Neutral News Aggregation? Comparing the Portrayal of German Politicians in Bing News and Google News Search Results

Becker, Marius

Erstveröffentlichung / Primary Publication
Sammelwerksbeitrag / collection article

Empfohlene Zitierung / Suggested Citation:
Becker, M. (2021). Neutral News Aggregation? Comparing the Portrayal of German Politicians in Bing News and Google News Search Results. In M. Taddicken, & C. Schumann (Eds.), *Algorithms and Communication* (pp. 25-65). Berlin https://doi.org/10.48541/dcr.v9.2

Digital
Communication
Research.de

Recommended citation: Becker, M. (2021). Neutral News Aggregation? Comparing the Portrayal of German Politicians in Bing News and Google News Search Results. In M. Taddicken & C. Schumann (Eds.), *Algorithms and Communication* (p. 25-65). https://doi.org/10.48541/dcr.v9.2

Abstract: News search engines are popular tools to navigate the online news landscape. By filtering and ranking articles, they act as secondary gatekeepers and can influence what news is accessible. This study examines to what extent two news search engines deliver different perspectives on political actors in the context of several political events. In a quantitative content analysis of 400 search results and 200 retrieved articles, the portrayal of German politicians in Bing News and Google News search results for 16 different search terms is assessed. The findings show that, although the Google News results are more likely to include opinionated articles, most politicians are portrayed similarly in the articles retrieved by both services.

DOI 10.48541/dcr.v9.2

Marius Becker

Neutral News Aggregation?

Comparing the Portrayal of German Politicians in Bing News and Google News Search Results

1 Introduction

News media serve several important functions in democratic societies: they highlight relevant issues, provide citizens with information to make informed decisions, monitor the government, and showcase different perspectives (Beck, 2016; Gurevitch & Blumler, 1990; Jarren, 2008). The internet is a significant source of information in Germany, with 80 to 90 percent of the German population using it (Koch & Frees, 2017) and with 68 percent of German internet users consuming online news on a weekly basis (Hölig & Hasebrink, 2019, p. 16).

To cope with the constantly increasing and changing online content, users rely on search engines to find websites relevant to their information needs. These services play a crucial role for online information seeking (e.g., during elections: Arendt & Fawzi, 2018; Trevisan, Hoskins, Oates, & Mahlouly, 2016) and are regularly among the top websites in popularity rankings (Alexa.com, 2017b; Similar Web, 2017). 39 percent of German internet users frequently rely on search engines to find news, with 13 percent ranking them as the most important tool for this purpose (Hölig & Hasebrink, 2019, p. 40).

While these services help users cope with the online information overload, they may introduce information biases. Based on McQuail's gatekeeper definition (2010), search engines can be described as internet gatekeepers, because they decide whether or not information is shown to recipients. While the internet may diminish the roles of individual human gatekeepers (Singer, 2006), these new digital gatekeepers may introduce new biases (Gerhart, 2004).

Differences between services' algorithmic systems used for the selection and ranking of content may result in differing search results when using the same search terms. Drawing from the current literature, this paper first examines the role of search engines as gatekeepers in the modern media landscape and presents approaches and results of previous studies on bias in these services. While the majority of studies focus on the retrieved news sources themselves, this study adds to the existing literature by comparing the search results of two popular news search services, Bing News and Google News, and assessing the content of the retrieved articles in more detail. A quantitative content analysis of the search results was conducted to facilitate this comparison and the resulting findings are discussed with regard to future venues of research and suggestions for practical uses.

2 Theoretical Background

2.1 News Search Engines and Algorithms

Algorithms can be described as sets of instructions to derive a desired output from a given input (Gillespie, 2014). Search engine algorithms can be further characterized as black boxed, embedded, ontogenetic, and contingent (Kitchin, 2017, pp. 20–22). They can be thought of as black boxes because the exact steps that lead to a specific output for a given input are well-kept trade secrets. They are the results of numerous people creating, maintaining, and revising the various parts of the algorithms, and thus become increasingly difficult to understand in their entirety (Kitchin, 2017; Seaver, 2013). Additionally, search algorithms are "never fixed in nature, but are emergent and constantly unfolding" (Kitchin, 2017, p. 21). They are constantly refined to account for new types of inputs, interactions, and contexts, which may generate unexpected results (see Mackenzie, 2005; Steiner, 2012).

Today's most common search engines utilize a web index and a web crawler in combination with various search and ranking algorithms (Risvik & Michelsen, 2002; Seymour, Frantsvog, & Kumar, 2011). A web index is a searchable database of all web content known to the search engine and may be limited to certain types of content (e.g., news; Lewandowski, 2015). Web crawlers are programs that traverse the internet by following links, archive the visited content in said index, and regularly revisited websites to update the index (Lewandowski, 2015; Risvik & Michelsen, 2002). Further, search algorithms search the index based on user queries and ranking algorithms in turn create the search result list by ranking the available content (Lewandowski, 2015).

A considerable volume of web traffic to news sites is generated by search engines (Olmstead, Mitchell, & Rosenstiel, 2011) and this has been demonstrated on numerous occasions. For example, studies on the effects of the shutdown of the Spanish edition of Google News in 2014 report noticeable decreases in daily web traffic, especially for smaller news outlets (Athey, Mobius, & Pál, 2017; Calzada & Gil,2017, 2020). In addition, considerable losses in traffic volume and drops in online marketer rankings were experienced in Germany by publishing house Axel Springer when they temporarily opted out of the German edition of Google News in October 2014 (Axel Springer, 2014; Calzada & Gil, 2020).

Most traffic via these search engines consists of casual users, which leads to increased competition for the audience's attention (Miel & Faris, 2008; Olmstead et al., 2011). In competing for this attention, news media must facilitate easy indexing and may even cooperate with search engine providers directly (Miel & Faris, 2008). For example, publishers may apply for indexing in services like Bing News (Microsoft Bing, n.d.). Until recently, Google News (Google Inc., n.d.c) also provided this option, though it no longer specifies how publishers can ensure their appearance in the service's index (Google Inc., n.d.b).

2.2 Algorithmic Systems as Gatekeepers

As mentioned earlier, by selecting which news content will be shown to users, search engines function as gatekeepers (Wolling, 2002, 2005). Journalistic gatekeeping traditionally refers to the process by which the content of media outlets

is determined (McQuail, 2010). More specifically, in the context of news, it refers to how some reports are selected for publishing, while others are not.

Search engines and traditional human gatekeepers do not fill the same roles (Schroeder & Kralemann, 2005; Singer & Quandt, 2009). Journalists, editors, and news organizations not only select information to publish, they also produce and broadcast. In comparison, algorithmic gatekeepers rely on previously published news created by traditional human gatekeepers. Thus, despite the popularity and prevalence of algorithmic gatekeepers, news media organizations still remain crucial to the circulation of news (Nielsen, 2014).

The increasing diversity of actors in modern gatekeeping roles poses challenges to the traditional gatekeeper approach (Wallace, 2017). Some scholars consider the gatekeeping approach obsolete (Williams & Delli Carpini, 2016), while others suggest expanding the process to include secondary gatekeepers (Singer, 2014), or argue for a more flexible understanding of the ways different actors coexist and curate the flow of information (Thorson & Wells, 2016; Wallace, 2017). The concept of online secondary gatekeepers describes an additional step in the flow of online news information in which human users or algorithmic systems take information published by primary gatekeepers such as media organizations and journalists and make it available to a broader audience (Nielsen, 2014; Singer, 2014, Wallace, 2017).

Types of digital gatekeepers can be differentiated via three aspects (Wallace, 2017): the access to information, the selection criteria, and the choice of publication. Human gatekeepers may utilize all available information channels, whereas algorithmic gatekeepers' access to information is controlled by their governing organization. Traditional human gatekeepers select information based on news factors (Galtung & Ruge, 1965), as well as personal criteria, predispositions, and attitudes (Eilders, 2006). Algorithmic gatekeeping similarly requires selection criteria. To circumvent the difficulties of reducing journalistic quality to quantifiable factors, algorithmic gatekeepers commonly redistribute already-published news content as secondary gatekeepers (Singer, 2014; Wallace, 2017) and instead of assessing the journalistic quality of the content itself, they focus on other factors like the popularity of the source or number of times a search term appears in the content (Lewandowski, 2015, p. 92). However, these measures may be manipulated in effort to improve search result rankings (search engine optimization, see Yalçın & Köse, 2010). The output of algorithmic gatekeepers is closely tied and

often limited to their proprietary platforms, whereas human online gatekeepers may distribute content across several websites (Wallace, 2017).

