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The structuring of information through search: sorting waste with Google

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Abstract

Purpose – The purpose of this paper is to explore informational structures producing and organising the construction of waste sorting in Sweden. It shows how the issue is constructed by it being searched for in Google and how this contributes to the specific informational texture of waste sorting in Sweden. It is guided by the following questions: who are the main actors and which are the central topics featuring in Google results on popular, suggested searches for waste sorting in Sweden? What do the link relations between these tell the author about the issue space that is formed around waste sorting in Sweden? How is the construction of the notions of waste sorting and waste shaped in the information available through Google's features for related and other relevant searches?

Design/methodology/approach – Waste sorting is discussed as a practice structured along moral rules and as a classification exercise. The study brings together two types of material, results from searches carried out in Google and lists of Google query suggestions for relevant search terms. These are analysed with a mixed method approach, uniting quantitative network analysis and qualitative content analysis of query suggestions. A sociomaterial approach theoretically grounds the analysis.

Findings – Waste sorting in Sweden emerges as an issue that is characterised by dense networks of rules and regulation, focused in public authorities and government agencies, which in turn address consumers, waste management businesses and other authorities. Search engine use and waste sorting in Sweden are shown to be joined together in various mundane everyday life practices and practices of governance that become visible through the search engine in form of search results and suggested searches. The search engine is shown to work as a fluid classification system, which is also created and shaped by its use.

Originality/value – The study offers a novel methodological approach to studying the informational structures of an issue and of its shaping through it being searched for. The sociomaterially grounded analysis of Google as a fluid classification system is original.

Keywords Recycling, Environmental information, Classification, Sociomaterial, Autocomplete, Search engines

Paper type Research paper

Introduction

In December 2013 Google released a list showing that during that year the third most popular search in Sweden in the category "how to" had been "how to sort waste". A year later, in December 2014, the sorting of waste featured again in the results that Google presented for searches carried out in Sweden. Yet, this time it was in the form of the third most popular search in the category "why" – "why to sort waste". Even if we account for the fact that results from Google Trends are filtered and do not present us with any absolute numbers (Lewandowski and Quirmbach, 2013), this is still indicative of the relative frequency of online searches related to the sorting of rubbish in Sweden. This is interesting for at least three reasons. First, it confirms that information related

to environmentally friendly living, specifically information concerning environmentally relevant everyday life practices, is increasingly accessed through search engines. Second, it opens up a possibility for studying how a particularly accepted and normalised social practice (Shove, 2003; Hawkins, 2006) is configured through information on it being accessed through search engines. Third, it confirms the central position of waste sorting for recycling as the smallest common denominator for the stabilising of how environmentally relevant practices are articulated in Sweden (Haider, 2011), while it also hints that the practice is not accepted entirely unquestioned. This paper investigates the sociomaterial construction of waste sorting for recycling in Sweden in and through Google. By doing this it also elucidates how the informational texture of issues is made up of variously interlinked sociomaterial practices, categories and structures of governance and of the constitutive role search engines can have in these entanglements.

The following questions guide the study: who are the main actors and which are the central topics featuring in Google results on popular, suggested searches for waste sorting in Sweden? Closely related to this is the question, what do the link relations between these tell us about the issue space that is formed around waste sorting in Sweden and thus of the informational structure organising the issue? And finally, how is the construction of the notions of waste sorting and waste shaped in the information available through Google's features for related and other relevant searches?

Information on waste and recycling is shaped by the way in which it is mediated and accessed through Google. This concerns information on different types of materials to be sorted and recycled, information on different everyday life practices implicated in how we deal with waste and also information on the meaning of waste sorting in contemporary consumer society. The search engine does not retrieve and display results in a neutral order, and thus the ordering of results is hugely consequential for what we can know in the first place and it is based on prior assumptions about relevance for a searcher. In a way, search engines second-guess searchers by presenting results in a certain order that is dependent on their previous searches, if possible also searches in other services, which links they followed, on their profile information, their location, what type of device they use (mobile or not) and so forth. Contemporary web search engines also suggest other searches that might be relevant or interesting for a searcher. Currently, in Google, this happens by means of the autocomplete function, where new terms are suggested while typing a query, and through suggestions for related searches displayed at the bottom of a results page. Both these features can be described as making traces of previous use visible while guiding future use. They give us a glimpse into popular searches related to waste sorting, but they also reinforce certain values and influence future searches as well as the development of future content. These features are based on algorithms for recommendation systems, yet by moderating full text search and presenting issues as pre-ordered along sets of meaning-creating categories, they also operate as fluid classification systems, pragmatically defined (Bowker and Star, 2000a, pp. 10-13).

