



Mediated health: sociotechnical practices of providing and using online health information

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Abstract

While most of the existing research about online health information focuses exclusively on either the provider or the user side of communication circuits, this article aims to integrate and discuss both sides and their mediated relation to one another. Drawing on actor-network theory, it conceptualizes the provision and use of online health information as sociotechnical. It questions concretely how website providers position their websites and information, how users browse through the web and assemble information, and interrogates the various concepts of online health information these different practices imply. Further, it asks how search engines, and Google in particular, come to play such a dominant role in the way health-related web information is provided and used. The article concludes by evaluating the implications of the findings in regard to debates about the quality of online health information and the way in which web information is distributed and acquired on a broader scale.

Key words

actor-network theory • Google • internet • links • online health information • trust • users • website providers

INTRODUCTION

Medical information has been described as no longer being bound to medical institutions, but as having 'escaped' into society at large by means of media, most notably new media (Nettleton, 2004). The internet in particular has become an important location where health-related information is circulated and accessed today. Consequently, the web as a health information source has been placed at the centre of the social scientific research agenda. A remarkable body of research has been concentrating on the role that online health information plays in medical practices. Apart from a few critical voices (Henwood et al., 2003) the web has widely been described as a tool of empowerment that strengthens patients (Fox and Rainie, 2000; Hardey, 1999). However, controversy has arisen regarding discussions of the diversity and quality of the information available online. While some scholars celebrate the plurality of the information, ranging from expert to non-expert knowledge (Hardey, 1999; Loader et al., 2002; Nettleton, 2004), others cast into doubt its quality against the background of medical criteria, formulating warnings against misinformation (Eysenbach et al., 2002). As a solution to the problem, medical professionals and policymakers alike have made demands for standardized quality labelling such as 'Health on the Net' (HON, see www.hon.ch; European Commission, 2002; Eysenbach et al., 2002). These labels certify websites as trustworthy when corresponding to medically defined standards and hence try to direct users to the 'right' information. However, these quality labels are hardly effective when it comes down to the actions of the end-user, as a number of studies have shown (Eysenbach and Köhler, 2002).

One reason for this trend is that the idea of qualifying the source of a website does not correspond well with practices of using the web. Users have their own strategies for searching, selecting and evaluating health information and these are closely related to the way that they usually browse the web (Adams et al., 2006). This indicates that the focus of research should be shifted away from predefined concepts of 'good' and 'bad' quality towards actual information-gathering practices. Clearly, practices of acquiring and assessing online health information in turn can only be understood in relation to the way in which information is provided and distributed on the web. Search engines play a central role in these practices (Fallows et al., 2004). It has been shown that not all medical accounts are equally distributed in search engine results; rather that certain representations are more dominant than others (Seale, 2005). This calls for new research investigating the relations of production of online health information, taking the technical specificities of the technology such as hyperlinks and search engines into consideration. Technology needs to be drawn into the story when attempting to understand how online health information is carried out in practice.

This article faces this challenge by investigating sociotechnical practices of providing and using online health information. It conceptualizes the provision and use of the information as sociotechnical because social and technical aspects are seen as equally important in these information practices. An analytical tool serving this goal is the actor-network theory (ANT) (Latour, 2005; Law and Hassard, 1999). ANT enables the researcher to symmetrically analyse human and non-human actors including website providers, users, their ideas and concepts, links, search engines, algorithms, keywords, pieces of text and other actors involved in the enactment of online health information. This perspective allows for an understanding of online health information in the making, which sheds light on a new facet of discussions around health-related web information and its quality. Furthermore, while most of the literature on online health information exclusively focuses on the provider or on the user side, this article attempts to discuss both sides and their mediated relation within one analytical framework.

The analysis is based on an empirical case study that investigated the provision and use of information about chronic diseases in the Austrian context. The study employed different research methods to get a grasp of website providers' and users' practices and narratives as well as the technical elements involved in so doing. The central research question that the analysis posed was as follows:

RQ1: How do website providers and users differently practice and conceptualize online health information, and what role do technical elements play in this?