The role of algorithmic gatekeepers is an important topic in normative discourses; they influence what is visible online, thereby shaping what is considered public interest (Gillespie, 2014; Wallace, 2017). With technologies filling roles previously occupied solely by humans, there are both hopes and concerns. On the one hand, news search engines can help to curate a personalized mix of news specifically tailored to the individual needs and preferences of every user (Helberger, 2019). On the other hand, there are concerns that these technologies actually impede the democratic exchange of ideas by creating personalized filter bubbles (e.g., Bozdag & van den Hoven, 2015; Kahne, Middaugh, Lee, & Feezell, 2011; Pariser, 2011). However, empirical evidence of this phenomenon is scarce and recent studies have reported only minor evidence of filter bubbles (for an overview, see Bruns, 2019; e.g., Bodó, Helberger, Eskens, & Möller, 2018; Dubois & Blank, 2018; Haim, Graefe, & Brosius, 2018; Krafft, Gamer, & Zweig, 2019). The increased economic pressure on media organizations (Helberger, 2019; Miel & Faris, 2008), and the lack of transparency in algorithmic gatekeeping processes (Diakopoulos & Koliska, 2016) are also viewed critically in the literature. As such, there is currently no clear conclusion on the democratic role of algorithmic news gatekeepers (Helberger, 2019), partly because a lack of coherent standards for human gatekeeping impedes the normative analysis (Nechushtai & Lewis, 2019).

Algorithmic Gatekeeping Bias

Contrary to the popular belief that algorithmic gatekeepers remove human media bias from the gatekeeping process (Bozdag, 2013; Carlson, 2007; Kitchin, 2017; Tavani, 2016), biases may also develop in algorithms (Friedman & Nissenbaum, 1996). These biases, categorized as societal, technical, and emergent, vary in their origins and are connected to different steps in the development and usage cycles. Societal biases influence system designers, which can lead to the implementation of these biases in the software. As algorithms are shaped by the conditions in which they are developed (Geiger, 2014; Kitchin, 2017), (un)intentional biases can originate from the designers themselves, from their working environment or industry, or from their culture in general (Friedman & Nissenbaum, 1996). Technical biases can be caused by technical decisions, imperfections, the quality of

training material, and limitations of the deployed systems (Friedman & Nissenbaum, 1996). Lastly, emergent biases may be identified after a system has been in use for longer periods of time. This type of bias is often the result of societal changes or changes to the context of the software that cannot be accounted for in the system itself (Friedman & Nissenbaum, 1996). Emergent biases may also be the result of how users utilize the technology in their everyday life (Kitchin, 2017). Algorithms are therefore not only shaped by the programmers and their environment, but also by how users interact with them (Gillespie, 2014).

Search engines specifically are susceptible to bias at several steps along the selection and ranking processes (Bozdag, 2013, pp. 214–220). First, the indexing itself may introduce bias as the online environment is constantly changing (Baeza-Yates & Ribeiro, 1999) and search indices can never encompass all the available content, which leads to coverage bias (Goldman, 2008; Vaughan & Thelwall, 2004). In addition to technical limitations, which can prevent the web crawlers from accessing certain websites (Barzilai-Nahon, 2008), curated indices further shape which news articles may be retrieved. If publishers must apply for inclusion and need to be vetted, these steps will limit the coverage of the respective index. Publishers who do not apply or do not pass the vetting process may not be considered by the search engine and thus remain invisible to users.

Second, there is potential for bias in the selection and ranking of news content based on the search query. Common criteria to assess a news article's relevance are text-specific factors (e.g., frequency of search terms appearing in the document), popularity (e.g., number of links pointing to the article), and the currency of the content (Lewandowski, 2015, p. 92). Popularity as a selection criterion can lead to authority or popularity bias in which established and popular websites are favored over smaller ones (Introna & Nissenbaum, 2000). Promotion of already popular content may lead to feedback loops, resulting in already influential media groups dominating the rankings (Schroeder & Kralemann, 2005). The factor currency is also contested because it may encourage news websites to hastily republish wire reports or copy articles from others, instead of producing original content (Carlson, 2007; Thurman, 2007), which is an example of third party manipulation via search engine optimization (Yalçın & Köse, 2010). While secrecy about ranking procedures helps combat manipulation, it also means that the validity of rankings cannot be verified (e.g. Hinman, 2005; Machill, Neuberger, & Schindler, 2003).

Third, despite the frequently assumed lack of human involvement, human operators also make editorial judgements on what data to collect, delete, or disregard (Bozdag, 2013). The aforementioned vetting of news sources can include assessment by humans, and therefore may be biased by individual attitudes, beliefs, and experiences. Additionally, the relationship between the search engine provider and the publisher may influence the white or black listing of specific sources (e.g., to punish publishers for lawsuits: Haim et al., 2018, p. 10).

Fourth, measures to personalize the search results based on user preferences and previous interactions may introduce biases similar to the previously mentioned filter bubbles.

Lastly, there is a potential for bias in the presentation of the search results itself as differences in font sizes and font styles between listed search results can further encourage users to visit certain websites instead of others (Jansen & Spink, 2006; Yue, Patel, & Roehrig, 2010).

In summary, algorithmic gatekeepers like search engines play an important role in the online media landscape. However, these non-human gatekeepers are not free of bias, albeit different types of bias compared to human gatekeepers, and should be examined accordingly.

2.3 State of Research

Researchers continuously examine algorithmic gatekeepers. In this context, personalization of search results is a very popular topic, with studies documenting effects of accounts related to search engines (Hannak et al., 2013; Nechushtai & Lewis, 2019; Puschmann, 2019) and the user's location (Kliman-Silver, Hannak, Lazer, Wilson, & Mislove, 2015; Krafft et al., 2019). While there is some evidence of personalized search results in Google Search, Google News appears to limit personalization to clearly labelled areas (Cozza, van Hoang, Petrocchi, & Spognardi, 2016; Haim et al., 2018).

A related avenue of research is the range of online information sources which users of different web services are exposed to. Studies in this area frequently employ click datasets and web-browsing records (e.g., Flaxman, Goel, & Rao, 2016; Nikolov, Oliveira, Flammini, & Menczer, 2015). However, as mentioned earlier, findings of empirical studies on the occurrence of filter bubbles have raised doubts as to the

validity of the concept (Bodó et al., 2018; Bruns, 2019; Dubois & Blank, 2018; Haim et al., 2018; Krafft et al., 2019; Möller, Trilling, Helberger, & van Es, 2018). In contrast, Google News results specifically include the highest percentage of ideologically opposing articles when compared to social media and general search engines (Flaxman et al., 2016) and are dominated by general interest news websites (Unkel & Haim, 2019). Although these findings contradict the concept of filter bubbles, they do raise concerns about the adoption of existing media biases in the search results (Unkel & Haim, 2019). For example, there is a potential for country-specific ideological biases as evidenced by an overrepresentation of conservative news sources in the German edition of Google News (Haim et al., 2018) and a left-leaning slant in the US edition's top stories (Trielli & Diakopoulos, 2019). Possible explanations for these contrasting findings include varying efforts in search engine optimization, as well as news sources' relationships with Google itself (e.g., strained relationships due to a lawsuit in Germany, Haim et al., 2018).

While uncertainty about potential ideological bias remains, there are conclusive reports pointing toward overall decreasing numbers of distinct news sources and increasing homogeneity in Google News search results (Haim et al., 2018; Krafft et al., 2019; Nechushtai & Lewis, 2019; Puschmann, 2019; Trielli & Diakopoulos, 2019; Unkel & Haim, 2019). Thus, some scholars argue that the service is not utilizing its algorithmic capabilities and is instead showing signs of source concentration and a mainstream bias (Nechushtai & Lewis, 2019, p. 302) with sets of mainstream news sources making up the core of Google News results (Puschmann, 2019, pp. 828–830).

Studies comparing search results for the same queries between different engines support the reports of media concentration. For example, in a comparison of search results between 2006 and 2008, an overall trend towards declining numbers of distinct news sources in Google News and Yahoo News is reported (Bui, 2010). Considering the important role news websites play in search results (especially for Bing and Google; see Magin et al., 2015), decreasing numbers of distinct news sources may indicate a concentration bias.

Against this backdrop, studies analyzing and comparing the actual content retrieved by search engines are crucial to understand how the previously described trends influence the information that is presented to users. In his paper, Ulken (2005) assesses political biases of Google News and Yahoo News by comparing the results of two search terms before the 2004 US presidential election. However, in

the limitations, the author notes two flaws in the coding scheme: the individual coding of each sentence without consideration of context, which prevents the adequate coding of messages stretching across several sentences, and the imprecise definition of favorability. In this comparison, Google News results are more likely to favor or oppose a candidate, while Yahoo News results are generally more impartial. The study found no overarching conservative or liberal tendency in the Google News results. Instead, the search results included both articles with conservative and liberal perspectives. Ulken (2005) suggests that these differences are caused by the wider range of news sources included in Google News' index. The inclusion of non-traditional news sources like blogs and a stronger focus on editorials and opinion pieces is in line with Google's stated goal of presenting different perspectives on current news topics (Google Inc., n.d.a).