The study at hand takes advantage of these features for studying some of the ways in which information about an issue is shaped by it being searched for. It also uses them for discussing how search engines intersect with the cultural conditions that afford the specific functionality of search engines and also with the particular conditions of the issue at stake, in our case, waste sorting. This is relevant because it makes visible the significance of the search engine for the structuring of information, and for how – in our specific case – the sorting of things is linked to the knowing of things and how this is intimately connected to the tools engaged in informing.

Search engines and the structuring of information

This study is theoretically grounded in a sociomaterial understanding of information and of technology. It starts from an understanding of humans and artefacts, and of information and information technologies, as constitutively entangled (Orlikowski, 2007; Orlikowski and Scott, 2008). In this perspective all practices need to be understood as sociomaterial (Orlikowski, 2007). Search engine use and waste sorting, search engines and waste, are both equally materially and socially constituted and in this entanglement, they are, as we can see, in certain moments constitutive of each other. Increasingly online web search engines are seen as our most important gateway to information on most topics (Stark, 2014), so also environmentally relevant everyday life practices, such as sorting waste for recycling. Especially the increased use of mobile devices, such as smart phones and tablets, has made online searching close to ubiquitous for many.

Not only is being searchable today often seen as a feature of information, information is also moulded to fit the shape provided by the tools used for searching for it, frequently the search engine interface (see also Kallinikos *et al.*, 2010). The last decade and a half has been marked by the rise of one actor, whose name has become synonymous with online search, Google (Halavais, 2009; Hillis *et al.*, 2013; Mager, 2009, 2012; Stark, 2014). This dominance is also connected to the company's development of other freely available tools, such as Google's cloud storage, e-mail service, text editing tools, new services and others, often pre-installed as applications on smart phones and tablets, and of the android platform. In the current situation, it is safe to say that what is visible in and accessible through Google search is of increasing importance for what we are able to know in the first place – as individuals, but also as a society (Eklöf and Mager, 2013; Lewandowski, 2012; Hillis *et al.*, 2013; Trevisan, 2014).

Clearly, this is a two-way relation and as much as search engines structure society, they are also structured by society. As we know, search engines and their algorithms are neither neutral nor independent tools. They are culturally and socially structured. The search engine functions, in the words of Alex Halavais (2009), as "a touchstone of digital culture and a reflection of the culture in which it exists" (p. 5). Astrid Mager (2009) talks of Google as an "obligatory passage point" in most contemporary information practices. Hillis *et al.* (2013) call our attention to "the astonishing naturalization of the process of search in everyday life" and talk of Google as having "achieved a socially consecrated status". The convergence of Google's different parts into one interlinked information eco-system in most parts of what is called the western world has implications for almost all information-related activities, directly mediated ones, but also others.

The algorithmic, sociomaterial architecture of the search engine can be said to not just provide access to reality (or rather information; I would like to add), but – as not least Wanda Orlikowski (2007, p. 1440) maintains, creates it. As Theresa Anderson (2007) notes, "[b]ecoming more mindful of these sociomaterial connections contributes to a fuller understanding of the way that documents (or citations/records, in the case of an information system) become representations of knowledge". The search engine's algorithmic structures and interface with their continuously emergent and shifting realisations of representations of search results, suggestions, adverts and user data works to this effect. In such an understanding, the results page – constitutively entangled across the information and practices as it is – in itself does the sociomaterial work of a document.

Researching search, researching society

What people search for online can also provide the basis for an understanding of
relevant topics at a given time and of how they evolve in relation to each other and to
various events (cf. Trevisan, 2014; Lewandowski, 2012). What is being searched for,
together with the possible results of searches, provides indications of the informational
dynamics at play in society (Trevisan, 2014) and, it can be added, of informational
structures producing and organising our assumptions. In this way, search engines can
be used, as, for example, Filippo Trevisan (2014) develops, for "the identification of
broad socio-political trends" and as "tools for social enquiry […]". Wieslaw
Pietruszkiewicz (2012, p. 80) sees a possibility to use the aggregated data of
individual searches to study "the information for which society searches" and to
"[capture] the socio-economic mood". Waste sorting for recycling, although it appears
as a mundane practice, is embedded in a larger socio-economic narrative, which makes
it a very interesting trend to study – exactly under those premises. Richard Rogers
(2013), in his book on digital methods, talks of search as research, and positions it as a
way of "making studies of engines, or more precisely social studies via or on top of
engines" (Rogers, 2013, p. 111). Notably, what is being searched for online, also shapes,
I suggest, how future searches are structured and how information is produced in the
first place.

