Abstract

The paper aims to contribute to the sociological analysis of power through the study of the structuration and retrieval of information on the internet. The main argument of the paper is that, paradoxically, in an age when the availability of information has increased exponentially, there is a risk that diversity in the use of sources for the construction of knowledge becomes more restricted than in the past and that information search moves towards greater objectification and centralisation. Knowledge management systems increasingly shape the ways in which we think about the questions we ask and how we try to answer them, which raises fundamental and largely neglected questions for education policy. The paper illustrates these trends with particular reference to the use of Google and Google Scholar.

Keywords: Sociology, critical analysis, Google, Google Scholar, knowledge management systems, internet search engines.

Introduction[1]

The analysis of the politics of the internet as a system of communication has tended to underline its potential as an empowerment tool for civil society (Roper 2002). There are several good reasons for this. In radical departure from previous mass communication models unidirectionality is no longer required. The internet is also more plural in the sense that all sorts of content and people can operate in it (Newhagen and Rafaeli 1996). Thus the internet brought with it a promise of liberation and 'democratisation' of knowledge production and distribution. It provided a platform for continuing inquiry (Anderson 2009), where the public would not only be a 'consumer' of information but also its creator and interpreter. Pluridirectionality and plurality were seen to redress the gatekeeping role of mass media (Bagidikian 2000).

In the area of education Willinsky (2002) illustrates this argument through a series of examples of the democratic impact of the internet on public education. Nagourney (2001) counted on a reduction of the control that a shrinking number of publishers have over scientific research and circulation (Malakoff 2o00). With the internet, open-access journals and self-publication became possible. Wikipedia and open access university materials such as MIT's Open Knowledge Initiative also became possible. YouTube presentations enabled both the dissemination of one's ideas and the consumption of a plurality of views. Eventually, it was possible for the informed individual to guide her education in a rebellious attitude against government and corporations' commodification of learning: Lamb and Groom's (2010) 'Edupunk'.

The internet is of enormous benefit to intellectual work and saves large amounts of labour time. Yet, the freedom it affords regarding information production and distribution has overwhelmed users and required better sorting mechanisms. Here, the debate has also centred on the potential of the internet to diversify the information that we can collectively access (Gilbert 2010). Engines such as Google Scholar (Scholar) have been seen as a democratisation tool and as "one of the most important research advances ever" (Kent 2005), capable of providing a gigantic peer review.

While literature has started to scrutinze the multi-faceted impact of search engines on culture and society (Halavais 2009; Vaidhyanathan 2011) there continues to be very little analysis of the possibility that the use we make of internet tools could be conducive to a de facto limitation of plurality of ideas, that under the promise of universalisation and democratisation new and uncritically accepted hierarchies emerge, partly as a result of the above mentioned hierarchical display of sources partly as a result of the behaviour of users. In other words, it is at this time of great freedom in the

production of views, and precisely because of that freedom, that we risk falling into a 'one-dimensional' dystopia (Marcuse, 1964), in the *consumption* of information. This, we argue, has fundamental implications for education policy. We illustrate these processes through the analysis of an exemplar: the use of Google and Google Scholar - the most popular academic search engine, launched in 2004. Against this backdrop, the intention of this article is twofold. First, to contribute to sociological analyses of emergent forms of power linked to the structuration and retrieval of information on the internet. Second, to reflect on the ways in which we construct and will continue to construct knowledge in "knowledge societies". Indeed, the manner search engines operate, classify and hierarchically display hits is crucial because "hits" are potential meaning constructors, the bricks we employ for our thought. They provide the sources for intellectual elaboration, shape what users read in the ways exposed below.

The argument proceeds in five stages. Section two presents an overview of politological and sociological conceptions of power and underlines the differences between these and new forms of power related to the sorting and display of sources that are emerging on the internet. Section three reflects on the 'market share' of Google Scholar and its organisational aims. Section four compares the principles for the organisation of information employed in the past century with those used by modern search engines, reflects on both technical differences and the social consequences of these and explores questions of 'reversibility' and 'user resistance' to the power of information retrieval systems. This is followed by a wider analysis of the ways in which the internet has changed the governmentality of information, where we review some of the key consequences of the current use of information retrieval systems, in relation to the range

of sources employed and the ways in which those sources are processed and used as well as implications for public policy. Section six concludes.

Power

'Power' is one of the most ubiquitous concepts in social theory and conveys many different meanings. The intention here is not to provide a detailed account of these, but to briefly review selective alternative conceptions, to ascertain their differences and commonalities, particularly in relation to the nature of power and how it is exercised.

During much of the 20th Century, the dominant account of power was the pluralist view according to which: "A has power over B to the extent that he can get B to do something that B would not otherwise do" (Dahl, 1957, pp.202-03). Power was conceived as a relation that manifests itself in the making of decisions over which there is an observable conflict of interest between actors (Polsby 1980). Later redefinitions of the concept, such as those by the neo-elitists Bachrach and Baratz (1962) and Lukes (1974) 'radical' view, focused on additional dimensions of power, including the capacity to avoid conflict being observable and the capacity to even prevent the emergence of conflict through the shaping of values, norms and ideologies in favour of the powerful. Thus, Lukes (1974:34; 2005) defined the concept of power by saying that "A exercises power over B when A affects B in a manner contrary to B's interests".

