices to cope with this situation. The analysis of those patterns draws an intrigued picture of the online searching behaviour, characterized by scanning a big number of online pages or sites, skimming the information, and spending very little time for reading it. These online "habits" have been organized in several taxonomies; in this article I analyzed concepts such as bouncing, squirreling and power browsing. I chose these terms because they can be related with the concept of reading and because they can illustrate the manner in which scholars combine different "text technologies" in their work. The study of the online information searching behaviour is also important as long as it can indicate how digitalization may lead to a different model of obtaining and developing knowledge.

Keywords: searching behaviour, bouncing, power browsing, squirreling, reading

1. The horn of publishing abundance
and the problem of searching

The electronic publishing has influenced in many ways some important practices, such as searching for information, reading, writing or communicating. The exponential growth of the cultural production is, on the one hand, a very good piece of news, but, on the another hand, becomes a problem that is hard to manage. The inflation of the scholarly articles makes difficult the filtration of the most relevant ones, the

accurate and rapid searching/finding, and the time spent for reading them. The famous slogan "we are all librarians now" includes, besides the positive traits (the lack of intermediation, the liberty of conducting the search, the possibility of crosschecking the authority of the sources), unfortunately, a set of problematic inconveniences. Of course, the librarians themselves are feeling anxious, since the Internet has brought a large palette of choices, facile access and, generally, intuitive tools, and, consequently, their role is about to become obsolete.

The widespread academic publication is accompanied by wastefulness, too – many articles are read, but so many remain unread or little used. A number of scholars just scan the information, read abstracts or only the titles; in this context, is it appropriate to use the term "reading" for these practices, or the word "viewing"? Furthermore, this interrogation point echoes Nielsen's statement that in the digital environment reading is not the right word to grasp the real picture.

Thus, the adequate model regarding this situation might be "more push than pull", and the comic question that arises from this situation can be "most articles are only read by the author and their mother?" (Nicholas and Huntington 2006, 48). Certainly, this situation is not one completely new or characteristic for the electronic publishing; it was found in the print world, too, when the number of the books could easily surpass one reader's capability of browsing and internalisation. However, the digitalisation makes that process more stringent and transparent; its development is done with a higher speed than in the precedent stages. The possibility of visualisation and keeping track of the new editorial appearances is at a high level, and that is one of the sources of anxiety that overburden the scholars that are under a stringent pressure of continuing updating. The new forms of publication and distribution on the net using blogs, wikis, personal websites or using methods as open sources and the public peer review and comments suppose a sustained online collaboration and a true challenge for the academic community. The very idea of community is now a key issue in the field of electronic publishing and of filtration of the content (peer review).

The increased number of "digital scholars" made also the debates over the electronic scholarly practices very present, even some authors have written about the relevance of the ICT on the academic work since 1990s. Now, there are approaches that mainly encompass subjects such as information seeking behaviour, the ways that electronic journals are used, the styles of searching and reading. The architecture of the methodology (and its accuracy) is often a critical one, since in the category of users we

have not only human agents, but also robots or spiders that are "working" for different searching engines. Moreover, the general profile of the user (of electronic journals or digital databases) is difficult to delineate; however, theorists describe the main habits of the visitors of scholarly sites in terms of bouncing, squirreling, power browsing, skimming. The general patterns of searching behaviour are very important for the design of the information tools, for the deep understanding of the trends in reading or seeking, so that "the most significant impact for research will not be how things get published, but how they get accessed" (Rowlands et al. 2008, 304). The researches as CIBER are impressive in their effort of collecting and interpreting the digital logs – the "fingerprints" that scholars leave behind them when they search for information. This digital evidence can bring a lot of clarifications, but the researchers have pointed out the limited validity of the inferences that start from the indicators of use and try to explain other complex situations, such as the preferences or the needs of the users.

In this complicated image of overabundance, to which the new technologies contributed in a substantial manner, the importance of searching becomes evident: "what people want most, and publishers are still unbelievably reluctant to provide it, is user/use information to help them find quickly what they want – they want recommended articles, highly cited or used article information to guide them find what they want" (Nicholas 2010, 298). Of course, this is not the only important topic related to the e-research, as a matter of fact a lot of things converge into a large view of the obsolescence of older forms of reading, writing, searching, publishing or reviewing (and theirs chinks, as preservation, archiving, the mobility of digital resources, the material fragility of the digital things etc.). The response to obsolescence is a great challenge for academics, especially when this obsolescence is less a material one than an institutional one. So, it is probable that "we must collectively consider what new technologies have to offer us, not just in terms of the cost of publishing or access to publications, but in the ways we research, write, review" (Fitzpatrick 2011, 10).