Sorting of waste as self-governance and a classification exercise

The study starts from an understanding of waste sorting for recycling as first a
practice that is structured along moral rules outlining what it means to act as a good
citizen in western consumer society (Hawkins, 2006) and second a specific kind of
classification exercise (Woolgar and Neyland, 2013). Gay Hawkins (2006) describes
recycling as "one of the most significant changes in personal conducts around rubbish
in the late 20th century" which is, as she develops, connected to the convergence of the
notion of the environmental crisis, specific understandings of responsible living and the
idea that rubbish could be an economic resource (p. 103). She specifically highlights
how "recycling gives waste practices a moral dimension. […] Beyond the act of
consumption were all those other little practices of classification and management that
waste habits now involve. The pleasure in the moment of disintegration is the pleasure
of the virtuous self, the pleasure of having been a 'good sort' and done your bit for the
environment, the pleasure of obedience to a moral rule" (Hawkins, 2006, p. 95). This is a
consequential connection that is introduced here, between how the governing of the self
is meant to happen through everyday life practices, a dominant moral narrative of how
to be a good citizen, and – important for the role of information tools – the role
of classification.

Based on Geoff Bowker and Susan Star's (2000a, b) discussion of classification as
structuring the processes of human interaction, an understanding of waste sorting for
recycling as a classification exercise has also been developed by Woolgar and Neyland
(2013). Not only does recycling, as they describe, involve distinguishing between
rubbish and non-rubbish, it also involves differentiating between different kinds of
rubbish. Bowker and Star (2000a, p. 10) write: "A classification is a spatial, temporal or
spatio-temporal segmentation of the world. A 'classification system' is a set of boxes
(metaphorical or literal) into which things can then be put to then do some kind of
work – bureaucratic or knowledge production". According to more or less elaborate
recycling schemes, waste needs to be dealt with differently depending on what should
be done with it and how it can be used in the future. Not least does this depend on what

an object had been used for before it turned into waste – i.e. packaging or other use – and how economically profitable it is to deal with it in certain ways and not in others, for instance to burn it for energy production, to re-use it or to recycle it into new materials. The significance of categories of waste and the matching of everyday life categories with categories for sorting waste has been highlighted by Henriksson *et al.* (2010) in a study of the Swedish waste sorting system and people's everyday life experiences with it. They show how the lack of congruence between different categories is a source of frustration for many and thus leads to a lack of trust in the system. Add to this that "[s]ome kinds of items cannot be left for recycling and this makes waste collection incomplete from the users' point of view" (Henriksson *et al.*, 2010, p. 2810). In Sweden, while there are of course a number of basic rules, mostly waste sorting for recycling is not done according to a uniform, nation-wide standard, but varies between regions, municipalities, cities and specifically also housing associations, depending not least on the company that has been procured to manage waste in a specific area (Wheeler and Glucksman, 2013; Henriksson *et al.* 2010). Yet, while the bureaucracy and institutions behind waste sorting in Sweden are specific to the country, the kind of bureaucracy and the demands it engenders and structures, is quite similar also in other western countries, even if it is expressed in other forms (see, e.g. Hawkins, 2006; Wheeler and Glucksman 2013; Woolgar and Neyland, 2013).

Material compilation
The study brings together two types of closely related material, results from sample searches carried out in Google and lists of Google query suggestions for relevant search terms. These materials are analysed with a mixed method approach, uniting quantitative network analysis carried out with the IssueCrawler tool and theoretically grounded qualitative content analysis. The following sections discuss the methodological conditions, including the tools used, in some more detail. This is followed by a description of the material compiled and of how it was collected.

Autocomplete and query suggestion as a research tools
The compilation of material was carried out by first following Google's suggestions for related searches and by collecting terms that the autosuggest function uses to improve search queries. On the web interface, search suggestions are part of the results page (see Lewandowski and Quirmbach, 2013; Lewandowski *et al.*, 2014, pp. 88-90). They are derived from previous searches and ranked according to a set of criteria including topicality, currency, commercial value, popularity (Lewandowski and Quirmbach, 2013; Lewandowski *et al.*, 2014). Another way to get a glimpse of what is searched for on Google is provided in form of the autocomplete or query suggestion feature. While typing a query into the search box, users are presented with terms to add to their search. They provide insight into what is being searched for in connection to specific terms at a certain time. Query suggestions, as not least Lewandowski *et al.* (2014) as well as Ward *et al.* (2012) highlight, directly influence how a search is formulated. An upshot of this is that while they provide guidance and many times make searches more relevant for the user (Ward *et al.*, 2012), they also reinforce certain dominant themes, understandings, values and not seldom commercial interests that circulate in society, as has been problematized by Anna Jobin and Olivier Glassey (2014). The different autosuggest functions are dynamic and frequently updated, which could pose a problem for certain research topics, or also enable diachronic approaches. However, for the

purpose of discussing how information about waste sorting for recycling is shaped by it being searched for this does not pose a problem, specifically since sorting and recycling waste is not likely to have great variation over the time frame of interest in our study.