This discussion recognises that there are two main ways in which it is exercised: through the possibility of coercion and through the creation of meaning (values, norms, ideologies). Sociological analyses, such as those by Bourdieu, Foucault and Castells,

have frequently focused on the later. Castells notes that there is, in fact, an inverse relationship between the need to base power on violence and the construction of meaning: "the more the construction of meaning on behalf of specific interests and values plays a role in asserting power, the less the recourse to violence (legitimate or not) becomes necessary" (Castells, 2009:11). This is because the construction of meaning provides legitimacy to the positions of the powerful. Those who control the production and distribution of information have a strong influence over the creation of meaning; the role of education systems as systems of indoctrination within the process of State formation is a clear example (Green 1990).

For Bourdieu (1979) relations of communication are always relations of power. Symbolic systems such as art, religion and language operate as instruments of knowledge that construct reality and have social as well as cognitive and communicative functions. They are structured systems that operate a structuring power established through a gnoseological order, which makes a consensus on the sense of the social world possible. This, in turn, is what contributes to the reproduction of the social order through the legitimization of domination. For Bourdieu it is the different classes and class factions that are engaged in the symbolic struggle to impose the definition of the social world that is most consistent with their interests through symbolic violence: the power to impose instruments of knowledge and taxonomies of social reality which are arbitrary but not recognized as such. The locus of the struggle is then the hierarchy of the principles of hierarchization (Bourdieu 1971): the dominant ideology tries to present the established order as natural, through masked imposition of classification systems and concepts and the heterodox discourse tries to destroy the false self-evidences of the orthodoxy. Symbolic power is then the power to constitute the given by

stating it, confirming or transforming the vision of the world, and through this, the action on the world and the world itself, while disguising its own arbitrariness (Bourdieu 1971).

For Foucault, by contrast, information is not only one resource of power. Instead, the mechanisms of power are inextricably linked with the mechanisms of knowledge. Power becomes a transformative capacity, with the ability to influence the actions of other individuals to realize certain tactical goals (Heller 1996). He thus rejected the view of power as something inherently concentrated in a single centre (a small group, a 'class') and repressive. Power is something that is exercised, rather than possessed, and something that produces ('truth', individuals), rather than something that merely excludes or conceals. The goals of power and knowledge are the same: in knowing we control and in controlling we know or are able to collect the information that lets us know (Foucault 1977). It is precisely through discourses, power and knowledge that subjects are created, labeled as 'normal' or 'abnormal' and henceforth subordinated and disciplined. The judgment of normality may be 'scientific', but also ultimately based on power and on moral positions shaped by power. Truth is linked in a circular relation with systems of power, which produce and sustain it.

The above discussions show that pluralist, neo-elitist, and radical analyses of power as well as sociological analyses of power, in spite of their significant differences, share some traits. They have a "centre", a core that is the field of struggle for social actors, individual or institutional, be it the creation of reality, truth, normality - the questions that have centred sociological analyses of power - or the achievement of much more immediate interests - the analysis of which has dominated politological works on power. Most of the reviewed notions, moreover, understand power as "power over" (cf.

Parsons, 1963) another person or group of people. This is clearly expressed by Castells (2009:13), who argues that: "The power to do something (…) is always the power to do something against someone, or against the values and interests of this "someone" that are enshrined in the apparatuses that rule and organize social life". This, however, may be less relevant than the analysis of "power to": the ability to effect outcomes, not the ability to affect others (Morriss, 2002). Moreover, these notions are based on the existence of competing interests (either "objective" or constructed through meaning) on a specific topic, and the existence of some kind of agenda of those involved in power relations regarding that topic.

How does this fit with an analysis of the internet? The way in which search engines organize and distribute information on the internet serves to construct meaning and is an instrument of power. Yet, none of the conceptions presented above captures well the power relations derived from the operations of internet's information retrieval systems. Search engines exert a different kind of power. Their power is characterised first, by being primarily a 'power to' achieve the organisational aims of engines' owner companies rather than a 'power over' others –although elements of this undoubtedly exist –cf. section five. Second, those who are subjects of power are also very evidently agents of power, who create the hierarchies that affect them and can change these as well as the ways in which they are employed, making the prevailing state of affairs continuously reversible. One of the most important inputs into Google's ranking algorithms, together with document titles and content is the reaction of its own users and its density of links –citations in the case of Scholar's algorithm (Beel et al. 2010; Page et al. 1999). With Google and Scholar the web stopped being treated only as a document repository to be considered also a social system. They are based on a kind of

preferential attachment process (Price 1976), whereby those who have will be given: those results higher in the lists are more likely to be reviewed, and thus cited, in an endless buckle. Relevance breeds relevance (Castells 2009). Scholar, then, is based on one of the most widely criticised areas in academia, bibliometrics, which assesses the importance of any given article through its citations (Brabazon 2007), and is constructed under the logic of capital accummulation (Mager 2012, Fuchs 2011).

This means that the "discourses" favoured by search engines could change at any point in time, as engines largely feedback on the popularity of certain "takes on matters" – a point developed further below. While Foucault also conceived individuals as both subjects and agents of power, in the case of search engines this happens within a single field of action. For the individuals concerned their dual character as subjects and agents is not 'an option' but a requirement: as long as their behaviour affects the search algorithms they become agents of power. Third, search engines' power is a 'power on', a power that is hollowed from substantive arguments or interests beyond its own perpetuation; it is in this sense continuous and works across topics rather than being based on fixed positions regarding specific topics. The way in which search engines select and rank information makes no judgment on the nature of the content ranked because this bears no relationship with the primary interest of its owners: market share and revenues. In this new landscape it is no longer governments, other public institutional stakeholders, or even mass media and publishing houses, but other private corporations (engines' owners), who lead on information management –a point we develop further below.