The study concretely asked: how do website providers position their websites and information; how do users find their way through the web and assemble information; and what various concepts of online health information do these different practices imply? Further, it asked how search engines came to play such a dominant role in the way online health information is provided and used. The resulting article begins with a critical review of the debates circulating between notions of the web as an empowerment tool for patients and as a source of misinformation and harm. This is followed by a brief discussion of the information politics that the web embodies in shaping the delivery of information, focusing specifically on links and search engines. The article concludes by examining the implications of the findings regarding debates about the quality of online health information, and the way in which web information is provided, distributed and used on a broader scale today.

ONLINE HEALTH INFORMATION: EMPOWERMENT OR DANGER?

Research about online health information has been divided between those contributions framing web information as potentially empowering, and others

seeing it as potentially harmful to patients. Two debates in particular are relevant regarding the argumentation of this article. First, the distribution and identity of the many voices offering online health information are discussed, especially with regard to its empowering potential. Second, the quality of the information available and how users evaluate its trustworthiness is debated.

A number of scholars have framed the web as encouraging pluralistic approaches to health information, challenging traditional knowledge hierarchies (Hardey, 1999; Nettleton, 2004). Nettleton (2004) has argued that new media enable a radical juxtaposition of diverse types of knowledge. In this context, the web has widely been discussed as facilitating access to the production of health information. Patients in particular as new producers of knowledge have been placed at the centre of attention. Having analysed a diabetes self-help network, Loader et al. concluded that virtual self-help groups are valuable sites 'where discursive learning about one's condition can be undertaken on a more equal basis' (2002: 64). Gillett (2003) has argued that the web provides the possibility to challenge dominant media representations and provide alternative accounts of diseases such as HIV/AIDS. Thus, having focused on particular websites or support groups, research may be seen as strengthening the ideal of the web as pluralizing medical accounts and dissolving hierarchies between expert and experiential knowledge. Nonetheless, considering the way in which online health information is distributed on the web, this imaginary ideal has been challenged. Seale (2005) investigated how medical representations of cancer are distributed in search engine results. His analysis has shown that net-savvy mainstream websites such as major cancer charities succeed better in gaining presence in search engine rankings, arguably at the expense of countercultural voices. One reason is that professionally maintained websites have better managed to use links and search engine algorithms for their purposes. Thus it is necessary to understand which strategies website providers employ to distribute their information online and which rationales accompany them.

As a consequence of the wide variety of online health information, the quality of such information has been debated. The quality issue has been framed as particularly important in the medical context 'because misinformation could be a matter of life or death', as Eysenbach and Diepgen (1998: 1) put it. This implies a leaning towards the risk discourse particularly dominant in the medical and policy realm. A broad range of studies have explored the quality of specific information offers on the basis of standardized medical criteria, concluding that much of the medical information lacks accuracy and completeness (Eysenbach et al., 2002). As a consequence, medical professionals and policymakers have called for quality criteria for websites (European Commission, 2002; Eysenbach et al., 2002). In the European context the quality label HON serves as a prominent example.

By giving authority to certain websites while denying it to others, ostensibly the end-user should be directed to evidence-based information defined by medical experts. However, these quality labels hardly succeed because users barely acknowledge the source of the website, let alone its quality status when surfing the web (Eysenbach and Köhler, 2002). Eysenbach and Köhler (2002) concluded that users have rather 'sub-optimal' search techniques. As in this argument, much of the debate about online health information embodies a strong hierarchy between approved orthodox and unsecure alternative information, and attempts are made to reify traditional knowledge hierarchies with the help of standardized quality criteria. However, it seems that the web and the social practices surrounding it are quite resistant to these attempts. One reason is that laypeople have their own strategies of making sense of scientific knowledge which does not necessarily correspond to experts' visions, as scholars in the field of science studies have argued (Lambert and Rose, 1996; Wynne, 1992). They have shown that lay people interpret and recontextualize scientific knowledge by locating it within their own social contexts and experiences. Hence these authors conceptualize lay people as epistemic actors in their own right (Jasanoff, 2005). In the context of online health information it has been shown that users' interpretations of medical information are deeply rooted in the way that users employ the web (Adams et al., 2006; Wyatt, 2005). Adams et al. (2006) have shown that users piece together information from different websites: instead of checking the source of a website, they evaluate information by comparing it with other pieces of information. The authors argued that reliability is not a 'yes-or-no kind of attribute' (2006: 109), rather that 'the reliability of information for the patient becomes intertwined in the search process' (2006: 111). Therefore, starting points such as search engines or particular portals need to be taken into consideration because they are an integral part of end-users' search and evaluation practices, according to the authors. Compared to the dominant orthodox view, this line of argument shows that further research regarding users' practices, which includes a consideration of the technical specificities of the web, is necessary when trying to understand users' epistemic practices.