From trending to suggested searches

Each December since 2006 Google releases top lists of the previous year's most popular searches structured along – what appear to be – ad-hoc, convenience categories (e.g. food, celebrity, film, how to searches, etc.). Most of the data are broken down into country categories and available in different languages. This is connected to the Google Trends tool. This tool includes an interface enabling the analysis of query data accompanied by a simple graphic visualisation of the changing popularity of search terms over time and often in relation to events reported in the news. The data do not reveal any absolute figures, but are queries shown as relative to the total search volume. Also, they are filtered, to exclude pornographic content and very common navigational queries that would skew the results (Lewandowski and Quirmbach, 2013). In this study Google Trends was used as a starting point for pinpointing the issue at stake and for formulating the queries. It was also used to establish which location in Sweden had most searches on the topic. As a result, Stockholm was set as the location in the advanced search preferences for the searches carried out in the local version of Google (Google.se).

The searches that provided the basis for analysis were carried out as follows. All searches were undertaken in Mozilla Firefox, logged out from the searcher's Google profile. Search history and the cache had been deleted. No history was saved during the searches. All searches were carried out 24 August 2015. Prior to searching I carried out test searches on different computers, in different places (although in the same part of the country) logged out and also logged into other people's profiles. I did this to roughly establish the extent of the personalisation of the search results, which existed, but mostly concerning the ordering of the results, yet not which results were retrieved. It seems safe to assume that the searches that I carried out are largely akin to what most searchers in Sweden would retrieve. This decision is also warranted by other research on personalisation in Google (Feuz *et al.*, 2011; Hannak *et al.*, 2013; Kliman-Silver *et al.*, 2015).

I initially followed the link from the Google Trends "popular searches" list for the query "How to sort waste?". This resulted in the search being executed in Google.com without quotes. No pre-set place information could be made out in the settings. On the results page the question appeared whether I had meant for the search to be carried out in a different grammatical form. I accepted that suggestion by clicking on the accompanying link and the results were displayed in a new tab. Also here no pre-set place information could be made out. At the bottom of the first page displaying the results for this search I was presented with four-related searches. These were: "How to waste sort shoes", "How to waste sort books", "How to waste sort tea lights" and "How to waste sort compact disks". I clicked on each of those and opened the results in a new tab. I then changed the location to Stockholm for each search and reloaded the search results. This left me with seven searches, two in Google.com without a location set, and five in Google.se, where the location was set to Stockholm. The number of searches in Google.se is lower since there were fewer suggestions made for related searches. Stockholm was chosen since the search volume on the search term "sorting waste" was highest in the Stockholm region according to Google Trends. The material collection for the second search on "why to sort waste" was carried out in a similar way.

I clicked on the query link in Google Trends and the results were displayed in Google. com. No quotation marks were included and no location information was set. I was presented with the following related searches: "why do we recycle" and "why do you recycle" (återvinna). I followed these two links and opened the results pages in new tabs. Neither included place information and all were carried out in Google.com. These three searches ("why to sort waste", "why do we recycle" and "why do you recycle" (note: translations from Swedish)) were also carried out in Google.se with the location set to Stockholm using the search tools. This led to six searches, three in Google.com and three in Google.se. Only the two searches on Google.com on how to recycle included sponsored results. In both cases there was one sponsored result at the bottom of the first page. I included these results in the further analysis. Only one search results page included images. These were not considered in the further analysis.

It has been shown that most people only follow links displayed on the first page of a search engine result (Höchstötter and Lewandowski, 2009). Accordingly, I concentrated on collecting these. I manually pasted the links displayed on the first results page for each search into an excel file, keeping the searches related to "why" and to "how" apart in separate worksheets. However, the aim is not to get a precise picture of what different searches can result in in detail nor to compare results for different searches or in different domains, but to gain a rich understanding of the broader issues structuring information available on waste sorting for recycling in Sweden through Google. Hence, the search results were merged, which lead to collections of 31 links resulting from the "how" set of searches and 39 links resulting from the "why" set of searches. Interestingly these had just three links in common, which led to a list of 61 unique URLs resulting from both sets of searches.