If the network society must be analysed, first of all, as a global architecture of networks programmed by different spheres of power and how they constitute "what counts", this

has clearly been subject to central modifications in the current landscape. Having reviewed the principles of Google's hierarchy, in the next section, the article looks at the extent to which Google and Scholar constitute what 'counts'.

A "Googlecracy"?

Google is today the search engine of choice, to the extent that Castells (2009) refers to a "Googlearchy". There is an unprecedented degree of dependence on Google and Scholar as tools to identify and rank information. Reliance on websites as a source of information in undergraduate and graduate work has increased very heavily, and for students Google is the most common way to identify information (OCLC 2006; Joy 2004). Examining 529 freshman English composition papers in 1999 and 2004 Hovde (2007) reports that web citations went up by almost 50 percentage points as a share of the total sources employed. This was at the expense of books and journals: the number of average citations per paper in the sample actually descreased from 8.3 in 1999 to 7.2 in 2004. A more recent study of MIT theses reported an increasing number of citations from 2004 to 2011, also thanks to electronic resources (Varshney 2012). Besides the volume of citations, Rowlands (2008:13; 2007) also noted a decrease in the use of scholarly sources and argues, in the results of the "Google generation" project that circumstantial evidence shows that the relative value that members of the academic community place on a range of methods for finding articles is decreasing.

It is not only students who make use of search engines, academics too. Around 40% of scholars (over 55% for those under 27 years) see themselves as very or quite dependent on Scholar for locating articles and around 40% of those below 26 for discovering

articles (Tenopir and Rowlands 2007). Kayongo and Helm (2009) note a shift in citation patterns by faculty with journals being cited more than books from the mid-2000s. This may be due, they argue, to the fact that journals are becoming increasingly accessible electronically, although it could also be due to the distinct purpose of journals as representing and advancing disciplinary knowledge, and the increasing importance of this function of higher education institutions.

There are, of course, geographic and subject, language, gender and other specific differences (Burright et al. 2005; Wu and Chen 2010; Earp 2008). There are also age-specific differences as younger researchers are significantly more dependent on Google than their older peers (Rowlands 2008), which will further accentuate the importance of search engines. In spite of these variations, the increasing importance of search engines to identify and retrieve scholarly information cannot be neglected. "Googling" has become synonymous with doing research (Neuhaus et al. 2006).

By contrast, traditional abstracting and indexing services are considered to be in a death spiral (Tucci 2010). Search engines have broken down their monopoly, but in this process they also significantly increased in importance vis-à-vis other ways to acquire information, such as referrals from colleagues (Gould and Handler 1989), challenging forms of authority that prevailed for centuries institutionalised in academia. Simpson (2012) argues that search engines fulfil the epistemic role of a 'surrogate expert', but are mostly 'shallow experts', who can offer testimony as to whether "p", and can direct to sources (a function previously restricted to 'deep experts'), but cannot meet diverse enquiries or teach how to understand a domain of expertise.

Search engines have also diminished the usage of social environments for community interaction and exchange, such as libraries, which were much more than the books they contained. The median number of reference questions asked in libraries has declined since the mid-1990s (Davis 2003). Faculty visits to libraries have also been declining with digitalisation. Almost a quarter of faculty visits libraries twice or less per year (Hemminger et al. 2007). The American Digital Library Federation reports that almost 90% of researchers go online first, and only later consult printed sources (Carlson, 2002). As Wagner (2009:73) summarises "Any reference librarian can tell you that, when we ask patrons what they have already searched as they attempted to find needed information, the most frequent answer is 'the web' or 'Google'".

It is remarkable is that this dominance has been forged in less than a decade. Scholar has a number of significant drawbacks: the information it displays does not undergo robust quality assurance procedures; derives false names for authors; inflates the number of publications attributed to an author (Jacso 2009), handles Boolean operators inconsistently, the nature of the materials it includes is very varied -from presentations to peer-refereed articles; the nature of the materials returned can also be very varied (a search on the term 'power[2]' in Scholar is topped by Michael's Power 'The Audit Society' because of the author's name and its over 4,000 citations, not because it is about power, and this is followed by works on pharmacology, moral judgements and agricultural diversification (all provided in the first page of search results and co-authored by various 'Power') before references to works on political sociology or physics are provided[3]). Moreover, it is difficult to know where Scholar's gaps are, as

[2] Performed on January 20th 2013.

[3] We are grateful to an external reviewer for raising this point.

Scholar does not specify the sources it crawls. Even if it looks as though a particular site is indexed, there is no guarantee that its full content is indexed. Some of these problems will be eased with Scholar's introduction in 2011 of the 'Google Scholar Author Citation' whereby authors can manage their own records, include new texts and correct errors, but can also easily 'play the system' to spuriously increase their outputs and citations. A wide range of literature has tested Scholar's coverage vis-à-vis alternative search options, which naturally offer different types of searching, such as SSCI, Scirus, Scopus, and PubMed (Stansfield et al. 2012; Gorman 2006). The main message is that Scholar is less accurate than other search tools.