INFORMATION POLITICS AND THE DELIVERY OF WEB INFORMATION

Contributions from new media studies are of key importance in fleshing out the political dimension of the provision and use of online health information. A number of scholars have shown that the web has inscribed power relations and hierarchies that crucially influence the distribution of web information (Elmer, 2002; Rogers, 2004). Rogers has called the form of politics behind the delivery of web information 'back-end information politics' (2004: 3). When it comes to information politics, linking strategies and search engine politics have been discussed centrally.

Sir Tim Berners-Lee (2000), the inventor of the world wide web, originally envisioned the web as an inclusive information network without borders, hierarchies or limits. However, recent work in network theory has shown that the web embodies strong hierarchies between well-interlinked hubs and weakly connected websites (Barabási, 2003). Thus scholars have begun to map and analyse power relations, focusing on the connectivity between websites (Park and Thelwall, 2006; Rogers and Ben-David, 2008; Rogers and Marres, 2000). Rogers and Marres (2000) have analysed which websites are dominant in the representation of climate change on the web and what their positions are on the issues. Their analysis conceptualizes hyperlinks as recommendations to relevant actors in the field, constituting issue networks; however, link connections may be read also as social networks. Park and Thelwall (2006) have analysed link connections as an indicator of social relations between Asian and European universities. Having found that universities of larger and richer countries tend to be better interlinked, they concluded that offline power relations are transferred to the web. These examples show that links do not have a single meaning. Thus, emphasis needs to be placed on actors' underlying motivations and strategies constituting linkage patterns (Beaulieu and Simakova, 2006).

Due to their widespread use, search engines, and Google in particular, have become central to discussions around information politics. Google has been framed widely as an 'information monopolist', crucially determining how web information is presented and used these days (Battelle, 2005); in particular, its proprietary algorithm, which defines the order of search results, has been critically discussed in this respect. The PageRank algorithm uses the number and quality of links a website receives as an indicator of its value (Brin and Page, 1998). While the company claims to use 'the collective intelligence of the web to determine a page's importance' (Google, <http://www.google.com/corporate/tech.html>), critics have argued that the algorithm produces a bias towards large, well-connected and commercial sites (Elmer, 2006; Introna and Niessenbaum, 2000: 7). As search engines systematically give presence to bigger websites at the expense of smaller ones, Introna and Niessenbaum (2000: 7) describe them as political actors, because they run counter to the democratic ideal of the web. As users mainly remain within the first 10 to 20 hits, search engines have been framed further as creating competition between websites for the 'top ten seats' (Introna and Niessenbaum, 2000: 174). Moreover, search engines crucially influence how information is represented online. Elmer has argued that the 'web browser-search engine couplet represents a disentangled web, where pages are taken out of their hyperlinked networks and placed into keyword-subject indexes or linear rankings of individual pages' (2006: 10). Hence search engines not only determine the order of web information, but also the shape

that web information takes. What this means in terms of its use needs to be investigated further.

METHOD

Research question

The central research question guiding the following analysis specifically interrogates how website providers position their information online and how they conceptualize their information offer in relation to other information available on the web. It further analyses how users search for and assemble information for their purposes, and how they perceive web information as a whole. In the study different research methods have been used to symmetrically analyse the social and technical actors involved in these practices.

Sample and data collection

To grasp the provider-side, hyperlink network depictions have been developed with the software Issuecrawler (<http://www.issuecrawler.net>) to identify communities of well-connected websites in the issue areas of asthma, diabetes, eczema and rheumatism, with a specific focus on the Austrian web space. On the basis of these link networks and in combination with top search engine results for the chosen diseases, seven dominant websites with a focus on diabetes were selected for a deeper analysis. To cover the diversity of health information circulated online, the selected websites ranged from non-profit organizations to commercial websites. Further, a kind of hybrid – a website provided by a diabetic sharing his expertise while living off the website – was chosen. The websites were analysed and interviews with the site providers carried out in 2006 and 2007. The seven interview partners included three members of self-help groups dealing with diabetes and rheumatism, a general practitioner specializing in diabetes, a diabetic providing a semi-commercial website, a director of a general health portal and a public relations manager of a pharmaceutical company producing insulin and diabetes-related devices. The providers were interviewed about their websites and ways of positioning them on the web.