IssueCrawler and Keyword tool

These links were used as starting points, so-called seeds, to establish two types of link relationships underlying the structure along which the issue of recycling is constructed in Sweden – a network of direct links between the websites retrieved and a co-link network. This was done by using the IssueCrawler software, a free to use, web-based tool that first crawls and then visualises networks of interlinked websites (www.issuecrawler.net). These networks are established either based on direct links between websites (interactor network) or based on the proximity relations derived from shared links (co-link networks). The latter concept of co-link networks assumes that sites that share many links are also topically close and although they are not necessarily endorsing the same values they are assumed to share proximity of interest in some way and can be analysed as "clusters of actors engaged in the same issue area" (Rogers, 2013, p. 39). Finding such networks can be done in several iterations, where the links retrieved from one crawl are then used as the starting points for the next crawl. This way the exploration moves further away from the original websites and situates it in a larger context (Haider, 2014; Bruns, 2007). In the present project, where the network visualisation's purpose is to gauge the area rather than to provide a systematic network analysis, two iterations were used to establish issue networks. These allow to zoom out from the original search results and help make visible some of the informational structures producing and organising the construction of waste sorting in Sweden.

In order to collect the most common autosuggest terms in Google related to waste sorting for recycling in Sweden the SEO tool "Keyword Tool" (http://keywordtool.io) was used. With it the highest ranked autocomplete terms connected to two grammatical version of the Swedish term for waste sorting, namely, "sopsortering" and

"sopsortera" were retrieved, which led to 243 and 290 terms, respectively. These were merged and cleaned manually to remove duplicates and closely related variants of the same term. This resulted in a list with 303 unique keywords. In order to get a rough picture of the type of topics that waste sorting is related to these were then categorised according to the type of content they signify. The following six categories were applied: location, material and artefact, fixtures and decoration, non-Swedish places, about and finally education. The starting point was to achieve semantically cohesive groups, applying a pre-understanding of waste sorting and of practices involved in waste sorting. However, while this was straightforward for the categories location and non-Swedish place, and quite unproblematic for material and artefact, as well as for fixtures and decoration, the remaining two groups are messy and contain ambiguous terms which oftentimes resisted simple grouping. Still, by far the largest number of terms (267) fell under location, material and artefact, fixtures and decoration, or non-Swedish place, making the ambiguousness of the remaining terms (36) not only manageable, but also very fruitful to explore. Having said that, "about" was chosen since what unites them is a clear meta perspective, either regarding the cultural value and status of waste sorting or guides and tools to facilitate it.

The structuring of waste sorting in Google
In this section the results from the IssueCrawler visualisations are presented, followed by an analysis of the autocomplete suggestions. A discussion of the results' possible implications concludes the paper (Figure 1).

Visible actors: recycling as a business, an administrative problem, an issue for instruction and a consumer concern.
The visualisation of the link network based on direct links between the websites resulting from both sets of searches highlights the most dominant actors in the representation of recycling on the Swedish web. In total, 31 websites are present in this network. Roughly we can distinguish between a provider side (right) and an information control side (left). The most central, i.e. largest node is the website of the project "Sopor.nu" (Rubbish.now). Sopor.nu was in fact present in all searches either the landing page or a subpage. Only one search result did not include a link to a page on Sopor.nu on the first page ("How to recycle shoes?"). It was always among the first five results, most frequently in first (four times) or second (six times) position. Sopor.nu is a portal resulting from the cooperation of five central actors, the Swedish Waste Management and Recycling Association, the Producer Responsibility Organisation for WEEE and Batteries in Sweden, the Business Sector Service Company for Collection and Recycling of Electrical and Electronic Products, the Packaging and Newspaper Collection Service, and the Swedish Environmental Protection Agency. Of those five, only one is visibly present in the network visualisation, namely, Avfallsverige, i.e. the Swedish Waste Management and Recycling Association. A subpage entitled "Why recycle materials" was in fact present on the first page in the results from all seven searches in the set concerned with the question why and only in one of the searches concerned with the question how. Avfallsverige.se received more in-links from the crawled population in IssueCrawler than the largest node Sopor.nu, however, it had fewer out-links to this same population. Together these two nodes form the centre of a cluster of central actors, uniting various regional waste management organisations, coordinating businesses or public administration units, collections of educational

Figure 1.
Interactor network:
"waste sorting"