But it is also more comprehensive, having dramatically improved its coverage in its short period of existence (Chen 2010). Scholar is a 'one stop shop' which offers access to a wider set of information sources (e-books, articles, pre-prints, reports, seminar discussions, teaching materials) than traditional academic retrieval systems. It can also be employed, on occasions, to bypass publishers and libraries making sources available to a wider public: "democratising" content (Jamali and Asadi 2010). Scholar enables the user to check for interconnections between authors and content through a "cited by" feature and can facilitate multidisciplinary work, compared to subject specific databases such as SciFinder Scholar or BIOSIS. Besides its wide coverage the main advantages of Scholar are the 'relevance' of the results it displays, the simplicity of its single search box (Neuhaus et al. 2006), its convenience, and its capacity to provide a clear sorting of results, a hierarchy. This helps Scholar not to gain power over others as such and change their views in particular directions it desires, but to gain power to maintain and expand its market share and fulfil its organisational targets. The following three sections look more closely at the architecture of and the consequences derived from the use of

search engines. The next section starts by comparing the principles for the organisation and display of information employed in the past with those of search engines, to elucidate the significance of the changes that we are undergoing.

Information, information management and hierarchical ordering

The ways in which search engines organise information are fundamental elements of the architecture of the internet, and of the ways in which information is accessed and socially processed. Systems for the classification of information are not new (Smiraglia 2002). Thomas Hyde's 1674 catalogue for the Bodleian Library provides one of its most famous illustrations, as the first great alphabetical catalogue that emphasised the importance of divergent forms of names and titles being both expressed and reconciled. However, its focus was simply on recording physical details of books. It was not until the XIXth Century, in the works of rationalists such as Pannizzi, Cutter and most prominently in M. Dewey's work – used to the present day in most libraries in the English speaking world - that systems of classification aimed to help readers to identify and choose among works based on their content and facilitate browsing by the public. Despite their different philosophies and assumptions, these systems met a classification need, derived from the increasing numbers of works available and a need for standardisation among libraries. But they, unlike previous classification systems, also reflected the fact that it is the intellectual content of the work for which readers consult a catalogue. They largely reflected a belief in an inherent order of knowledge (Hjorland, 2008), and in the distinctions and judgements made by professional librarians who had a profound understanding of their subject areas and contributed to the constitution of different fields of knowledge.

There are a number of differences between such previous classification schemes and Scholar. For instance, and as mentioned, Scholar relates much more strongly works through its "cited by" feature, making relationships within fields explicit and, potentially, breaking islands of work, something that had been much called for in information management (Svenonius 1992) –although the extent to which Scholar has actually delivered this promise could be subject to debate, as citation trails can serve to reinforce silos and reciprocity. Second, Scholar places much less emphasis on the rigor of its thematic classification: a Scholar search on 'power' can return results from very distant fields from physics to sociology. Thus, the hierarchies of classification created by previous systems, which schematized a universal and permanent order and division of knowledge and provided single entry points to sources - derived from the need to store a single item in a single location on a shelf - are fundamentally challenged. Different points of view (e.g. feminist) need different systems of organisation and key terms/ information retrieval systems are better able to cater for a plurality of views. Yet, Scholar, unlike earlier systems, does not have a view of its own on the content of the works it displays based on the expertise of a professional group; it is just a modus operandi.

The required expertise to carry out research thus changes: whereas in an indexed system users relied on the expertise of indexers in free text systems the search terms –rather than subject expertise alone- become more important. 'Search expertise' *and* subject expertise (Duggan and Payne 2008) can radically change the results obtained. In this sense, the simplicity of the search box conceals the importance of knowing how it works and how to use it. The diminished emphasis on thematic classification is accompanied by the inextricable relationship between the terms used and the results

obtained in free text searches. This locates searches much more specifically temporarily and ideologically. Indexing systems adapted to vocabulary changes through the work of indexers in order to ensure that older material be correctly 'linked' to newer terminology[4]. Language turns and battles over words become even more significant in free-text searches than in the past.

Yet Scholar and search engines more generally show an even more radical difference from previous systems, to the extent that we can talk of a 'third phase' of information management. It is based on the principles of ranking, relevance judgements and personalisation. In Scholar the manager not only identifies the works (cf. Hyde's system) or provides details on its content to guide the selection (cf. Dewey's system), but also makes a judgement on the work and its relevance for the reader that is displayed in a hierarchy. Scholar does not classify information/works; it uses terms searches to *rank* those sources is retrieves. While the way in which Scholar exactly works is not public for commercial reasons, one fundamental aspect in Scholar's ranking is the number of citations a document has (Page et al. 1999). Through its ranking, Scholar subscribes a new social epistemology and produces a new context for knowledge domains, which is different to the previous rationalist and empiricist epistemologies dominant in knowledge management (Smiraglia 2002). It also implicitly (re)creates disciplinary hierarchies since citation volumes differ across sciences, social sciences and humanities.