In their paper, Magin, Steiner, and Stark (2019) analyze the websites retrieved by five search engines for different queries on political topics and focus on the diversity of information in the search results by coding different information elements. Information elements include background information, current events, actors, and potential future developments. Further, they report significant differences in the information diversity based on the topics themselves, and depending on the number of search results considered per search engine. All services performed comparably when the first ten results are considered, though significant differences were observed when only the first three hits were examined (Magin et al., 2019, p. 424): Google and Bing performed similarly, while Ask provided results with the most diverse information.

2.4 Media Portrayal of Politicians

Recent studies have raised concerns about political bias in news search results (see Haim et al., 2018; Trielli & Diakopoulos, 2019). However, these studies focus on the representation of news sources and not the news content itself. So far, only Ulken (2005) has assessed political bias on a content level by analyzing the favorability towards or against the two selected politicians.

There is some empirical evidence that media coverage about politics focuses less on topics or parties, and instead puts individual political actors at the center of attention (Adam & Maier, 2010, p. 231; Karvonen, 2009; van Aelst,

Sheafer, & Stanyer, 2012). While current research does not tie citizens' voting decisions directly to individual politicians (see Adam & Maier, 2010), the opinions of politicians likely play an indirect role in the voting process by influencing party perception and identification with the party (Aaldering, van der Meer, & van der Brug, 2018; Brettschneider, 2002; Garzia, 2017).

Politicians can be evaluated in different dimensions which *"...[comprise] 'hard' professional (or performance-related) characteristics, 'soft' personal traits, and the details of their personal lives"* (Holtz-Bacha, Langer, & Merkle, 2014, p. 156). Focusing on professional traits, Aaldering and Vliegenthart (2016) propose a framework consisting of six dimensions that characterize political leadership images: political craftsmanship, vigorousness, integrity, responsiveness, charisma, and consistency. Political craftsmanship refers to the ability to act efficiently in a political environment and encompasses aspects like (issue-specific) knowledge, political experience and the ability to judge and understand political situations and actors. Vigorousness describes the strength of leadership displayed by a politician and includes assertiveness, decisiveness, and negotiation skills. Integrity refers to a politician's trustworthiness and whether they are perceived to be motivated by electorate interests or greed. Responsiveness describes a politician's receptiveness to citizens' concerns and public opinion, and charisma encompasses the ability to inspire followers, to convey a vision to the public, to appear likeable, and to successfully convey all these aspects in media appearances. Lastly, consistency refers to how stable a politician's opinions and views on society are over time, and whether they act in line with these views.

The discussion of the aforementioned personal characteristics in the media is referred to as privatization (Holtz-Bacha et al., 2014, p. 156; Langer, 2010; van Aelst et al., 2012, p. 210) and four broad and easily identifiable categories can be used to assess its prevalence in media coverage (Holtz-Bacha et al., 2014; van Aelst et al., 2012). The first of these categories encompasses all references to families and friends. The second refers to information about politicians' lives before politics, including their upbringing, details about their scholastic career and education, as well as information about unrelated previous jobs. The third focuses on politicians' leisure time, which includes references to private interests, hobbies, and vacations. The fourth and final category is made up of all references to politicians' love lives, including current or past partners, and sexual orientations.

2.5 Research Aim

The discussed literature reveals several research gaps. For example, although some studies compare different services, many focus on examining Google, which is likely influenced by Google's market dominance. Very little empirical data exists on search results retrieved by Microsoft's Bing (e.g., Magin et al., 2015; Magin et al., 2019), the second most popular search engine in Germany (Microsoft Bing Ads, 2016), with even less information on its news search engine. These parts of the services merit closer inspection, because journalistic news sources make up the majority of results in many search engines (see Magin et al., 2015; Magin et al., 2019). The aforementioned content-level study may already be considered outdated (Ulken, 2005) as the constantly changing nature of algorithmic gatekeepers calls for frequent (re-) examination (Kitchin, 2017).

Therefore, the aim of this study is to compare two news search engines on a content level, focusing on the German editions of Google News and Bing News. Google News was selected because Google is the most popular site for German internet users (Alexa.com, 2017b) and its news search engine is the fifth most popular news website globally (Alexa.com, 2017a). Bing News is part of Germany's second most popular search engine, with a market share of ten percent at the time of data collection (Microsoft Bing Ads, 2016).

This study provides a descriptive snapshot of the search results on a content-level. Assuming that the media coverage of politicians can indirectly affect identification with political parties and voting decisions (Aaldering et al., 2018; Brettschneider, 2002; Garzia, 2017), differences in the sources and content retrieved by search engines may influence people's perceptions. In line with Ulken (2005), the portrayal of politicians shall serve as the main point of comparison, leading to the following three research questions.

RQ1: *What news sources are retrieved by Bing News and Google News for search queries related to German politicians and how do they differ?*

This study begins by looking at the actual sources presented by the two services to provide context for the content-level analysis. Previous studies have shown a declining trend in the diversity of sources and have reported greater diversity (Flaxman et al., 2016) and trends of media concentration over time (Bui, 2010). More recent

studies have observed selected news sources dominating the search results (Haim et al., 2018; Krafft et al., 2019; Nechushtai & Lewis, 2019; Unkel & Haim, 2019).

RQ2: *To what extent do the two news search engines' results differ in their portrayals of individual politicians?*

This study also compares the services' search results on a content-level by assessing the portrayal of politicians' professional characteristics and private traits. Previously, more evaluative portrayals of politicians have been explained by more diverse sources (Ulken, 2005), though more recent studies have reported trends of source concentration and mainstreaming (Bui, 2010; Haim et al., 2018; Krafft et al., 2019; Nechushtai & Lewis, 2019; Unkel & Haim, 2019). However, as Magin et al. (2019, p. 422) point out, the effect of limited source diversity on the range of perspectives in diversity of the actual content remains unclear and, as a result, the present study examines this development from a content perspective.

RQ3: *To what extent do the two news search engines' results differ in their portrayals of politicians affiliated with different political parties?*

Lastly, this study looks at the overall portrayals of politicians based on their party affiliations. Earlier studies have sought to assess claims of a conservative political bias in search results (Ulken, 2005). Recent findings observe signs of a left-leaning bias in the US edition of Google News (Trielli & Diakopoulos, 2019) and an overrepresentation of conservative sources in the German edition (Haim et al., 2018). Thus, the present study investigates the potential of political bias by examining the portrayals of politicians based on their party affiliations.

3 Method

This study follows a quantitative and cross-sectional design based on a reverse engineering approach (Diakopoulos, 2014, p. 404; Kitchin, 2017, p. 23). The selected search engines are black boxes, where only input and output can be observed, but the internal processing that leads to the output remains unknown (Baumgärtel, 1998; Glanville, 1982; Lewandowski, 2015). The comparison of outputs for identical

inputs cannot provide specific information on how the outputs are generated, but it can indicate general differences between the services (Seaver, 2013). Considering the gatekeeping function of search engines, differences in the outputs may influence the composition of users' news diets depending on the selected service.

Data collection was conducted in three steps. In the first of these, several parallel searches using a range of search terms were performed with the German editions of Bing News and Google News. The search terms focus on several events in the German political sphere between December 2017 and January 2018. To replicate realistic and typical search term usage, the chosen search terms were short and not in the format of an actual question (Hochstotter & Koch, 2008; Jansen & Spink, 2006; Silverstein, Marais, Henzinger, & Moricz, 1999; Zahedi, Mansouri, Moradkhani, Farhoodi, & Oroumchian, 2017).

In total, sixteen search terms divided into three categories were selected for analysis (Table 1). These categories are political parties of the German Bundestag, the topic of coalition talks, and the names of two politicians. The topic of coalition talks, specifically talks about the continuation of the grand coalition ("Große Koalition", GroKo) between the Christian Democrats (CDU/CSU) and Social Democrats (SPD), was chosen because it dominated the media coverage at the time the searches were conducted and was of great importance for Germany. The two politicians, Angela Merkel and Martin Schulz, were chosen because of their pivotal roles in these coalition talks.

Four search queries were repeated at different points in time, as there was a significant development in the process of coalition negotiations. The searches for each search term were performed simultaneously for Google News and Bing News, which allows for comparisons between the services. Comparisons between different search terms are not feasible, because not all search terms were used on the same day. In an effort to minimize personalization effects, all searches were conducted in fresh browsers with no connected Google or Microsoft accounts. For each search query, the first results page per search engine was archived, with each page listing 20 search results.