Notes: The colours indicate top-level domains: .nu (red); .se (light green); .org (dark green); .com (blue)

resources (oneplanet.se. klimatuppdrag.se), and waste management companies (Sysav, Ragnsells, IL Recycling/atervinningsbar.se). The waste management company Sysav's website was also the result that was shared across all searches. A number of websites are part of local authorities' websites and specifically aimed at businesses active in a particular region or people living there. They deal with regulations, rules and know – how about how things are done in the respective administrative unit (miva.se, vetabvetaland.se, gästrikeatervinnare.se, partille.se). Connected to this quite centrally organised cluster of rather different actors, yet with a focus on waste management businesses and local authorities' information on rules and regulations, are a number of relevant actors that are concerned with recycling in a different way. These are first Wikipedia, representing the encyclopaedia genre, a source used to establish known facts about an issue and also a website that almost always is present among the first results in most Google searches (Lewandowski and Spree, 2011); and second, news media in the shape of two traditional national newspapers (Dagens Nyheter and Svenska Dagbladet). Together they can be seen to represent societal information control and knowing about rather than knowing how to. Connected to these are again local or regional authorities' websites, but also consumer societies or their publications (Råd & Rön, Villaägarna) as well as a webforum and a blog.

The PR platform Mynewsdesk, which lets businesses publish press releases, functions as the link between the two sides of the network, the provider side and the information control side. This has to do with one of the original five actors behind Sopor.nu. The Packaging and Newspaper Collection Service is responsible for how containers for rubbish collection are located in the cities. Each relocation is announced in a press release which in turn frequently generates a local news item. In the material, news together with consumer advice media, instructional material alongside administration and businesses are central in how recycling is shown on the web. This hints at a complex relationship between different issues, actors, as well as rules and regulations and not least practices that are thoroughly enmeshed across specific societal structures. However, it is clear that the producer side dominates the link network. This is not surprising and in line with Swedish legislation (Wheeler and Glucksman, 2013; Henriksson *et al.*, 2010). This will become clearer in the next section, where the results of the co-link analysis are discussed and related to the analysis of autosuggest terms. Here something interesting happens, the producer side moves into the background and consumer responsibility comes to the fore.

Networks of rules and regulations

Waste sorting in Sweden, as it is represented in Google results, emerges as an issue that is characterised by dense networks of rules and regulation, focused in public authorities and government agencies, which in turn address consumers, waste management businesses or in a more abstract way other authorities. This was hinted at in the visualisation of the direct link network discussed above. Yet, the extend of the regulative structure that entwines recycling across the informational texture of an extensive bureaucracy in the form of a wide range of administrative entities and institutions is striking. This becomes quite tangible in the visualisation of the co-link network (Figure 2).

This framing of waste sorting for recycling as a heavily regulated issue governed by a network of bureaucracy is interspersed by a larger framing of the issue as a societal concern as represented in non-profit organisations, instructional material and the education sector. In our visualisation, the largest and most central node is the website of the Swedish Environmental Protection Agency. It is at the centre of a cluster of government authorities, including the Public Health Agency of Sweden, the Swedish Energy Agency, the Swedish Standards Institute or the National Food Agency. Closely connected is a cluster that centres around consumer concerns. Once again, the portal Sopor.nu emerges as a further central node. It is not the largest node in the co-link network, yet it has a distinct position tying together a number of largely private actors around the issue of waste sorting for recycling. Slightly at the periphery, yet with a distinct position tied to both clusters we find the Swedish National Agency for Education. What becomes visible is the dense and complicated character of the regulation of a growing sector tying together seemingly simple everyday life practices with private and public management and governance structures while producing and maintaining a moral basis for these accountability relations (Woolgar and Neyland, 2013).

The website of the Swedish Environmental Protection Agency as the largest node is followed by three equally sized nodes, one is the website of the Swedish Consumer Agency and one is a site called "Hello Consumer" (translation), a national information forum coordinated by the Swedish Consumer Agency, one the website by Swedish Post

Figure 2.
Co-link network
"waste sorting"
in Sweden

Notes: The colours indicate top-level domains: .se (red); .nu (blue)

and Telecom Authority, who has a consumer interest side. In the proximity to these further consumer-oriented organisations appear, such as The Swedish Consumers' Banking and Finance Bureau and The Swedish Consumers' Insurance Bureau, the Swedish part of the European Consumer Centre Network and others. This is interesting less for reasons of comparison, but because it highlights the complex character of the seemingly simple and normalised issue of recycling in contemporary society. The link networks bring into relief how practices that express care for nature and the environment are also always consumer issues (see also Haider, 2014) and, what's more, that they are concerns of variously connected networks of bureaucracy, public and private (Woolgar and Neyland, 2013). This is largely in line with the picture that emerges from the analysis of the search terms suggested through Google's autocomplete tool. Yet here focus shifts to the problem of matching things with bins and expectations and the central role of classifications.