Thus, the roles of the information retrieval system and its impact on knowledge producers and publishers also change. The openness of indexation and ranking and its

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[4] We are grateful to an external reviewer for raising these points.

crowsourcing to the public, together with the increasing link between bibliometric performance, reputation and hiring and promotion decisions –to which addendums to Scholar such as 'Publish or Perish' and 'Scholameter' contribute-, have created new sets of incentives for information 'producers' to work within, in the margins of and outside of conventions. Advice on 'academic search engine optimisation' (ASEO) strategies to make it easier for engines such as Scholar to crawl and index work have been made available from researchers (Beel et al. 2010), publishers and journal editors (Norman 2012) and higher education institutions such as the LSE (2011). Beel and Glipp (2010) tested the potential for manipulation and 'academic search engine spam' in Scholar. Scholar indexed invisible text they added to articles (content spam) spuriously increasing the number of searches in which the paper appeared, and indexed fake papers -nonsensical papers, duplicated papers with only a title change uploaded onto sites such as academia.edu- which can be used to manipulate citiation counts (citation spam, similar to the 'link spam' in used to increase the visibility of websites in general search engines). Journals are subject to the same pressures of the ranking battle. SAGE stated in 2010 that 60% of all its online readers come via Google or Scholar (Beel and Gipp 2010).

Ranking is linked to the concept of 'relevance', which is conceived as a discernible and objective property of the document (its title, author, citations), and additionally assumes that users do not want to see related documents not directly relevant to their queries. Relevance relates to a relation, but what it involves, between what elements, affected by what factors etc. are controversial questions to which Google's algorithm provides its own, non-neutral, answer, which is commercially driven (pay-per-click) in an environment where the audience is sold as a commodity to advertisers (Fuchs 2012). As

with Bourdieu's notion of symbolic power, the locus of the struggle is the 'hierarchy of the principles of hierarchization' dispossessing users from the instruments of symbolic production. Scholar has only a few restrictions that users can employ. Scholar enables users to select between 'articles' or 'legal documents', time-frames for the search, order results by date, include/exclude citations and patents and create alerts for specific queries. This means that those who are more knowledgeable in constructing searches are able to impose more of their own preferences over the hierarchy created by Scholar. But besides these few restrictions, the rest relies on its algorithm. In Scholar, unlike in other systems of classification that operate in the web, such as collaborative tagging, social bookmarking and other folksonomies (MacGregor and McCulloch 2006), users do not have a say in the way the categorisations and classification are constructed. It is the collective intelligence of thousands of participants that perform the testing and validation of information (Anderson 2008), but on terms decided by Google. Scholar concentrates, treats and redistributes information and, above all, effects a theoretical unification through its algorithm.

A third trait is personalisation. Google has adjusted its services to respond to users' previous choices, both personal and by those with similar profiles, based on systematic user monitoring to enhance the performance of its pervasive platform of web advertisement (Adsense and Adwords). Since 2009 personalisation is the 'default' option in Google (which gathers data from Google Search, Maps, Mail, Earth, Google+ and a myriad of other data points), and thus the option for most users (Stucke 2012). This increases both personal benefits in terms of 'relevance' of search results and company benefits in terms of increased revenues. But it can lead to a sub-optimal situation where personal and social discoveries are precluded due to confirmation

biases. In other words, personalisation threatens 'objectivity', which requires telling enquirers what they do not want to hear (Simpson 2012). Scholar has not moved quite in the same direction, yet. But from 2012 it includes a "my updates" option which is more comprehensive for authors that make their Scholar profile public, and provides users with reading recommendations based on their profile. Further developments regarding personalisation in Scholar will be decided upon by Google.

The principles of ranking and relevance in particular lead to the objectivation (their unitary representation and classification under the parameters it has defined) and centralisation of the sources it presents. This is argued in the next section, which sketches the social consequences of the use of search engines using Scholar as an exemplar.

Social consequences and policy implications: Meaning construction, standardisation of sources and the public private divide

Social consequences

The last section has analysed hierarchical ranking, relevance and personalisation as key features, linked to Google and Scholar's business model and logic. Yet, unlike technological determinism would suggest, these tools do not operate in a vaccum. This section looks at how user behaviour compounds some of the reviewed trends. It argues that these trends touch upon central issues regarding what education is and may or not be. In this respect, the section concludes looking into the future Google and other major players image for search engines and extracting implications for educational policy.

It has been our contention that recent changes in certain structural features in information production and consumption systems and the technologies that support them risk diversity. Yet users' behaviour is key to understand the trends derived from technological changes. In this respect, it is telling that the average number of terms in an internet query is very small, ranging from 2 to 3 according to most studies (Baldi et al. 2003), and that users tend to review only the first 2-3 pages of results. Moreover, the majority of users (three quarters) do not refine their queries based on feedback from the results obtained with the initial query, for instance by modifying or adding terms. This is compounded by the fact that even knowledgeable users may ignore the terminology used in the literature to express a particular concept –as mentioned, a weakness of free text searches compared to indexing. It is only very experienced users who can locate greyer information sources, through the use of more complex information-seeking strategies (Aula et al., 2005).