Table 1: Search terms

Search Terms		Date of Search	Context
Political parties			
CDU	(center-right)	16.01.2018	Day after potential coalition partner SPD calls for changes to exploratory coalition talk agreements after slow negotiations
CSU	(center-right)	04.12.2017	Day of CSU leader Horst Seehofer's announcement to resign as Bavaria's chief minister
SPD	(center-left)	21.01.2018	SPD votes on whether to start coalition talks with CDU/CSU
AfD	(right-wing to far-right)	24.01.2018	Day after the AfD assumes head of a committee in the German Bundestag for the first time
FDP	(center to center-right)	23.12.2017	Day after FDP leader Christian Lindner proposes revival of previously aborted "Jamaika" coalition talks (with CDU/CSU and Die Grünen) after new elections
Die Linke	(left-wing to far-left)	30.12.2017	Day of Oscar Lafontaine's (ex-leader of Die Linke) proposal for a new joint left people's party with Die Grünen and SPD
Die Grünen	(centre-left)	08.01.2018	Day of Simone Peters', federal chair of Die Grünen, announcement to not run for this position again
Topic: Coalition talks			
Große Koalition		20.01.2018 22.01.2018	Day before the SPD-vote on coalition talks for a grand coalition (German: Große Koalition, GroKo); Day after the positive SPD-vote to begin coalition talks

GroKo	20.01.2018 22.01.2018	Day before the SPD-vote on GroKo coalition talks Day after the positive SPD-vote to begin coalition talks
GroKo Verhandlungen	27.01.2018	After the first day of GroKo coalition talks
Jusos	22.01.2018	The SPD youth organization, Jusos, publicly opposes GroKo after SPD votes to start GroKo talks
Kooperationskoalition	13.12.2017	Day after SPD proposes an alternative, less binding coalition model (cooperation coalition)
Sondierungsgespräche	13.01.2018	Exploratory talks between SPD and CDU/CSU end with agreement to engage in coalition talks
Sondierungen GroKo	13.01.2018	Exploratory talks between SPD and CDU/CSU end with agreement to engage in coalition talks
Politicians		
Angela Merkel (CDU leader at the time)	20.01.2018 22.01.2018	Day before the SPD-vote on GroKo coalition talks Day after the positive SPD-vote to begin coalition talks
Martin Schulz (SPD leader at the time)	20.01.2018 22.01.2018	Day before the SPD-vote on GroKo coalition talks Day after the positive SPD-vote to begin coalition talks

Order based on number of seats in the German federal parliament (CDU & CSU share seats). Party search terms include common abbreviations: Alternative für Deutschland (AfD), Christlich Demokratische Union (CDU), Christlich-Soziale Union in Bayern (CSU), Freie Demokratische Partei (FDP), Sozialdemokratische Partei Deutschlands (SPD).

In the second step, the first five news articles per results page were archived in their entirety. The links were not clicked during the first step to avoid providing any information about supposed preferences of the simulated user. With no available information on whether Bing News personalizes the main results, these measures of caution were implemented in all searches, even though personalization on Google News does not appear to influence the main results (Cozza et al., 2016). It is also important to note that the two search engines differed in their layouts: Bing News presented one article per search result, whereas Google News grouped several articles together into one. In line with literature on presentation bias, the most prominent article for each of these groups was selected for the content analysis (Jansen & Spink, 2006; Yue et al., 2010). Thus, the topmost link per result was chosen because its larger font size was deemed more likely to catch a user's attention.

The third and final step was a quantitative content analysis of the first ten search results as they appeared on each archived result page and the first five news articles in full length. This sampling strategy is based on user behavior studies that show web search users tend to focus on the first visible results without scrolling down (Granka, Joachims, & Gay, 2004) and concentrate on the first page of search results (Jansen & Spink, 2006). In total, this strategy resulted in a sample size of 400 search results and 200 articles evenly distributed between Bing News and Google News for the content analysis.

3.1 Source Characteristics and Content Characteristics

The content analysis was conducted with two different coding units. Search result entries, consisting of headlines, source names and snippets (only in Bing News), were analyzed to collect data on the characteristics of the retrieved news sources. The source categories include the ranking position, the search engine, and the news source. The news sources themselves were differentiated by name and based on their primary background as online-only, broadcast, or print media.

The second coding unit, whole news articles, was used to assess the content characteristics of the search results. Articles were differentiated as copies of wire service reports (Carlson, 2007; Thurman, 2007) and clearly marked opinion pieces. Articles, which were neither wire reports nor opinion pieces, were classified as regular articles. While there are many aspects in which the retrieved content

could differ, this study focuses on the portrayal of politicians for three reasons. First, there have been concerns about political bias in search results (see Haim et al., 2018; Trielli & Diakopoulos, 2019; Ulken, 2005). Media portrayals of politicians may influence political decisions and elections (Aaldering et al., 2018; Garzia, 2017; McAllister, 2007), which establishes this aspect as one proxy measure for political bias. Second, analyzing the portrayal of individual politicians has a strong tradition in communication research, which aided the codebook development (Adam & Maier, 2010; Holtz-Bacha, Lessinger, & Hettesheimer, 1998; Karvonen, 2009; van Aelst et al., 2012). Third, the most prominent political topic in the news at the time of data collection was closely tied to the leaders of the different political parties in Germany.

The portrayals of politicians were coded in 20 content categories (Table 2). These categories can be divided into two parts: leadership images, and privatization. The former focuses on politicians' professional characteristics as differentiated by Aaldering and Vliegenthart (2016) and the latter considers their personal lives as defined by Holtz-Bacha et al. (2014). This approach differs from Ulken's (2005) by providing a more detailed assessment of portrayal based on established concepts in political communication research.

Every category was coded up to three times per article, depending on the number of mentioned politicians, and only references to the first three mentioned politicians were considered. For each category, the overall tone of the article in reference to a specific politician's characteristics was assessed. The categories were coded in an ordinal scale differentiating between positive (1) and negative (-1) portrayals. Mentions of characteristics that included both positive and negative evaluations or no evaluation were coded as ambivalent or neutral (0; see Aaldering & Vliegenthart, 2016). The absence of mentions of characteristics was coded outside of this scale.

The six dimensions of leadership images identified by Aaldering and Vliegenthart (2016) were split into twelve individual categories to simplify the coding process. Similarly, broader dimensions of privatization were split into smaller categories. In addition to private relationships, lifestyle (e.g., hobbies), past life and socio-economic background, mentions of age were also considered. For the data analysis, an overall portrayal index was calculated by combining the values of the leadership image categories with those of the privatization categories in a mean index.

Table 2: Content categories

Categories	Sub-Categories	Cohen's Kappa
Privatization[a]		
Age		.91
Religion		-[c]
Private Relationships	Family/Love Life	-[c]
	Friends & Relatives	1.0[c]
Past Life & Upbringing	Childhood	1.0[c]
	Socioeconomic Background	.82
Education		.86
Lifestyle		1.0[c]
Mean reliability		.86
Leadership Images[b]		
Political Craftsmanship	Political Experience	.89
	Knowledge	.84
	Judgement	.74
Vigorousness	Assertiveness	.92
	Guidance	.82
	Decisiveness	.74
Integrity		.89
Charisma	Likability	.90
	Public Support	-[c]
Consistency		.82
Responsiveness	Consideration of Feedback	1.0[c]
	Opportunity for Feedback	1.0[c]
Mean reliability		.84

All categories are coded on a three-point scale: -1 (negative) 0 (neutral / ambivalent) 1 (positive). [a] *Based on Holtz-Bacha et al. (2014) and van Aelst et al. (2012).* [b] *Based on Aaldering and Vliegenthart (2016).* [c] *Lack of variance in pretest sample, these categories are not included in the mean reliability indices.*

The codebook was pretested with a sample of 60 search results and 30 articles coded by two independent coders. The inter-coder reliability for the categories differentiating news sources and article types is sufficient (Cohen's Kappa between .94 and 1.0). The more complex content categories show generally sufficient but varying reliability coefficients (Cohen's Kappa between .74 and 1.0). However, these reliability coefficients need to be interpreted with caution, as the pretest sample lacked variance for most privatization categories (excluding age, socio-economic background and education) as well as for the leadership dimension responsiveness. Although previous studies report low levels of personalization in German news (Emde & Scherer, 2016; Holtz-Bacha et al., 2014; Sörensen, 2016), these categories were included in the final codebook as it remains unclear to what extent the selection of articles in the search results mirror the characteristics of the media landscape (Unkel & Haim, 2019, p. 11).