2. Snapshot of the digital searching behaviour

The majority of researches have shown that journal articles represent one of the major sources of information used by scholars. The use of journals in the digital environment indicates a good transition from print to digital form and a real adaptation of academics, regardless of age, to

the new format. The comparisons, at this point, between Net generation (or Google generation) and the previous ones revealed some true differences, but also a lot of myths (Rowlands et al. 2008). One possible argument for the success of e-journals even for the old scholars can be the general preservation of the print format in the digital medium through the instrumentality of the popular PDF (seen as iconic for the journal texts). Thus, the familiarity of the print journal can be kept, and if the online tools are easy to access, the experience of electronic journal can be very satisfactory. David Nicholas (2010) analyzed the use of scholarly and professional journals in the digital environment and he resumed it in some interesting points: there is a high volume of journals use, so the move to the digital was a success; moreover, people do activities as searching or reading journals all the time, but the use has become more volatile. Also, there is a strong correlation between e-scholarly use and the performance, "top researchers (per capita) are the most voracious users of the literature; the universities where usage is greater are the top universities" (2010, 293-294). But, if the digital transition was well felt in the public (some reader devices or gadgets being a help in this context, facilitating the use of databases and the reading in any place), the digital information seeking and the readership have changed in a very significant way.

Information seeking is a crucial component of scholars' work, and this activity is done for many purposes as teaching, researching, writing a text. The improvement of searching and the collecting of the most relevant and recent studies in the field are some basic requirements for a scholar. Studies on information searching behaviour can be divided in two major streams. One is conducted with the domains of interactive IR and information behaviour (the micro-level traits of users' behaviour), another is made with the area of library services (the macro-level of users' information behaviour related to the library provision, quality and image) (Du and Evans 2011, 299). This categorisation highlights some of the most important players in this subject, but the complete picture is more complex, because the academic community and the universities represent other key stakeholders.

Some recent researches draw an intrigued and "shocking" picture of the online searching behaviour, characterized by scanning a big number of online pages or sites, skimming the information, and spending very little time for reading it. The dimension of the article tends to be an important factor of the decision to read it online, so the urge for the authors can be "make it short!" If the article is longer, it is more probable that it will be read just in abstract form. Furthermore, now the pressure is

under the abstracts, that have to be well written, very well structured and increasingly informative; if they are well done, then they will be able to represent an indicator of their choice and usage. "Simplicity and speed beat relevance and quality" (Nicholas 2010, 297), and in the same way the convenience of searching and its pragmatism are very important. In their study from 2011, Jia Tina Du and Nina Evans have shown that 64 percent of participants used Google as a starting point for their research information and a participant explains the situation in these terms: "It has been my habit for years" (Du and Evans 2011, 302).

Another trait of the searching behaviour is that scholars are seeking information horizontally and they do not use a deep, vertical strategy. In general, people do not return to the same site or journal, they bounce and search a panoramic view; some authors talk about "promiscuous" forms of behaviour that arise from this digital habits. The power browsing is a very rapid navigation through the overwhelming quantity of information for picking up some small pieces. In this picture, the full-text download is perceived as an indicator of users' satisfaction; scholars might download a lot of articles or books, but the signs of using/reading them are so hard to find. Thus, another digital habit can be identified in this collecting or gathering behaviour of the scholars that probably hope to read those articles downloaded in the future.

In the effort to concentrate the information searching behaviours in some relevant patterns, theorists realized some typologies of the relevant steps that a scholar makes in his search. Thus, since 1993, Ellis sets six common information-seeking patterns that include starting, chaining (the process of following the successions or series of citations, references or other connections between articles, and at this point the web is very well equipped), browsing (the extended scanning of articles, including references), differentiating (the process of filtering the information), monitoring (keeping up-to-date with some sources) and extracting (getting some important ideas) (Du and Evans 2011, 300). Meho and Tibbo completed that schema with another 4 characteristics, namely accessing, networking, verifying and information managing (Du and Evans 2011, 300). In this respect, significant factors and features of information seeking process – such as the sense of community, the value of communication between scholars, the necessity of archiving and organizing the content – are put into context.

Navarro-Prieto et al. developed in 1999 three general patterns of searching: top-down strategy (when the search begins with a large domain and comes down until the specific information is found), bottom-up

strategy (when the scholar – more experienced or already informed – searches a specific keyword) and a mixed strategy (Nicholas, Huntington, Williams and Dobrowolski 2004, 26). The category of users can be also divided in "repeat" or "non-repeat" users (study done by Pomfrett et al. in 1999). "Repeat users" can be: "enthusiastic users" (great frequency of journals and a full-text view), "vanilla users" (the moderate group), "unfulfilled users" (group that use infrequently a small number of journals – one or two –, and who do not find anything they had to read), "gap fillers" (users that access few journals, but frequently), and "demand specific users" (scholars that have the bibliographic information before the searching and who request the full text for the most part of them). "Non-repeat users" are distributed in three groups: "tourists", "lost users", and "exploratory users" (Nicholas, Huntington, Williams and Dobrowolski 2004, 28-29).