Autosuggest terms as fluid classifications

Autosuggest terms help to situate the concept of waste sorting in relation to actual practices of waste sorting and to assign meaning to those practices. Here, the largest

group consists of terms specifying artefacts, products and materials (122 terms). Interestingly the majority concerns actual products, as was also the case in the suggested searches analysed above: e.g. envelope, keys, Christmas wrapping, knives, clothes, lamp, flowers or even gardening soil. Only few terms signified materials that things can consist of, like rubber, rigid plastic or Styrofoam. The second largest group (111 terms) concerns specific places, regions or cities, in Sweden, with three being specified further with the term opening times. Clearly, waste sorting is done locally and to identify local rules and the local recycling centre's opening times is essential for that. A small (18), but quite easy to identify and consistent group, concerns fixtures and decoration and also how to actually carry out waste sorting at home or at the office, where to place the bins and where to buy them and such like. This highlights how waste sorting is also an issue related to how spaces are organised and how they need to adapt to accommodate the necessary practices related to it. A small group includes terms referring to larger geographical or political entities, the EU, the USA, Germany and Norway, and also references to two non-Swedish cities, Oslo and New York can be placed here. The remaining suggested search terms are a lot more difficult to place in neat categories. However, they are also most interesting, especially in relation to the more consistent categories. Here we find terms like Wikipedia, YouTube, film, app, but also facts, correct, list, argument, guide, and unnecessary, environmentally friendly, fines, or legislation and not least terms that I described as pertaining to the education system, such as school, children or nursery school. The way in which the issue network above indicated that waste sorting for recycling was shaped by its entanglement in regulative structures and its mingling of rationalisations as a consumer and as an environmental issue, takes here a different turn. It can be seen as zooming into the network to establish how more exactly the problem is articulated, which practices it relates to and also which cultural and moral issues are at stake.

Analysing the autosuggest terms by applying the interrogative structure that was suggested by the original queries (how to sort waste? and why do we sort waste?) gives rise to an interesting picture. The interrogative pronouns what, where, how, when, why, and who cut partly across the semantic categories suggested above and present us with a picture in which what (e.g. material and artefacts) and where (e.g. location) dominate and when (e.g. opening times) is marginal. Interestingly, the question words how and why that formed the starting point for this study – yet not for the collection of terms with the Keyword tool – are very diverse and can be found in different semantic categories. Why is captured in the question word itself, but also in terms like reason, environmentally friendly, unnecessary, or advantages and disadvantages. How surfaces through terms from the semantic category fixtures and decoration (e.g. in the kitchen, in the cupboard, in the office), but also in the form of terms like lists, guide, a-z, app, and such like as well as in form of the semantic category material and artefacts. The latter of course also pertains to the question word what which makes its appearance in the question itself "what waste do we sort?" as suggested query term and already mentioned above. The pronoun who is probably the most interesting in this context. Only one term signifies a group of human actors doing the actual waste sorting, namely, children. Through this other terms, such as school, nursery school, game or even YouTube gain new meaning. They can be seen as moderating the original questions what and why, but also as showing how waste sorting for recycling is part of society's control structures that demand educational efforts and

shaping of conduct of citizens in the society's foremost educational institution (Hawkins, 2006).

Woolgar and Neyland (2013, p. 76 ff.) talk about the "ontological multiplicity" that characterises waste sorting for recycling and which makes it so difficult to carry out, i.e. the way in which quite ordinary materials require to be treated very differently depending on shifting sets of criteria, for instance how they were used before, who is responsible for their production, shipping or recycling, in what condition they are and so forth. In Google we can see this complex ontological multiplicity, at the same time as efforts to reduce and control it become visible. The classification of waste for recycling becomes discernable in Google. This includes the arrangements pre-empting and scaffolding this classification, i.e. where in the house waste it should be stored until it is thrown into the right bin and in which way and also how to instil and uphold what Hawkins (2006, p. 95) calls "the pleasure of obedience to a moral rule" that consumer society's waste practices are supposed to grant.

Seen against the background of the entangled bureaucracies visible in the link networks, the autosuggest terms bring into relief how waste sorting for recycling is articulated as a problem, in two ways – quite literally a problem of sorting correctly and second as a problem of doing the right thing in consumer society, a problem of conduct for which not least educational resources need to be employed. This is done according to a type of fluid classification scheme, consulted through Google, which, however – and this is specific – also is created and shaped by use. The invisible "mediators of action" as Bowker and Star (2000b) pertinently describe classifications and standards come into sight – at least momentarily.