4 Results

4.1 Retrieved News Sources

For RQ1 *(What news sources are retrieved by Bing News and Google News for search queries related to German politicians and how do they differ?)*, the spectra of retrieved media sources differ between the two services, with 80 distinct sources for Bing News and only 58 distinct sources for Google News. Differences are also prevalent when the types of sources are considered (Table 3). Both services mainly rely on print media sources (Bing News: 67%; Google News: 77%; $\chi^2 = 4.45$; $p = .35$), with Bing News featuring more online-only media ($\chi^2 = 21.50$; $p < .001$) and Google News including more broadcast media ($\chi^2 = 5.23$; $p = .022$).

The top five search results are compared in a similar manner to provide context for the following analysis of the content characteristics (Table 4). Significant differences are observed in the types of articles: more than half of the top five articles retrieved by Bing News (52%) are wire reports, whereas these types of articles only account for 27 percent of the top five articles retrieved by Google News ($\chi^2 = 13.10$, $p < .001$). Neither Bing nor Google feature opinion pieces in the top results frequently, however Google News results seem more likely to include them (Bing News: 6%; Google News: 12%), though this observation is not statistically significant.

Table 3: Overview of the variety of sources retrieved by Bing News and Google News (N = 400 entries).

Search Result Entries	**Bing News (N = 200)**		**Google News (N = 200)**			
	n	% (rounded)	*n*	% (rounded)	χ^2	*p*
Online-only media	49	25	15	8	21.50	<.001***
Broadcast media	17	9	32	16	5.23	.022*
Print media	134	67	153	77	4.45	.035*

** p < .05. ** p < .01. *** p <.001.*

Table 4: Types of sources and articles in Bing News and Google News top 5 results (N = 200).

Top 5 Results	**Bing News (N = 100)**	**Google News (N = 100)**		
	n / %[a]	*n* / %[a]	χ^2	*p*
Type of media				
Online-only media	29	5	20.41	<.001***
Broadcast media	6	19	7.73	.005**
Print media	65	76	2.91	.088
Type of article				
Regular	42	61	7.23	.007**
Wire report	52	27	13.10	< .001***
Opinion piece	6	12	2.20	.138

** p < .05. ** p < .01. *** p <.001.*

The two services feature similar numbers of distinct sources when looking at the five most frequently featured sources per service (Bing News: 7; Google News: 6; Table 5). These sources account for 21 percent of the Bing News entries and 29 percent of the Google News entries. The Bing News results include the only online-only source in both top five lists. News sources like Spiegel Online, Frankfurter Allgemeine Zeitung, Die Welt, and Tagesspiegel appear in both search engines' results and with similar mean ranking positions.

Portrayal of individual politicians

The following analyses for RQ2 (*To what extent do the two news search engines' results differ in their portrayals of individual politicians?*) are based on the 200 whole articles (100 per search engine). While neutrality has also been addressed in a normative context in previous chapters, it should be understood as journalistic neutrality in the following. Thus, neutral portrayals refer to mentions without clear positive or negative evaluations or with a balanced mix of both.

In total, 96 different politicians are mentioned 464 times in the analyzed articles. More than half of these mentions bring up politicians' leadership images or their personal lives (55%, n = 255). The sample is rather void of privatization as defined in this study, with very low case numbers for Bing News (n = 30) and Google News (n = 23). Leadership images are addressed more frequently but again with no difference in emphasis (Bing News: n = 120; Google News: n = 126). The combined portrayal indices show a general trend towards balanced portrayals with no significant differences between the services (Bing News: m -.09, SD = .56, n = 129; Google News: M = -.07, SD = .70, n = 126; t = -.227, p = .821).

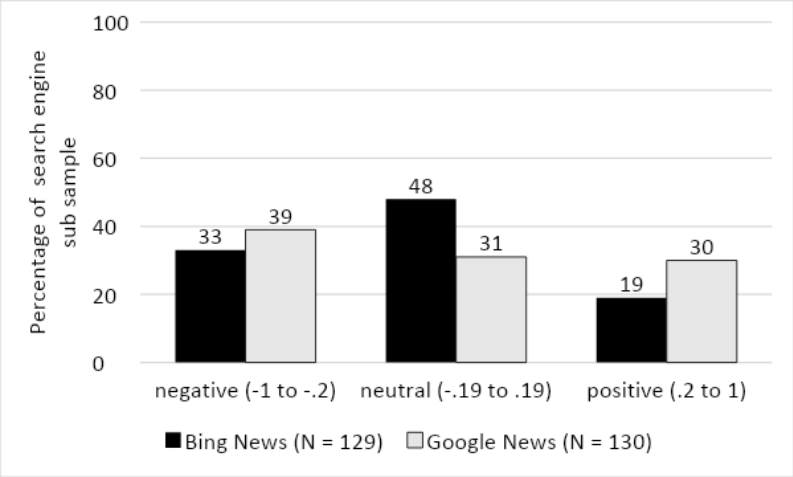
However, significant differences in the distribution of positive or negative portrayals are observed (χ^2 = 8.994, p = .011, Figure 1). Both samples contain similar shares of negative portrayals (Bing News: 33%, N = 129; Google News: 39%, N = 130). Bing News features more neutral portrayals (48%; Google News: 31%) and Google News features more positive portrayals (30%; Bing News: 19%). Overall Google News retrieves a more balanced mix of positive, negative and neutral portrayals, whereas Bing News results emphasize neutral portrayals. The different types of articles show a trend of increasing neutrality from opinion pieces to regular articles to wire reports, though this finding is not statistically significant ($M_{Opinion}$ = -.32, SD = .69, n = 36; $M_{Regular}$ = -.14, SD = :65, n = 194; M_{Wire} = -.03, SD = .53, n = 87; p = .061).

Table 5: Top 5 most frequently featured news sources per search engine.

	Source	Times retrieved	% share of entries by search engine (rounded)	Average Ranking[a]		Type of media source
				M	*SD*	
Bing News (N = 200)						
1	T-Online.de	15	5	4.00	2.67	Online-only
2	Spiegel Online	11	4	4.18	2.96	Print
3	Augsburger Allgemeine	10	3	3.80	2.44	Print
4	Die Welt	8	3	5.75	3.28	Print
5	Frankfurter Allgemeine Zeitung	7	2	3.00	1.53	Print
	Tagesspiegel	7	2	6.71	2.43	Print
	n-tv	7	2	7.43	2.07	Broadcast
Google News (N = 200)						
1	Spiegel Online	22	7	4.68	2.92	Print
2	Focus Online	14	5	5.57	3.00	Print
	Frankfurter Allgemeine Zeitung	14	5	4.64	2.59	Print
3	Tagesspiegel	13	4	5.85	3.53	Print
4	Die Welt	12	4	5.67	2.87	Print
5	Tagesschau.de	11	4	3.91	2.91	Broadcast

[a] *Ranking between 1-10; lower values denote more prominent placement in the search result lists.*

Figure 1: Comparison of the ratios between neutral and evaluative news retrieved by Bing News and Google News (rounded percentages).



Five of the 96 mentioned politicians account for more than half of the coded mentions. The case numbers for the other mentioned politicians are insufficient for further analysis, with mostly one or two mentions for several politicians. The selected politicians are Martin Schulz (SPD, $n = 61$), Angela Merkel (CDU, $n = 37$), Horst Seehofer (CSU, $n = 19$), Christian Lindner (FDP, $n = 16$), and Kevin Kühnert (SPD, $n = 10$). As a result of almost half of all mentions (45%, $n = 209$) occurring without coded references to leadership image or privatization, the case numbers per politician are surprisingly low considering the overall sample size of 464 mentions.

Although there are statistically significant differences in the overall portrayals of two politicians (Lindner: p = .025; Kühnert: p = .039; Table 6), these findings should not be over-interpreted when considering the low case numbers (n between 3 and 10) and high standard deviations. In the case of Christian Lindner, the Bing News results are considerably more negative ($M = -.60$, $SD = .49$, $n = 6$; Google News: $M = 10$, $SD = .57$, $n = 10$). Kevin Kühnert is portrayed somewhat positively in Bing News ($M = .17$, $SD = .29$, $n = 3$), while the news retrieved by Google News are very favorable ($M = .63$, $SD = .26$, $n = 7$).

For the remaining three politicians, the overall trend of positive, negative or neutral portrayals is remarkably similar between the services; however, in the

Table 6: Comparison of the portrayal of the five most frequently mentioned politicians in articles retrieved by the news search engines.