To examine the user-side, online search experiments and successive qualitative interviews were carried out in 2006 and 2007. Altogether, 41 participants were recruited via bulk mail to do a web search on a chronic disease. The users varied in gender, age, educational background and internet skills, in order to cover the variety of people searching for online health information. The participants were individually invited to do a search on asthma, diabetes, eczema or rheumatism, which were distributed randomly among the participants. None of the participants had prior

experience of the disease.¹ Each of the participants was given a fictional scenario, which stated, for example, that they had just come back from the doctor with a diagnosis of diabetes, and with some additional information about the disease. The participants' search lasted for about one hour, and was stored as film and logfile. Directly after the search, the participants were interviewed about their search strategies and the information that they found. Further, similarities and differences between this particular search and previous web searches that the participants conducted on other health-related issues were discussed.

The hyperlink networks, websites and search films were analysed systematically. The interview material was transcribed fully and categorized with the ATLAS.ti qualitative research software (see www.atlas.com) and analysed following a grounded theory approach (Glaser and Strauss, 1968).

Why actor-network theory?

ANT offers the possibility to combine symmetrically technical and social elements within one explanatory structure (Latour, 2005; Law and Hassard, 1999). It has been described as a material-semiotic approach that conceptualizes social reality as an effect of a network of 'materially and discursively heterogeneous relations that produce and reshuffle all kinds of actors including objects, subjects, human beings, machines' (Law, 2007). Following ANT, online health information as the central object of my analysis may be interpreted as enacted in a network of heterogeneous entities including website providers, users, their ideas and perceptions, websites, links, Google, automated algorithms, keywords, textual elements and pieces of text, just to mention a few of the various elements involved. A central argument in ANT is that the identity of each of the elements is not given, but rather enacted and stabilized by the relational effects of the network (Law, 2000). Hence actors do not have a pre-defined identity; rather their identity is made and remade dynamically by the actor-network around them. However, this does not imply that all of the actors in the network are of equal importance: certain actors may better succeed in gaining centrality than others. To grasp this, Callon (1986) introduced the notion of translation, describing how certain actors acquire centrality by becoming 'obligatory passage points' through translating others' interests into their own. Obligatory passage points succeed in causing other actors to arrange with them to reach their individual goals (Callon, 1986). Successful translation also implies that the identity of the actors involved are shifted and transformed. Thus obligatory passage points may be seen as central nodes of translation and transformation, as this article will show by discussing Google as an obligatory passage point.

Sociotechnical practices of providing and using online health information

In the following, the empirical results are presented along three dimensions. First, the strategies that website providers employed to position their sites and information on the web and how they conceptualized online health information will be elaborated. Second, the strategies that users employed to find and assemble health information and how they perceived online health information will be analysed. Third, Google will be discussed as an obligatory passage point mediating between providers' and users' practices and narratives.

Website providers' positioning strategies

An analysis of the link networks, the websites and the providers' narrations revealed that all the website providers employed links to position their sites on the web in various ways. Thus the link may be seen as a central element in providers' positioning strategies. It transpired that providers' positioning practices were closely related to the different agendas that the websites follow. Non-profit organizations expressed the primary aim of informing and helping patients, but also of recruiting new members or clients via the web, in the case of self-help groups or the general practitioner. Providers of commercial websites addressed the economic dimension of the web much more directly. Besides informing patients, they articulated the need to raise their popularity, user traffic and sponsorship contracts to keep the sites and corporations behind the information running.

First, the strategy of putting up links to relate specific web information to other sources of information and contextualize the content beyond one's own site was expressed. Corresponding to the goal of informing patients, links were seen as a way to recommend useful content to users. Having been asked whether he looks through the site to which he links, the web administrator of a diabetes self-help group said:

Of course ... I don't want to associate our empowered patients with charlatanism somehow. That's something I reject.