The applicability of a range of power laws whereby a small number of 'causes' produce a large proportion of the occurrence of a 'result' has been confirmed regarding both internet users' surfing behaviour (Bar-Ilan and Peritz 2002) and bibliographic citation trends (Price 1963). The 80/20 rule, or Pareto principle, has proved particularly useful in bibliographic research. Nisonger (2008) notes that 80% of libraries' use is made by 20% of users. More importantly 80% of use is supplied by 20% of the collection. Given its structure, its ranking of items and users' restrictive search behaviours, the use of Scholar is likely to further skew the distribution, so that *fewer* items account for large proportions of use than occurs in libraries. This already happens in physical libraries with high circulation levels (Burrell 1985) and larger collections (Dee et al. 1998), which do not start to approach the volume of material available from Scholar. Even if it

sounds counter intuitive, it is a general trend that as the number of available options rise, the distribution curve becomes more extreme and the difference between the number one spot and the median spot widens (Shirky 2005). Given that Scholar considerably increases the volume of available information, this could also be expected to happen in relation to the use of sources.

Thus, the consequences of the shift from transparency of content in classification systems towards ranking in search engines are profound. If the user follows Scholar's guidance, the result is that the range of sources to consider becomes de facto restricted to a handful of works that appear in the first two-three pages of results. In this exercise the user subscribes to a distinction in favour of the popular, and becomes subject to name-dropping effects and 'noise'. Scholar thus molds mental structures by imposing common principles of vision and division (cf. Bourdieu 1979). It is a structuring structure, on the bases of restricted judgement criteria. As already advanced, the hierarchies and objectivation produced by Scholar are liable to change and re-appropriation by its users. Individuals can use a range of tactics for this: they can stop using Scholar, ask for changes to it, such as how it assesses relevance (challenging and changing the ways in which Scholar ranks items), go back to other sources of sources, supplement Scholar with the use of other sources, become more proficient in the use of the engine and how it operates, or change the nature or status of previous writings. As such, Scholar as a power mechanism could be conducive to counter-hegemonic re-appropriation. However, the challenge is the effect of domination created on the bases of an arbitrary and uniform authority, and a lack of the same pluridirectionality that exists in other areas of the internet. Moreover, the consequences of being seen as trying

to 'game' the system can be severe and may result in your content being downgraded or removed.

Search engines' social consequences expand beyond the selection of the 'sources of sources', and thereby sources themselves, used to encompass further behavioural consequences. They change drastically the way we look for information, read it, think about it, and even the questions we ask. Internet reduces the amount of time that readers dedicate to each text, as they, given the increasing availability of information, move on quickly to find a rich quote or an "apt phrase" without following arguments through. The internet has increased the volume of text skimming (Liu 2005) or "power browsing", which poses new challenges to the achievement of "deep understanding" (Duggan and Payne 2009) and is a common trait for both younger and older internet users - affecting professors, lecturers, practitioners and students. As Rowlands (2007: 21) wrote, "Power browsing and viewing are the norm for all; reading, appears to be undertaken only occasionally online, probably undertaken offline and possibly not done at all. Promiscuity is endemic and a direct result of a combination of massive choice and the constant refreshing of choice by search engines". Similar concerns were expressed by Kant in the context of an 'overabundance of books' over two centuries ago; and when encyclopedias prioritised certain works (Wellmon 2012). The difference is that the average time spent on e-book and e-journal sites is four and eight minutes respectively (Rowlands et al. 2008). As such, new practices have raised questions as to whether the internet modifies our memory (Sparrow et al. 2011) and/or limits our cognitive capacities (Carr 2008). Unrestricted availability can reduce the incentives to retain information on what is read, as information will continue to be easily accessible in the future. This is important because, as mentioned, even though information is

available on the internet subject specific knowledge helps users in search performance and problem solving (Duggan and Payne 2008). They overabundance of information and easy retrieval can also promote the confirmatory character of research. Finding evidence to support predefined arguments can now be more easily found and filtered with precision without much need to engage with contrary views.

Finally, the internet and the way Scholar operates have effects even on the questions we decide to tackle and the purposes of our searches. Warwick et al. (2009) point out that students who rely on the internet for their assignments use their information skills to spot the questions they consider to be the easiest on which to find material, and which could be addressed by a simple information searching strategy. There is evidence that students also straightforwardly assume that Google lists the most appropriate or relevant results for their searches (Combes 2008) devoting little time to examine relevance, accuracy or authority, which may lead to the reduction in the search for alternative arguments –as can the above mentioned move towards personalisation. The most common response by students to an ever expanding body of information resources is to adopt increasingly narrow information-seeking strategies (Thornton 2012). Related to this is the simplification of argumentation and its fragmentation: partial reading by keywords in electronic articles and e-books occurs, to locate the information that suits readers' needs and that can reduce drastically the incentive to make justice to whole arguments, in an example of how technology and behaviour conjunct towards new ways of identifying and analysing information. While this behaviour is not technologically determined, it is technologically enabled.

Policy implications

We need to start putting much more effort on trying to make sense of these implications, within the context in which they are embedded, in particular the privatisation of education and the role of the State vis-à-vis private actors. Thus, Ball (2009) examines different types of education policy privatisation and the shifting barriers between the public and the private in education through organisational recalibration/ 'selling improvement', colonisation of the infrastructures of policy and the global reach of educational businesses. There has also been a growing interest in the influence of ICT transnational corporations such as Cisco Systems, Microsoft and Intel on education (Bhanji 2012) and their roles as international actors shaping educational practices through partnerships with schools and governments.