			Overall portrayal[b]				Distribution[c] (%)				
Politician[a]	Engine	*n*	*m*	*SD*	*t*	*p*	-	*a/n*	+	χ^2	*p*
Martin Schulz (SPD)	Bing	30	-.50	.45	.91	.369	80	17	3	.175	.916
	Google	31	-.60	.40			84	12	3		
Angela Merkel (CDU)	Bing	14	-.13	.17	-.35	.726	29	71	0	3.39	.183
	Google	23	-.09	.56			35	48	17		
Horst Seehofer (CSU)	Bing	9	.45	.53	.29	.778	0	44	56	2.71	.258
	Google	10	.37	.72			20	20	60		
Christian Lindner (FDP)	Bing	6	-.60	.49	-2.51	.025*	67	33	0	5.95	.051*
	Google	10	.10	.57			10	70	20		
Kevin Kühnert (SPD)	Bing	3	.17	.29	-2.47	.039*	0	67	33	5.83	.016*
	Google	7	.63	.26			0	0	100		

** p <. 05. ** p < .01. *** p <.001. Portrayals based on very small case numbers deemphasized. [a] Based on number of mentions. [b] Scale from negative (-1) to neutral / ambivalent (0) to positive. [c] Abbreviations:- negative, a/n ambivalent / neutral, + positive.*

cases of Angela Merkel and Horst Seehofer, the standard deviations differ much more between the search engines. While the differences in the distributions are not significant, the p values for the chi-squared tests are noticeably lower than those of the t-tests, which may be related to the significant differences in the overall distribution of evaluations (Figure 1).

The valence of the evaluations themselves likely depends on the political situation at the time of data collection. This means that comparisons between different politicians and party affiliations are not meaningful, though comparisons between the services are not impacted as each search was conducted in parallel in both services.

4.2 Portrayal based on Party Affiliation

For RQ 3 (*To what extent do the two news search engines' results differ in their portrayals of politicians affiliated with different political parties?*), the indices for individual politicians are combined into party averages to compare the portrayal of politicians based on their party affiliation. The following results only describe the overall portrayal of all mentioned politicians, grouped by party affiliation. This does not constitute a portrayal of the political party itself, because the representatives of the different political parties may differ between the two news search engines and political parties encompass more than the individual party members.

Similar to the case of individual politicians, the overall evaluation of politicians based on party affiliation appears largely unanimous, with only slight differences in the degree of positivity or negativity (Table 7). For the mean comparison, only the portrayal of FDP politicians differs significantly between Bing News and Google News ($p = .025$), with Bing News results reporting more negatively ($M = -.66$, $SD = .47$, $n = 7$) than Google News results ($M = .00$, $SD = .63$, $n = 11$). Looking at the distributions, the majority of the Bing News articles featuring portrayals of FDP politicians are negative, whereas Google News retrieved similar shares of positive and negative portrayals. Considering the low case numbers, it is interesting to note that these differences are nearly statistically significant ($p = .066$). However, the FDP case numbers match up almost perfectly with the case numbers for Christian Lindner. Therefore, the result is likely caused by the divided portrayal of this individual politician in the very small sample and does not reflect a bias based on party affiliation.

Table 7: Portrayal of politicians of the eight political parties in the German Bundestag in articles retrieved by the news search engines

		Overall portrayal[b]					Distribution[c] (%)				
Party affiliation	Engine	*n*	*m*	*SD*	*t*	*p*	-	*a/n*	+	χ^2	*p*
Christlich Demokratische Union (CDU)	Bing	20	-.02	.32	.28	.782	20	70	10	1.14	.566
	Google	29	-.05	.49			28	55	17		
Christlich-Soziale Union in Bayern (CSU)	Bing	18	.22	.68	.65	.523	17	39	44	1.27	.530
	Google	16	.06	.77			31	25	44		
Sozialdemokratische Partei Deutschlands (SPD)	Bing	53	.00	.63	.12	.902	49	32	19	5.21	.074
	Google	54	-.19	.69			54	15	32		
Alternative für Deutschland (AfD)	Bing	6	-.25	.42	-.55	.597	33	67	0	4.95	.084
	Google	7	-.05	.87			43	14	43		
Freie Demokratische Partei (FDP)	Bing	7	-.66	.47	-2.35	.025*	71	29	0	5.44	.066
	Google	11	.00	.63			18	64	18		
Die Linke	Bing	7	-.21	.48	.-07	.946	43	43	14	.89	.640
	Google	5	-.19	.26			40	60	0		
Bündnis ‘90 / Die Grünen	Bing	15	.09	.29	-.88	.408	0	87	13	11.57	.003**
	Google	7	.36	.79			29	14	57		

** p <. 05** p < .01. *** p <.001. Portrayals based on very small case numbers deemphasized. [a] Scale from negative (-1) to neutral / ambivalent (0) to positive. [b] Abbreviations:- negative, a/n ambivalent / neutral, + positive.*

Apart from the FDP cases, there are three more notable differences in the distributions. While not significant, the data for the AfD ($p = .084$) and SPD ($p = .074$) show remarkably similar patterns: Google News features higher shares of positive and negative portrayals, whereas Bing News features more neutral portrayals. In the case of Die Grünen, there are significant differences in the distributions ($p = .003$), with Google News featuring significantly more positive portrayals and noticeably fewer neutral portrayals. While these findings should not be over interpreted considering the small case numbers, they may again indicate different approaches to create an overall balanced mix of news articles.

5 Discussion

The first research question concerns the sources presented in the search results. Both services heavily rely on legacy media sources, thus maintaining rather than decreasing the influence of these organizations (Nechushtai & Lewis, 2019). Whereas Bui (2010) found Google News to retrieve more distinct sources and Ulken (2005) found more online-only sources, the present study observes fewer distinct sources and fewer online-only sources compared to Bing News. Google News' lower number of distinct sources, and resulting stronger reliance on the top five sources, supports the previously reported trends of concentration and increasing homogeneity (Bui, 2010; Haim et al., 2018; Krafft et al., 2019; Nechushtai & Lewis, 2019; Puschmann, 2019; Unkel & Haim, 2019). The findings also suggest a similar trend for Bing News, whose list of top five sources is very similar to the Google News list, despite an overall higher number of distinct sources.

There are some similarities to the findings by Haim et al. (2018) and Unkel and Haim (2019): some conservative sources, like Die Welt and Focus online, appear frequently in Google News results, whereas popular media like Bild.de, T-Online, RTL or Stern do not. Interestingly, one of these underrepresented sources is among the most frequently retrieved in Bing News results (T-Online). However, with individual sources accounting only for a maximum of 7 percent of the Google News search results, compared to previously observed shares of up to 24 percent (Haim et al., 2018, p. 6), these trends are less pronounced in the current study. This may indicate changes in the algorithms, changes in the search engine optimization of other news outlets, or

other factors potentially influencing the results (e.g., the used search terms or the sampling procedure which did not consider the respective front pages).

The second and third research questions focus on the content of the retrieved news articles, in which roughly half of all mentions of politicians addressed professional or personal characteristics. The findings generally show no significant differences in the portrayals of politicians between Bing News and Google News. There is a consensus between the two services, with no evidence of systematic favoring of individual politicians or their political party affiliation. Both search engines retrieve more articles with negative than positive evaluations. This is likely a general news media bias and not specific to the algorithmic systems themselves (Unkel & Haim, 2019, p. 11). Negativity itself is a news value (Galtung & Ruge, 1965; Harcup & O'Neill, 2017; Harcup & O'Neill, 2001) and as such is a part of German political media coverage (Kepplinger, 2000). The similarities in the portrayals can partially be explained by the considerable overlap in top search results. Both services seem to rely on very similar cores of mainstream sources (Puschmann, 2019), which may indicate a mainstreaming bias (Nechushtai & Lewis, 2019). The inclusion criteria for these mainstream media cores remain a crucial open question, especially concerning the different media cores reported for the German and the US editions (Haim et al., 2018; Trielli & Diakopoulos, 2019). Closer analysis of the core media themselves seems like a logical next step in this direction. Haim et al. (2018, p. 10) suggest differences in search engine optimization as one potential explanation. These differences could be compared between over- and under-represented media to help understand the search results (e.g., Britvic, Duric, & Buzic, 2014).