Concluding remarks

To sum up, this study explores informational structures producing and organising the construction of waste sorting in Sweden. It shows how waste sorting is structured by it being searched for in Google and how this contributes to the specific informational texture of the notion. The study starts from the aggregated searches on the specific topic of waste sorting, as they are collected and made available in Google Trends. It moves then on to explore dominant informational structures at play by combining Google Trends development over time, issue/co-link networks as derived from search results, and a content analysis of autocomplete suggestions on the said topic of waste sorting in Sweden. This is framed in a sociomaterial perspective accounting for the material structuring of information (Orlikowski, 2007; Anderson, 2007). Recycling, specifically in Sweden, is also connected to established practices and a part of routines in a way that the objects implicated in these practices, recycling stations, bins and compost heaps, in themselves can be said to propel informational values, i.e. to work to the effect of informing about the issue of waste sorting in culturally specific ways (e.g. Henriksson *et al.*, 2010; Haider, 2011). However, as has been highlighted by Henriksson *et al.* (2010), people experience difficulties with recycling and "a frequent cause of uncertainty is that the basic categories of the waste system are not in line with basic categories constructed in everyday life" (Henriksson *et al.*, 2010, p. 2810). The larger categories of the taxonomy of waste are quite stable – glass, paper, compost, metal and plastic. Yet how finely grained the classification scheme is varies greatly. The problems that the "ontological multiplicity" of ordinary materials (Woolgar and Neyland, 2013, p. 76) pose for the

average waste sorter become tangible – and in all likelihood also reduced – in the search engine's suggestions.

We can see in our exploration how Google contributes to managing waste correctly by translating everyday life categories – such as specific artefacts – into the categories of the waste system, and through this it also shapes online information on waste and recycling and thus the classification of waste. Furthermore, since, in Sweden, dealing with waste is mainly divided between two groups of actors – private or public – depending on whether it concerns packaging or other household waste, the same material could require to be discarded into different containers. This is noticeable in the way in which waste sorting and recycling emerge as issues entangled in rules and regulations between private and public sector actors, yet still as remain deeply embedded in a consumer perspective of individual responsibility. This is not least visible in the emergence of children in the autocomplete terms. We can see, how Google acts as an arbitrator between the larger demands of managing a complex waste system between private and public organisations and the everyday life practices that actually lead to things being thrown into the right bins and also within a cultural framework that makes sure that this is perceived as the right thing to do. As Woolgar and Neyland (2013, pp. 74-78) show in their ethnography of waste management, it is precisely in this "pairing of boxes and their households" that the messy and often ambiguous "interconnection between governance, accountability, and classification" (Woolgar and Neyland, 2013, p. 75) is established and maintained.

While waste sorting for recycling is a widespread activity deeply ingrained into the moral fabric of everyday life in Sweden (Henriksson *et al.*, 2010; Wheeler and Glucksman, 2013), it is far from simple and requires numerous connections to be established and translations to be made. Clearly, as the popularity of searches on waste sorting indicates, Google plays a significant role here. As Google's results pages give access to dominant understandings of waste sorting for recycling and issues as well as actors related to it, they strengthen their very dominance. This concerns materials and practices and also the different moral values attached to them. The search engine becomes here a tool in waste sorting for recycling understood as a classification exercise, especially if we see classifications as mediators of action (Bowker and Star, 2000b) and as constitutively entangled (Orlikowski, 2007) across the sociomaterial practices they produce and organise. In this sense, the search engine also makes visible how presumably universal classifications (Bowker and Star, 2000a) are in fact continuously emergent and contingent. Search engine use and waste sorting are joined together in various often mundane, everyday life practices and practices of governance. Some of the moments and sites where this joining occurs are visible in the link networks and in the list of recommended search terms. The search engine's complex algorithmic arrangement produces, amplifies or shapes these joints. Yet it also helps to make them discernible and thus works to highlight the sociomaterial character of the issue's informational texture (in which search engines are intrinsic). Bowker and Star (2000a, p. 285) highlight how classification systems, as results of struggles over the meaning of different categories, are a part of western modern bureaucracy. This is also quite visible in the link network that that engulfs waste sorting in Sweden. They also describe how "various kinds of classification […] knit together to form the texture of a social space" (Bowker and Star, 2000a, p. 286) and how what they call "boundary infrastructures" are central to this interweaving. Google, it can be argued, works to this effect, a boundary

infrastructure that knits together classifications, thus crafting a part of the texture of the social space. Yet and this is relevant, the fluidity and transient character of the classification – in our case of waste and waste sorting in Sweden – is acutely visible in the way in which the informational texture continuously shifts direction and expands into new suggestions, thus knitting – to return to the metaphor introduced above – the informational texture of issues, a complex materiality bringing together categories and things, bureaucracies and business models, personal conduct and moral responsibilities.

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