This quotation shows that links were seen as virtual pathways directing users to trustworthy information. In this mode of perception, the quality of the information is bound to the credibility of the provider, the actor responsible for the content. The quality of the interlinked website further reflects the seriousness of one's own page. The strategy of using links to recommend trustworthy web sources was expressed primarily by non-profit website providers such as self-help groups and the general practitioner trying to represent their offline identities on the web.

Second, links were seen as a way to attract users. Links allowed website providers to give presence to other websites by linking to them and thereby to gain presence by getting a link in return. Talking about the early days of his website, the diabetic providing the semi-commercial website explained these link exchanges as follows:

And you just start to look, what's on the web beyond me ... And we said: 'Let's associate simply, because if someone finds us and then you have the link page, well, he may then look further, no? And with your site, just the opposite.'

This strategy of attracting users may be seen as a collective strategy of gaining presence through mutual support. Self-help associations in particular transferred their offline relations to the web in order to gain visibility. In this context, links were seen also as pathways channelling users away from websites: this is why large websites such as the general health portal widely denied link exchanges, because they feared running the risk of losing more users than they gain. The director of the health portal added that losing users would mean equally losing appeal to sponsors. While most of the providers hinted at the economic dimension of the website between the lines, the public relations agent of a pharmaceutical company openly said: 'Well, the internet, here we have to stick to the truth. It exists because it creates money.' This shows that collective strategies of gaining visibility end where competition starts.

Finally, the strategy of collecting hyperlinks from other websites as a way to gain visibility in search engine results was expressed. All of the website providers were aware that users reached their sites most notably via Google. Referring to the competition between websites, the providers expressed the need to position their sites strategically in Google's search results. In particular, the commercially oriented websites articulated quite an elaborate knowledge of Google's PageRank algorithm and how to optimize their sites accordingly. The diabetic providing the semi-commercial website said that he actively tried to allocate links from other websites in order to climb up the Google ranking. As only the number of links counts in this context, he collected links from all types of websites, including pharmaceutical companies. The director of the general health portal referred to the technical support that it receives from a professional agency in terms of links, keywords and meta-keywords. When asked whether he cared about search engine optimization, he answered:

We of course do our homework. We once had a great workshop, where someone who is professionally dealing with these issues advised the editorial and technical department and told them what is important to consider.

Although all the website providers were aware of Google's algorithm, the willingness to adapt their websites accordingly varied strongly among them. Providers of commercial sites considered strategies to gain visibility in search engine results as part of their daily job. However, non-profit organizations widely associated these practices with manipulating their sites and rejected this strategy.

Actor-centred information epistemology: how providers conceptualize online health information

Talking to website providers about their positioning strategies revealed that a specific concept of online health information is implicit in their practices. All the website providers had their own site and its content in the focus of attention. They presented themselves on the homepage and provided categories of various kinds. They framed their sites as coherent information packages with an inner logic to make it attractive for users. In this concept, each subpage appeared to be embedded in and contextualized by the overall information structure. Further, they perceived themselves as responsible for the content of the information package. This implied that the quality of the website is bound clearly to the provider and its image. Talking about the usefulness of quality seals, the director of the health portal said: 'But it is still a matter of belief. I think in the end it is good if a name and a face is committed to the site ... Someone has been held responsible.' This quotation illustrates that the website provider was seen as a relevant authority guaranteeing the quality of the information.

On the basis of the concept of their own sites, the providers framed other websites similarly as enclosed entities having a certain identity. When asked how she generally perceived the health information available on the web, the general practitioner answered:

Well, not so bad, as it is often talked down. I think it is fairly apparent how good the information is. Also because of these standard websites that have been established, netdokter.at and .de and these sites.

Similarly, other website providers referred to particular websites when reflecting on online health information in general. They articulated a clear understanding of the websites acting in the same issue area and which image they attach to them. The perceived identity and quality of the websites also played a crucial role in the way they interlinked their sites, as described previously. The website providers usually linked to the homepage of the website welcoming the user and disclosing its identity. This allowed for interconnecting web content while keeping the boundaries between websites and their identities visible and secure.

In this way website providers tended to conceptualize online health information as composed of websites understood as coherent information packages linked to a specific actor. The quality of the information was seen as inextricably connected to the identity of the actor providing it. This was mirrored in the way that the website providers interrelated their information packages with other information offers through links perceived as recommendation to trustworthy web sources. Thus website providers may be seen as having an actor-centred information epistemology.