While an overall agreement in the portrayals is observed, the degree of positivity or negativity can differ between the services. The mean portrayal measures for individual politicians and party affiliations show high standard deviations and, in some cases, the standard deviations differ considerably between the services, likely caused by different distributions of positive, neutral, and negative evaluations. In total, Google News shows a nearly even distribution, whereas Bing News shows a larger share of impartial portrayals and fewer positive portrayals. The findings for Google News support previous research. Flaxman et al. (2016) report higher percentages of ideologically opposing articles when compared to social media and general search engines. Ulken (2005) also observed higher shares of positive and negative evaluations. While this trend was previously explained by a higher number of distinct sources and the inclusion of online-only sources, the findings for research question

one contradict this explanation. Instead, the types of the retrieved articles may explain this result: compared to Bing News, Google News retrieved significantly fewer news agency reports, which are generally less opinionated. The algorithmic systems may differ in the weighting of this type of content. Scholars have previously voiced concerns that wire reports can be copied so as to exploit the ranking factor currency (Carlson, 2007; Thurman, 2007). Bing News may be more susceptible to this strategy, however it is also possible that the two services differ in their approach to create balanced news experiences (Google Inc., n.d.a; Microsoft Bing, n.d.): Bing News strives for balance by emphasizing impartial content, whereas Google News provides equal amounts of positive, negative and impartial content. To assess which of these approaches is preferable exceeds the scope of this paper, as answers to this question vary based on the normative approach used for the evaluation (see Helberger, 2019).

5.1 Limitations

A few limitations must be addressed. First, the presented findings are only a snapshot in a very dynamic field of research. The data was collected at the end of 2017 and in the beginning of 2018, shortly before Google News received a considerable update (Upstill, 2018). Developments of the ranking algorithms and search indices may now yield different results. Nonetheless, this study can provide reference points for further studies.

Second, there are limitations of the content analysis. This study utilizes the portrayal of politicians as a proxy for political slant in the news coverage, which oversimplifies certain situations. Negative evaluations of failed political endeavors or positive evaluations of political successes both may be politically biased or simply impartial reports of the respective events. Considering the mixed empirical evidence of personalization in German media coverage of politics (Adam & Maier, 2010, pp. 225–227), a different proxy for political slant could be beneficial and may result in more evaluations for the analysis. The idea of coding portrayal on an article level is not ideal either, because of the complexity of evaluating each article. Further, the reliability of several categories could not be assessed exhaustively, as some dimensions of leadership images and privatization rarely applied to the collected articles.

Third, the sampling procedure may influence if and how politicians are portrayed in the search results. The search terms themselves were selected to be

impartial, however different, more partisan search terms may implicitly influence the ideological slant of the results (Borra & Weber, 2012; Flaxman et al., 2016, p. 311). Therefore, the presented findings are only valid for the selected search terms and in the time frame of data collection. For example, observations like the negative portrayal of Christian Lindner in the Bing News results cannot be interpreted as a general bias against this politician.

Lastly, this study cannot provide insight into real-life situations. Outside of the experimental setting, users frequently do not avoid personalization of search results. Therefore, it is very difficult to simulate identical realistic users to allow for comparisons of these types of services.

5.2 Outlook and Implications

This study adds to the existing body of descriptive studies which examine differences between various news search engines. As a result of the highly dynamic nature of the internet, these types of studies quickly become outdated. However, when taken together, they can document overarching trends and developments over time (e.g., the core of mainstream sources for Google News), albeit without any insight into the intentionality of the observed behavior.

Further research is needed to assess the extent of the observed differences in order to verify these observations for other content aspects (e.g., portrayals of specific issues, portrayals of organizations) and to identify possible explanations for these differences. New data collection methods based on the documentation of search engine use and results by participating regular users may help to fully understand the extent to which differences in search results occur in real life situations (see Puschmann, 2019). Ideally, trends reported in these descriptive comparisons between search engines should be put into context by interviewing developers about their intentions, decisions and limitations leading to the observed behavior (Kitchin 2017, pp. 24–26). However, this approach is naturally complicated by the search engine providers' interest to keep trade secrets confidential. Finally, this study shows that algorithmic gatekeepers may develop a content bias by restricting specific types of articles, which may require new assessment criteria (e.g., based on the observed differences in the distributions of evaluative content). The behavior and characteristics of news media should

also be considered in this context as they may directly or indirectly influence the retrieved content. For example, effective search engine optimization may directly affect the ranking position of specific news outlets or indirectly change the ranking algorithm as certain counter measures are implemented by search engine providers to prevent the exploitation of the algorithms (e.g., putting less emphasis on wire reports). This ties into the moral and ethical responsibilities of news search engine providers; while they must continue to combat attempts to exploit their algorithms, their roles as gatekeepers call for cautious and farseeing actions. In this sample, it seems that Google News' avoidance of wire articles leads to more evaluative articles compared to Bing News. While this may very well be a conscious decision, it could also be an example of an unwanted effect.

From a user perspective, the findings emphasize the importance of information literacy (*see Dogruel in this volume*) as internet users need to be educated about the processes behind the services they use every day. Insight into ranking differences between search engines may even improve user's online information seeking: users looking to compare different opinions may benefit from consciously selecting Google News to retrieve more opinionated reports.

All things considered, perhaps the commonly cited advice to cross-reference information between different sources needs to be expanded to also include the cross-referencing between different services to find said information.

Marius Becker is a researcher at the Department of Empirical Media Research and Political Communication at Technische Universität Ilmenau, marius.becker@tu-ilmenau.de

References

Aaldering, L., van der Meer, T., & van der Brug, W. (2018). Mediated Leader Effects: The Impact of Newspapers' Portrayal of Party Leadership on Electoral Support. *The International Journal of Press/Politics*, *23*(1), 70–94. https://doi.org/10.1177/1940161217740696

Aaldering, L., & Vliegenthart, R. (2016). Political leaders and the media. Can we measure political leadership images in newspapers using computer-assisted content analysis? *Quality & quantity*, *50*(5), 1871–1905. https://doi.org/10.1007/s11135-015-0242-9

Adam, S., & Maier, M. (2010). Personalization of Politics A Critical Review and Agenda for Research. *Annals of the International Communication Association*, *34*(1), 213–257. https://doi.org/10.1080/23808985.2010.11679101

Alexa.com (2017a). Top Sites by Category: News (visited: 04.11.2017). Retrieved from https://www.alexa.com/topsites/category/Top/News

Alexa.com (2017b). Top Sites in Germany (visited: 04.11.2017). Retrieved from https://www.alexa.com/topsites/countries/DE

Arendt, F., & Fawzi, N. (2018). Googling for Trump: Investigating online information seeking during the 2016 US presidential election. *Information, Communication & Society*, *22*(13), 1945–1955. https://doi.org/10.1080/1369118X.2018.1473459

Athey, S., Mobius, M. M., & Pál, J. (2017). The Impact of Aggregators on Internet News Consumption. *Stanford University Graduate School of Business Research Paper*, *17*(8). Retrieved from https://ssrn.com/abstract=2897960

Axel Springer (2014). Axel Springer concludes its data documentation: Major losses resulting from downgraded search notices on Google. Retrieved from https://www.axelspringer.com/en/press-releases/axel-springer-concludes-its-data-documentation-major-losses-resulting-from-downgraded-search-notices-on-google

Baeza-Yates, R., & Ribeiro, B. d. A. N. (1999). *Modern information retrieval* (1. print). *ACM Press books*. Harlow u.a.: Addison-Wesley [u.a.].

Barzilai-Nahon, K. (2008). Toward a theory of network gatekeeping: A framework for exploring information control. *Journal of the American Society for Information Science and Technology*, *59*(9), 1493–1512. https://doi.org/10.1002/asi.20857

Baumgärtel, T. (1998). *Reisen ohne Karte: Wie funktionieren Suchmaschinen?*, *98-104*. Retrieved from http://www.ssoar.info/ssoar/bitstream/document/12583/1/ssoar-1998-baumgartel-reisen_ohne_karte.pdf

Beck, K. (2016). *Kommunikationswissenschaft*: UTB GmbH.

Bodó, B., Helberger, N., Eskens, S., & Möller, J. (2018). Interested in Diversity. *Digital Journalism*, *7*(2), 206–229. https://doi.org/10.1080/21670811.2018.1521292

Borra, E., & Weber, I. (2012). Political Insights: Exploring partisanship in Web search queries. *First Monday*, *17*(7). https://doi.org/10.5210/fm.v17i7.4070

Bozdag, E. (2013). Bias in algorithmic filtering and personalization. *Ethics and Information Technology*, *15*(3), 209–227. https://doi.org/10.1007/s10676-013-9321-6

Bozdag, E., & van den Hoven, J. (2015). Breaking the filter bubble: Democracy and design. *Ethics and Information Technology*, *17*(4), 249–265. https://doi.org/10.1007/s10676-015-9380-y

Brettschneider, F. (2002). *Spitzenkandidaten und Wahlerfolg*. Wiesbaden: VS Verlag für Sozialwissenschaften.