In all these types of privatisation the private sector enters the public through partnerships and/ or contracting more or less directly linked to a government regulation or inspection, and the commodification of education. However, in the case of search engines, we witness a different type of redrawing of the boundaries between the public and the private, through which private companies penetrate further in educational issues, under the acquiescence of the State, unable or unwilling to govern and regulate global for-profit search engines (Mager 2012). Whereas in the cases analysed by Ball the 'core executive' is vigorous, retains a substantial authoritative and coordinating presence over policy and acts accordingly within the limitations and incentives provided by complex policy networks, in the case of distribution of information through the web we witness an assenting withdrawal and the ascent of dependence.

Such an sssenting withdrawal is all the more surprising given the fact that the internet started as a *public* project, later transformed by privatisation to firmly disdain public involvement. In this context, dependence and lack of capacity are a tangible threat. As

an example, libraries are increasingly dispensing with classifying books; as search engines can be used (full text searches) without the heavy costs of providing metadata (Hjorland 2012), which must be reduced given other costs imposed by publishing houses. With it goes specialist knowledge created over centuries.

Dependence on the private sector is significant because its lack of independence. Search engines create new regimes of truth. When asked about the future of Google in 2004, Google's co-founder Larry Page, argued that: 'eventually you will have an implant, where if you think about a fact, it will just tell you the answer' (Levy 2011:67). Google and Scholar aim to do just that in the future. This is highly problematic given not only the degree of acceptance of the information received from search engines but also the role of private companies with commercial interests in deciding, what is a 'fact'. Vaidhyanathan (2011) documents that for a period of time the status of Arunachal Pradesh, a disputed territory between China and India, changed depending on the location of the search, to avoid disputes with governments in important markets and how Google tweaks rankings based on the number of copyright complaints issued against it. Page already justified Google's position in relation to China's requirement regarding censorship of contents and eventual withdrawal from mainland China with reference to *Google's judgement* of the 'best interest of humanity and the Chinese people' (Levy 2011:280) –of course, commercial aspects played a key role, and Google accepted censorship initially on a commercial bases. When France wanted to introduce a tax on Google's use of French press content in Google News in 2012 Google's response was to threaten not to index links to French newspapers in their web. At the same time Google has started to prioritise results from Wikipedia –whose data is key for some of its future projects.

The commercial thus affects the operation. Algorithms are not only modified to improve search results but also profits. Sources can be prioritised/ relegated on commercial judgements. In Scholar, results can be linked to Google Books (which makes available and advertises books, generating an income stream), and Google provides case studies on how making books available in its platforms increases revenues for publishers and authors –and Google. But also think about the possibility of prioritising references that portray particular drugs as effective treatment, for instance. Google argues that this is licit as its right to prioritise is a First Amendment right: the way in which it presents information to its users is an act of its freedom of speech (Christian 2012). The corollary is that there should be little accountability beyond board of directors' rooms and shareholder meetings.

In the long-term the risk dependency is clear: companies change or fail; their priorities move. Universities and libraries are more durable. In 2011 Google removed Scholar from the toolbar in its search pages, making it less accessible. Contingent judgements on which projects have the highest revenue potential matter. According to Vaidhyanathan (2011) for that reason alone it is imperative that stable public institutions take the lead in Google's task of 'organising the world's information'.

Is this dependence justified? Information and knowledge are public goods: non-rival (undiminished by consumption by others), non-excludable (consumption is available to all). Only their expression are protected by copyright laws. Additionally one may need to spend resources to extract a public good -water from a public lake (Stiglitz 1999). The central public policy implication of public goods is that the State must play some role in their provision; the market is an inadequate tool for its equitable distribution. The State could provide the 'extraction of the goods' from the internet directly, could

finance the development of alternatives or could regulate the extraction by private providers if it sees a risk of ineffective supply (education on critical assessment of information quality could also help).

Fuchs (2012) has suggested the expropriation of Google to universities to change the capitalist relationships within which it operates, but this seems unlikely and would not address the concerns we have raised in terms of standardisation of sources. The alternative to publicly finance research on alternative technologies has found its supporters (Mager 2012; Fuchs 2012; Vaidhyanathan 2011). The experience of Quaero, launched by France and Germany in 2005, as a multi-billion initiative to create a 'European' platform for the development of the next generation of search engines was flawed because disagreements as to whether it should manage multimedia or text materials, as much as for technical reasons, and shows the difficulties in this. Europeana, a searchable repository for European Cultural collections such as digitalised books and paintings, created in 2008 under Chirac's promotion and the EU's endorsement is largely unknown by the public.

Regulation may take several forms. It could relate to exerting changes to the architecture of Google, to make it more decentralised and less partial. The possibility to avoid personalisation by default, for instance, has already been alluded to (Simpson 2012) and would help solving some of the problems raised. One could also envisage making Google's and Scholar's algorithms public after a certain period since release to increase transparency and competition, or making Google share –under adequate protections- the profile data that enables it to experiment more than other companies and 'get things right' more often competitors reinforcing its market power (Stucke

2012). Questions are open regarding the authorities to regulate these matters, and so far regulatory frameworks have failed to grasp global search technologies.

This lack of action contrasts highly with the situation regarding other open educational resources (OER). The OECD includes within OER the "software that supports the development, use and reuse and delivery of learning content, including searching and organisation of content, content and learning management systems" (OECD 2007:30). which clearly incorporates search engines such as Scholar. Yet, a recent OECD analysis of OER in 28 countries (Hylen et al. 2012) shows that countries overwhelmingly support OER and expect OER to be a policy priority in the near future, but are only active in terms of content creation. They show a disconcerting lack of engagement with the essential aspect of information/ knowledge distribution and how it should be enacted –issues remarkably absent in the list of challenges governments reported regarding OER. This is in spite of countries reporting that their primary concern in being involved with OER is a desire to *increase access* to high quality learning materials. While we continue to put the emphasis on the public supply of new resources and digitalisation of content and disregard completely the central aspect of distribution we will continue to miss the point. Policy needs to take people's behaviour and constraints into account.