Users' search strategies

In the experiments and interviews with users, it turned out that they rarely employed links to browse the web because links were widely perceived as chaotic, misleading and time-consuming. Rather, all of the participants who searched for a chronic disease employed Google,² making it a central actor in their practices. As the users widely clicked through the result list from top down, they predominantly reached the large websites such as general health portals and Wikipedia (www.wikipedia.org), which were well-connected and displayed at the top of the results. In comparison, smaller websites such as sites from self-help groups were ranked further down. This shows that websites getting links predominantly from their own community were outpaced by websites getting links from a broad range of sites as a result of covering all kinds of diseases and other issues. The crucial question is: why did users employ Google and which strategies were embedded in this practice?

First, the strategy of using Google to thematically order the messy flood of health information was articulated by the participants. Typing keywords in the input box enabled users to structure the information along their interests. Nearly all of the participants began by typing the name of the disease in the search engine, thereby channelling them first and foremost to big websites. During the search process the participants specified their keywords and reached smaller and more specific websites. Having searched for information on asthma, a female bookseller described this process as follows:

And then you can specify by combining different search terms, also using the functions plus and minus. Well, I think one has developed strategies how to reduce this complexity – well, complexity is the wrong word – how to take out of the immense quantity of information the things that you can maybe use.

Hence the choice of keywords played a crucial role regarding the virtual routes that users took through the web. Consequently, the participants actively changing and combining keywords – mainly the younger and more experienced web users – were more likely to reach specific information such as alternative medicine than those participants who stuck with the same keywords throughout.

Second, Google was seen as an initial point, creating a feeling of order and security. The hierarchical order of search results was enjoyed because it provided the possibility of easily working through the information. It enabled a linear order to be followed and returned to at any time. Having searched for information on eczema, a schoolgirl articulated: 'The first initial point was Google, then some sites and always back to Google and looking what comes next.' Thus Google appeared to be a home base that people always could go back to in case of trouble. The widely shared search strategy may be described best as 'going back and forth' to Google. While some people argued that they go through the result list from the top down because they believe that the best websites are placed on top, others argued that they go from the top down due to pragmatic reasons. The participants further enjoyed that Google allows for selecting websites on the basis of headlines, small portions of text embedding the keyword and website address. This facilitated easy comparison between various pieces of information and the combination and evaluation of different health information.

Although relying heavily on Google when navigating through the web, when participants talked about the way that the search engine functions, Google finally turned into a black box. Contrary to website providers, hardly any of the participants knew how Google works technically and ranks its results. Some added further that they would not understand it anyway or that they were not interested. Comparing the internet to a car, a middle-aged investment adviser said: 'What is happening in the background does not really concern me.' This shows that they widely understood the search engine as a neutral tool pre-sorting web information for them.

Issue-centred information epistemology: how users conceptualize online health information

Discussing search strategies with the users revealed a very different information epistemology in comparison to the providers. Users had their interests in tight focus: generally they tried to gain an overview of the disease at first, and later they tried to find specific information such as nutrition and exercise, or particular medication in relation to the disease. When asked how she perceived her search on diabetes, a young woman said:

First of all I put 'diabetes mellitus' in the input field, then 'type 2 diabetes', then 'diabetes and sports', then different sports, 'diabetes and martial arts', then 'diabetes and kids' and 'diabetes and hereditary', because I wanted to see if I could pass it down.

This quotation exemplifies her journey through the web by naming topics and keywords that structured her search. Instead of websites or website

providers, the majority of the participants referred to their interests when talking about ‘the flood’ of online health information.

On the basis of their interests they browsed and perceived the web information. Basically, when climbing down the Google results while looking at the textual elements embedding their keywords, the source of the website quickly lost its importance. One participant straightforwardly said that the address

actually does not make a difference. It’s rather about hearing different opinions at first and if I were to find contradictions, I would maybe start to think about who says what.

Apart from the websites familiar to the users, the address of the website was hardly recognized by the majority of the participants. Only in cases of contradictions did actor-oriented considerations turn out to be relevant on a secondary level. As the users widely entered websites on a particular subpage that Google proposed, the website providers were not necessarily revealed to the user on the sites themselves, which explains why users hardly remembered which websites they actually visited. Reasoning about a particular site, a female risk manager said:

Although I cannot really tell which link it actually was, because you rarely remember the site address. One rather remembers that one has put a combination of keywords into Google and that the site appeared on the third position.