Recent studies have filled the picture of information searching behaviour with new patterns. The CIBER research (2007) has established that the main traits of information searching behaviour in virtual libraries are: horizontal information seeking behaviour, navigation, viewing, squirreling, diverse information seekers and checking information seekers. For example, the "skimming" activity (horizontal information seeking) is observable in the fact that 60 per cent of e-journal users view less than three pages, and 65 per cent never return to the database. "Navigation" means that users spend a lot of time just to hang around, figuring out about the map of the library or the manner of searching. "Viewing" is an activity that seems to substitute the reading in the online environment (users read rapidly the titles, the content and the abstracts), while "squirreling" is tied with the consumer instincts of scholars, that want to have some articles (they take advantage from the free offers, for instance, and download a lot number of documents) (Nicholas et al. 2010, 294-295).

Palmer, Teffeau and Pirman have re-interpreted Unsworth's concept of "scholarly primitives" and they have developed the concept of "scholarly information activities" (2009). For Unsworth, the term "primitives" refers to "some basic functions common to scholarly activity across disciplines, over time, and independent of theoretical orientation" (2000). The list of scholarly primitives contains discovering, annotation, comparing, referring, sampling, illustrating, representing. For Palmer et al., "the concept of scholarly information activities is related but emphasizes the explicit role of information in the conduct of research and production of scholarship" (2009, 7). Thus, the five core scholarly

information activities and their primitives are searching (direct searching, chaining, browsing, probing and accessing), collecting (gathering and organizing), reading (scanning, assessing, rereading), writing (assembling, co-authoring and disseminating) and collaborating (coordinating, networking, consulting).

3. Bouncing on the surface of the net

From now on I will extract and develop just some concepts from those taxonomies, for illustrating the recent research about the information seeking behaviour. I have also chosen these terms because they can be related with the concept of "online reading", and the relationship between them can be a significant one. Thus, an important form of behaviour in the online environment is bouncing, "whereby a high proportion of users view only a few web pages from the vast numbers available on a site and a substantial proportion (usually the same ones) generally do not return to the same website very often, in fact at all" (Nicholas et al. 2008, 189). The explanation for this deportment is found in some facts as the huge choice of information that scholars have in hand, the characteristics of the search engine, of the tools and of the interface, the shortage of time, the usage of basic retrieval skills (and, consequently, a big rate of search failure) and the age (the young are more tempted to bounce than the older academics). This continuous move from site to site, the shallow way to search and the information rush were described as "promiscuous". Nicholas, Huntington, Williams and Dobrowolski developed the two key attributes of bouncing in terms of shallow searching or site penetration and promiscuity (2004, 32). Of course, the penetration of sites is superficial, and, in their study, 43 per cent of visitors viewed only one page and just 6 per cent saw 10 pages. The promiscuity is when many sites are visited, but without any coming back from the visitor. Even in the case of well known databases, as Emerald, this phenomenon is at work (in a survey period of a month, nine in ten users visited the site just once) (Nicholas et al. 2004, 39). The loyalty as repeat behaviour is hard to be obtained in the digital world, where the informational offer is huge. The site with a good number of returnees is "site stickiness" or is considered to have a "brand following". The need to compare information and not to be obedient to any authoritative voice, as well as gathering information horizontally are some other reasons for this online behaviour.

Despite the fact that it is surrounded by an "inglorious" vocabulary, this type of behaviour is not necessarily negative *per se*. So, "this is a mistake to assume that bouncing (looking at only a couple of web pages and then going somewhere else and doing the same thing) necessarily represents 'failure at the terminal'. While it certainly does sometimes, it also represents a highly direct and pragmatic form of information seeking behaviour. Thus users may enter a site knowing exactly what they need, not wanting to waste any time, having done their homework elsewhere" (Nicholas et al. 2010, 206). Studies show that best researchers or academics tend to be bouncers, and that derived from a great knowledge of the domain and from the need to be up-to-date with the articles published in their area of interests. In a study done by Carol Tenopir, Donald W. King, Sheri Edwards and Lei Wu with the aim of observing the changes in scholarly article seeking and reading patterns, one point was the finding that "readers sometimes know about the information reported or discussed in an article prior to reading it for the first time. In fact, readers said that they knew about the information in about half of the articles they last read (51.4 per cent)" (Tenopir et al. 2009, 8). The importance of chaining is hereby revealed, as the importance of the multitude of sources that a scholar uses. In the above study, the US science faculty became aware of information using journal articles, informal discussions with colleagues, conferences or workshops, listserv, news group, e-mail for colleagues, websites of authors etc.