Future projects by Google, Microsoft and other major ICT transnational corporations relate to the generation of *suggestions* of questions/ information: having computers paying attention to what goes on around them and suggesting 'useful' information, so that even if you do not know what you are looking for, Google will tell you (Levy 2011:67). A second race relates to building systems that automatically answer questions delivered in everyday language through *"answer engines"* (New Scientist 2012). Google and Microsoft's Bing can already provide answers to a small number of queries,

but the range of answers will expand dramatically in the short term using opensource data (such as Wikipedia and others) and data search companies hold (Giles 2012). This will raise even more fundamental challenges for education systems, social relations and individual viewpoints (one could think about questions such as: What should education be? What is the purpose of life? and about the relative importance of the process to find an answer and the endpoint in developmental terms) given the acceptance of Google's responses. The above discussions further exemplify the far-reaching implications for educational policy of Scholar: the way we organise information has concrete consequences in the way in which we organise our learning and the purposes it serves.

Conclusions

The internet, and search engines, have enormous advantages and popularity. They shape the way in which we look for information and how we assess that information; they shape the information that we eventually consult and even the questions we ask. While the literature on power is large, the experience of Google Scholar does not fit well with previous pluralist, neo-elitists and radical analyses of power. Scholar has a substantial amount of power in the collective creation of meaning, through its control of the sources we access. It does this on the bases of new hierarchical principles, which replace old ones and are presented as neutral and efficient on the bases of the relevance of the searches it performes. The nature of such power is not easily reconciled with pluralist conceptions. But even those analyses of power that take into account the importance of meaning creation rely on the existence of different stakeholders with a set of interests in the areas where meaning is created, and therefore power relations are played out. Meaning making is substantive and it is performed to legitimise specific interests.

Scholar has developed what we have called a continuous "power on" knowledge, which is not a power over, but a power to achieve Google's organisational aims, which is not topic-specific, which does not defend fixed but reversible views on particular issues, which relies on the "votes" of the majority of authorised voices (those who quote and can be cited), who are both agents and subjects of this power. Scholar, nevertheless, affects meaning making processes given the positional advantages it provides to certain sources over others, and the ways in which it affects the way in which formulate questions and envisage answers. Herein lies a central tension the article has highlighted: Scholar is increasingly acting as a surrogate expert, but it is a much more standardised source than those it replaces. This, coupled with the behaviour users make of it, risks leading to the uniformation and objectification of sources. From diffuse symbolic capital in the academic community we move to an objectified and codified - in a single algorithm - symbolic capital. Such an effect is unintentional, even something that is against what Google as an organisation would likely desire. In Foucauldian terms, it is a 'strategy' (an unintentional effect produced by the non-subjective articulation of individual and group tactics) rather than a 'tactic' (an intentional action). Google thus presents a paradox of intentionality, with its rationality (providing easier access to increased volumes of sources) is the opposite to its real social function: making the volume of sources manageable through sorting and reduction, which reveals a radical disjunction between the tactics of its creators and the strategy that it effectuates as an institution. This disjunction survives given the benefits that Google's strategies yield to different social groups - its creators, students and scholars - who have the capacity to ensure that it continues to function as an institution of reduction and standardisation through their take-up of the tool.

Knowledge construction in 'knowledge societies' was expected to provide solutions to problems that are global, but that require different local treatments, and an emphasis on local contexts. Yet, information sources are becoming increasingly 'uniformised' and fragmented to fit for purpose. Knowledge societies were expected to bring about knowledge diversity, from which to draw new and alternative perspectives, insights and solutions. Yet, with the ever-larger availability of information there has been, necessarily, a new emphasis on restriction, ordering and control so as to make such volume of information manageable – risking a transition towards 'knowless societies'. More than ten years ago Stafford (1999:145) noted that, "academic research involves three steps: finding relevant information, assessing the quality of that information, then using appropriate information either to try to conclude something, to uncover something, or to argue something. The Internet is useful for the first step, somewhat useful for the second, and not at all useful for the third." Google, however, has acquired a crucial role in the second step; it has its own system to assess the information, and it is affecting the approaches we use to search for information in fundamental ways. But it aims to also answer questions directly in the near future. The number of people employed to work on Google Scholar is unknown, but the estimates are that fewer than 10 people are involved in the project as their main tasks. They have a disproportionate say on the sources used to construct meaning. In spite of the fundamental questions that these developments raise for education systems and policies, governments have not taken new technologies for the distribution of information as a central concern. They have focused only in the supply of educational materials, and the public sector more generally is relinquishing its capacity in this area. While the literature has criticised Scholar on the grounds of its low "quality assurance levels" (Sorensen and Dahl, 2008;

Bell, 2004) or due to 'Panoptican' concerns, there is an overwhelmingly positive view of the advantages of the tool. This paper has aimed to contribute to the construction of a more balanced assessment, by sketching some of the current and future challenges and tensions inherent in the above processes.

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