This quotation shows how central Google was in the users’ information practices. This finding has wider consequences. Rather than the source of the website (as promoted by orthodox policies), other evaluation mechanisms were employed primarily to assess web information. Using multiple websites at once allowed for a comparison between different types of information. Recurring information becomes increasingly trustworthy in the course of the search process, as a couple of participants articulated. Hence it was not the website provider that guaranteed the quality of the information, but rather the fit with other pieces of information available online. The usefulness of the information in terms of users’ needs and interests played a role in these evaluation processes as well.

Hence users tended to conceptualize online health information as an information flood made up of disconnected bits and pieces of information. Along their interests and Google’s transformation of these issues in keyword indexes, they created their own stories, dissolving the boundaries between websites and their providers. The quality and validity of the information was seen primarily as solidifying the process of assembling a coherent story through repetition and non-contradiction. Thus users may be seen as having an issue-centred information epistemology.

Google as an obligatory passage point

Throughout the course of this study it became apparent that website providers and users practised and conceptualized online health information in very different ways. Besides all these differences, they had one thing in common: that Google played a central role in their actions. From an ANT perspective, Google may be seen as an obligatory passage point both enacted and stabilized in providers' and users' practices. Website providers adapted their linking strategies to Google's algorithm and users primarily used the web information provided by Google. However, the search engine should be seen not only as passively enacted by both actor groups, but rather as actively mediating and translating between them.

Website providers had the primary goal of positioning their information to advantage and attract users. They generally tried to reach this goal by interlinking their sites for various reasons. Having realized that users widely employ Google to browse, web providers have been attracted by Google in terms of gaining visibility, if admittedly to differing extents. Google uses hyperlink networks to identify websites dealing with a specific search term and ranks the identified websites according to the number of links a website receives. In particular, commercially oriented website providers have begun to allocate extra links to climb up the results and gain a 'top 10 seat'. The search engine displays subpages dealing with the particular keyword in a linear list, and presents the sites with textual elements comprising the keyword. This representation allowed users to browse and order web information along their interests with the selection of keywords, their primary goal. It further enabled the screening of web information by looking at the way in which keywords are embedded in the passages of text displayed. Thus Google may be seen as translating the providers' logic of linking and goals attached to it into the end-users' logic of searching and their interests involved.

The process of translation always implies certain transformations, as ANT suggests. First, Google may be seen as creating strategic link practices on the provider-side. Consequently, not all link pathways are meant to be recommendations and attractive to walk for users: this is why users increasingly turn away from using links towards using Google, making it an integral part of their information practices, and this in turn may strengthen strategic linking further and the stabilization of Google as an obligatory passage point. However, Google not only changes the order of websites, but also how their information offer is navigated and used; the search engine links to a particular subpage containing a keyword for which someone has searched. Hence, it does not lead to the entry point of the website as defined by providers; rather it takes out the subpage of the site's hyperlinked networks and overall context (Elmer, 2006). Thus Google may be seen as splitting up and decontextualizing the coherent information packages that

providers have tied together. It presents disembodied pieces of information from different websites, all corresponding to the same keyword, but not constituting a coherent information order. It opens up the possibility to recontextualize the information for users, but in turn also imposes the duty to do so.

DISCUSSION AND CONCLUSION

This article has investigated the sociotechnical practices of providing and using online health information dealing with chronic diseases. It has shown that website providers use links to contextualize their information, attract users and gain visibility in search engine results. It has argued that providers' link practices are related closely to an actor-centred information epistemology. Website providers conceptualized online health information as a configuration of websites understood as coherent information packages configured by specific actors. These information packages related to each other, but clear boundaries between websites were drawn. The article has elaborated further that users predominantly employed Google to structure the information along their interests, work through the flood of information and create a virtual home base giving a feeling of security. Contrary to the providers, the users attached an issue-centred information epistemology to their actions. They perceived online health information as an assemblage of individual bits and pieces of information. Information from different websites merged and boundaries between websites were dissolved. The crucial question now is what consequences are derived from these findings regarding major debates about the quality of online health information.