Moreover, in a longitudinal study of online users' information searching behaviour, Vivian Cothey tried to detect the relationship between the experience of users and the web information searching behaviour. Commonly, it is expected that if the users become more experienced, they will search for information in a more systematic manner, in a way that is considerably more active and better organized. In this respect, the increase of the level of experience that a user possesses is seen in a deep relation with qualitative changes in his information searching behaviour. This study, which kept track for 206 students over ten months and used a longitudinal transaction log analysis of the URL's accessed during 5 431 user days, invalidated this common sense idea: "users adopted more passive or browsing styles of information searching and the range of Web host that they access becomes less conformant or more eclectic as they become more experienced" (Cothey 2002, 76). The sporadic and eclectic web usage that characterises an experienced user can be explained through a higher level of selectivity that he has obtained.

Nevertheless, this finding seems congruent with the above remarks made by Nicholas et al. concerning the best researchers that are veritable bouncers.

4. What about reading?

Even if the online reading was approximated with the concepts of power browsing and squirreling, the former is proper for the searching activities and the latter for the collecting purposes. The power browsing was seen as a possible symptom of the rise of a new kind of online reading behaviour, based on the scanning of some textual frames: "It is clear that users are not reading online in the traditional sense, indeed there are signs that new forms of 'reading' are emerging as users 'power browse' horizontally through titles, content pages and abstracts going for quick wins. It almost seems that they go online to avoid reading in the traditional sense" (Nicholas et al. 2010, 295). Even the scholars seem to avoid the online reading it is impossible to separate reading from navigating (Nicholas, Huntington, Jamali, Rowlands and Dobrowolski 2008, 295). Readers of scientific journals can't keep pace with the increasing amount of the literature, so they read shallow, fragmented, discontinuous, selective, with a decreased concentration, attention or immersion in the texts (online immersion is considerable different from the hermeneutic immersion theorized by Don Ihde). In this respect, the online "reading" of the scientific articles can be compared with the manner in which many readers skim newspapers (Liu 2005, 706).

In this context, the full-text view, the download or the "sending for printer" activity become users' satisfaction indicators. Squirreling – the download of articles with the hope that they will be read later in the future – was seen as a "proxy for reading". In fact, squirreling can be perceived as another good metaphor for what is happening in digital environment, Hillesund having pointed very well this process: "This viewing and bouncing behaviour is called 'squirreling' – an energetic search for treasures that are downloaded for later consumption" (Hillesund 2010, 4). Squirreling indicates that most readings are still done on paper for a deep and concentrated work, so the "paperless office" is still a myth (Sellen and Harper 2002). Computers are used for searching articles, storing, making of documents, but paper seems to be used for tasks that require sustained concentration, such as reading. Even in the writing process, computer remains the main tool, but the paper reading is an essential

component, that can be observed in the enormous printouts that commonly surround the desk.

The study made by Hillesund in 2010 has similar conclusions. The scholars combine different "text technologies" in their work, but when they have to read in a reflective and sustained mode, they use prints. Thus, "today, one can safely say that scholars have some fingers in a paper-based text cycle and the rest in a digital text cycle. Indeed, by focusing on physical aspects of reading, this study reveals that three historical systems are in use in scholarly literacy events; the modern computer system, printed paper – and the ancient system of handwriting" (Hillesund 2010, 12). In this respect, the data collected and interpreted by Ziming Liu with regard to the changes in reading behaviour over the past ten years are congruent, too. Liu takes a step further in concluding that it is unlikely to think that paper will disappear in the digital age, "printing for reading" being one of the very significant "driving forces for the increasing consumption of paper" in this electronic stage (Liu 205, 710). This remark can be a reassuring thought for those who believe in the imminent and rapid extinction of the books and texts in the print format. Of course, this situation can be modified radically in a short time; as Tenopir at al. observed, if the reading patterns changed moderately from 1977 to the mid-1990s, after that period the changes where more accelerated and diverse (2009).

The analysis of the information searching behaviour of scholars brings to light a rich picture with new patterns adapted for the digital environment. Of course, their novelty can be more accurate interpreted in the sense of "remediation" (Bolter and Grusin 2000) and of complementary approaches of habits and strategies used online and in print format. One key conversion that was little explored is the way in which digitalization leads to a different model of obtaining and developing knowledge. As Nicholas et al. noticed, the "information searching behaviour follows the architecture of distributed information sources on the Internet. [...] The analysis of the searching behaviour of digital consumers tell us much more than that, it also shows us how people develop knowledge" (Nicholas, Huntington, Williams and Dobrowolski 2004, 41-42). The distributed communications network (Baran 1964) entails a very dynamic and variable relationship between nodes; thus, the process of searching and retrieving information transforms us in bouncers and draws an interesting tree of knowledge.

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