The different information epistemologies that providers and users bring to the table imply different concepts of trustworthiness. Providers conceptualize trustworthiness of information as clearly bound to the image of the site and the institution behind it. To them, it is the provider which has the responsibility to guarantee the quality of information. This corresponds to imaginary ideals of medical professionals and policymakers attempting to regulate online health information by labelling websites as trustworthy. However, end-users hardly recognize the website provider at all, least of all its identity. Instead of trusting sites as a whole, they rather validate pieces of information by recurrence and how they fit into the overall information assemblage with which they are provided. Hence users conceptualize trustworthiness not as a pre-given quality that websites have (or do not have), but rather as something to be established in the course of their search practices (Adams et al., 2006).

Given the lack of significance that users attribute to the identity of the provider, it hardly appears surprising that quality seals awarded to single sites

have little effect. It shows that quality ratings defined by experts do not work because they ignore lay epistemologies rooted in users' information practices. This suggests that stakeholders trying to regulate online health information should think about new ways of protecting users from misinformation by taking their lay practices seriously. One step in this direction which the HON foundation has taken is to provide a toolbar to download. Users employing Google can check the toolbar in the browser to see if the different websites are certified, instead of seeing whether the quality seal is displayed somewhere on the website. Thus HON may be seen as paying its reference to Google as an obligatory passage point.

However, what are the implications of Google having played out as an obligatory passage point in the analysis? First, it shows that Google should not be interpreted as a hegemonic 'information monopolist' endangering the democratic potential of the web as an external factor; rather that it needs to be understood as itself enacted and stabilized in social practices. Second, it underlines that concerns about information politics do have to be evaluated when reasoning about the plurality of online health information and its empowering potential. Google turned out to evoke strategic link practices on the provider-side (e.g. abusing links to gain visibility in search engine results). On the user-side Google appeared to direct users predominantly to large, commercial websites, confirming its algorithmic bias (Introna and Nissenbaum, 2000). Finally, and most importantly, the analysis has shown that Google's predominance matters not only in terms of information politics, but also in its epistemological implications. It transforms enclosed information packages into bits and pieces of information assembled around keywords, and enables users to browse and order the information along the issue-themes in which they are interested. This strengthens the idea that control over information increasingly passes from providers to users, as Weinberger (2007) has argued. Google's transformation process further implies that the pieces of information are taken out of a bigger context that becomes lost on its way to the Google display. Consequently, web information as such appears lexical and disentangled. Hence, users are not only provided with the possibility of individually assembling web information, but also with the duty to recontextualize and make sense of it. Thus, particularly in the medical context, it is of key importance to develop a more fine-grained understanding of these practices of sense-making, the skills required in these processes and the hierarchies spawned by unequal access to those skills. A starting point may be to acknowledge Google not only as a political but also as an epistemic actor, crucially influencing how information is represented and shaped on the web.

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Notes

- 1 These search experiments enabled the researcher to get an understanding of the way that users browse through, assemble and evaluate web information when doing a longer web search on a health-related issue. They also imply certain limitations: first, the idea of doing a longer web search after having received a (fictitious) diagnosis was imposed on the participants by giving them about one hour of search time. Second, although having addressed different dimensions of the disease, the information given may have determined partly the search that followed. Finally, the participants neither experienced the encounter with the doctor by themselves, nor did they feel symptoms of the diseases. Hence the levels of urgency and specificity in information-seeking identified in studies on information-seeking models (Johnson, 1997) were lacking, which may have influenced their search strategies. In the successive interviews the hypothetical search situation was compared to real health searches that the participants had run previously, in order to contextualize the material gained in the search experiments and prevent overly-biased results.
- 2 Nearly everybody opened Google straightforwardly and most of the participants used the search engine throughout the whole search process. Some – especially older – participants however did not know how to spell Google right and therefore typed Goggl or Googl instead. Two participants clicked on the search button of the Browser and were thus directed to the MSN search they used for lack of alternatives. In the course of the interviews the reason for these difficulties turned out. Particularly people not familiar with the web had Google either installed as a welcome page or integrated in their Browser at their home computers. Towards the end, a few participants tried to compare their findings with results of other search engines, particularly Yahoo, Alta Vista or the Austrian search engine Austronaut. As the results seemed to be rather disappointing, this excursus generally did not last very long.

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