Britvic, I., Duric, J., & Buzic, D. (2014). Comparative analysis of Google and Bing SEO on leading Croatian news portals. In *Information and Communication Technology, Electronics and Microelectronics (MIPRO), 2014 37th International Convention on* (pp. 474–478). IEEE. https://doi.org/10.1109/MIPRO.2014.6859614

Bruns, A. (2019). It's Not the Technology, Stupid: How the 'Echo Chamber' and 'Filter Bubble' Metaphors Have Failed Us. In *International Association for Media and Communication Research Conference: IAMCR 2019,* Madrid.

Bui, C. L. (2010). How Online Gatekeepers Guard Our View - News Portals' Inclusion and Ranking of Media and Events. *Global Media Journal*, *9*(16), 1–44. Retrieved from http://www.globalmediajournal.com/open-access/how-online-gatekeepers-guard-our-view-news-portals-inclusion-and-ranking-of-media-and-events.pdf

Calzada, J., & Gil, R. (2017). *What Do News Aggregators Do? Evidence from Google News in Spain and Germany*. Retrieved from https://ssrn.com/abstract=2837553 (visited: 13.01.2018)

Calzada, J., & Gil, R. (2020). What Do News Aggregators Do? Evidence from Google News in Spain and Germany. *Marketing Science*, *39*(1), 134–167. https://doi.org/10.1287/mksc.2019.1150

Carlson, M. (2007). Order versus access: News search engines and the challenge to traditional journalistic roles. *Media, Culture & Society*, *29*(6), 1014–1030. https://doi.org/10.1177/0163443707084346

Cozza, V., van Hoang, T., Petrocchi, M., & Spognardi, A. (2016). Experimental Measures of News Personalization in Google News. In S. Casteleyn, P. Dolog, & C. Pautasso (Eds.), *Lecture Notes in Computer Science: Vol. 9881. Current Trends in Web Engineering: ICWE 2016 International Workshops, DUI, TELERISE, SoWeMine, and Liquid Web, Lugano, Switzerland, June 6-9, 2016. Revised Selected Papers* (pp. 93–104). Cham, s.l.: Springer International Publishing. https://doi.org/10.1007/978-3-319-46963-8_8

Diakopoulos, N. (2014). Algorithmic Accountability. *Digital Journalism*, *3*(3), 398–415. https://doi.org/10.1080/21670811.2014.976411

Diakopoulos, N., & Koliska, M. (2016). Algorithmic Transparency in the News Media. *Digital Journalism*, *5*(7), 809–828. https://doi.org/10.1080/21670811.2016.1208053

Dogruel, L. (2021). What is Algorithm Literacy? A Conceptualization and Challenges Regarding its Empirical Measurement. In C. Schumann & M. Taddiken (Eds.), *Algorithms and Communication (Digital Communication Research, [Bandnummer]: pp. X-Y)*. Berlin. [DOI]

Dubois, E., & Blank, G. (2018). The echo chamber is overstated: The moderating effect of political interest and diverse media. *Information, Communication & Society*, *21*(5), 729–745. https://doi.org/10.1080/1369118X.2018.1428656

Eilders, C. (2006). News factors and news decisions. Theoretical and methodological advances in Germany. *Communications*, *31*(1), 135. https://doi.org/10.1515/COMMUN.2006.002

Emde, K., & Scherer, H. (2016). Politische vs. persönliche Kritik: Die Darstellung von Politikern in der Nachrichtensatire ‚heute-show'. In P. Henn & D. Frieß (Eds.), *Digital Communication Research: Band 3. Politische Online-Kommunikation: Voraussetzungen und Folgen des strukturellen Wandels der politischen Kommunikation* (pp. 119–139). Berlin: Freie Universität Berlin Institut für Publizistik- und Kommunikationswissenschaft. https://doi.org/10.17174/dcr.v3.6

Flaxman, S., Goel, S., & Rao, J. M. (2016). Filter Bubbles, Echo Chambers, and Online News Consumption. *Public Opinion Quarterly*, *80*(S1), 298–320. https://doi.org/10.1093/poq/nfw006

Friedman, B., & Nissenbaum, H. (1996). Bias in computer systems. *ACM Transactions on Information Systems*, *14*(3), 330–347. https://doi.org/10.1145/230538.230561

Galtung, J., & Ruge, M. H. (1965). The Structure of Foreign News. *Journal of Peace Research*, *2*(1), 64–90. https://doi.org/10.1177/002234336500200104

Garzia, D. (2017). Personalization of Politics Between Television and the Internet: Leader Effects in the 2013 Italian Parliamentary Election. *Journal of Information Technology & Politics*, *14*(4), 403–416. https://doi.org/10.1080/19331681.2017.1365265

Geiger, R. S. (2014). Bots, bespoke, code and the materiality of software platforms. *Information, Communication & Society*, *17*(3), 342–356. https://doi.org/10.1080/1369118X.2013.873069

Gerhart, S. (2004). Do Web search engines suppress controversy? *First Monday*, *9*(1). Retrieved from http://www.firstmonday.dk/ojs/index.php/fm/article/view/1111/1031

Gillespie, T. (2014). The Relevance of Algorithms. In K. A. Foot, P. J. Boczkowski, & T. Gillespie (Eds.), *Inside technology. Media technologies: Essays on communication, materiality, and society* (pp. 167–194). Cambridge, Massachusetts: The MIT Press. https://doi.org/10.7551/mitpress/9780262525374.003.0009

Glanville, R. (1982). Inside every white box there are two black boxes trying to get out. *Behavioral Science*, *27*(1), 1–11. https://doi.org/10.1002/bs.3830270102

Goldman, E. (2008). Search Engine Bias and the Demise of Search Engine Utopianism. In J. M. Owen, A. Spink, & M. Zimmer (Eds.), *Information Science and Knowledge Management: Vol. 14. Web Search: Multidisciplinary Perspectives* (pp. 121–133). Berlin, Heidelberg: Springer.

Google Inc. (n.d.a). About Google News (archived version: 27.04.2016). Retrieved from https://web.archive.org/web/20160427175222/https://support.google.com/news/publisher/answer/106259?hl=en&ref_topic=4359865

Google Inc. (n.d.b). Appear in Google News. Retrieved from https://support.google.com/news/publisher-center/answer/9607025

Google Inc. (n.d.c). Getting into Google News: Quickstart guide: Step 3: Apply for inclusion (archived version: 29.09.2017). Retrieved from https://web.archive.org/web/20170914194923/https://support.google.com/news/publisher/answer/7526416

Granka, L. A., Joachims, T., & Gay, G. (2004). Eye-tracking analysis of user behavior in WWW search. In M. Sanderson, K. Järvelin, J. Allan, & P. Bruza (Eds.), *Proceedings of the 27th annual international ACM SIGIR conference on Research and development in information retrieval* (p. 478). New York, NY: ACM. https://doi.org/10.1145/1008992.1009079

Gurevitch, M., & Blumler, J. G. (1990). Political communication systems and democratic values. In J. Lichtenberg (Ed.), *Cambridge studies in philosophy and public policy. Democracy and the mass media: A collection of essays* (pp. 269–289). Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139172271.011

Haim, M., Graefe, A., & Brosius, H.-B. (2018). Burst of the Filter Bubble? *Digital Journalism*, 1–14. https://doi.org/10.1080/21670811.2017.1338145

Hannak, A., Sapiezynski, P., Molavi Kakhki, A., Krishnamurthy, B., Lazer, D., Mislove, A., & Wilson, C. (2013). Measuring personalization of web search. In D. Schwabe (Ed.), *Proceedings of the 22nd International Conference on the World Wide Web: May 13 - 17, 2013, Rio de Janeiro, Brazil* (pp. 527–538). New York, NY: ACM. https://doi.org/10.1145/2488388.2488435

Harcup, T., & O'Neill, D. (2017). What is News? News values revisited (again). *Journalism Studies*, *18*(12), 1470–1488. https://doi.org/10.1080/1461670X.2016.1150193

Harcup, T., & O'Neill, D. (2001). What Is News? Galtung and Ruge revisited. *Journalism Studies*, *2*(2), 261–280. https://doi.org/10.1080/14616700118449

Helberger, N. (2019). On the Democratic Role of News Recommenders. *Digital Journalism*, *7*(8), 993–1012. https://doi.org/10.1080/21670811.2019.1623700

Hinman, L. M. (2005). Esse est indicato in Google: Ethical and Political Issues in Search Engines. *International Review of Information Ethics*. (Vol. 3, No. 3), 19–25. Retrieved from http://www.i-r-i-e.net/inhalt/003/003_hinman.pdf

Hochstotter, N., & Koch, M. (2008). Standard parameters for searching behaviour in search engines and their empirical evaluation. *Journal of Information Science*, *35*(1), 45–65. https://doi.org/10.1177/0165551508091311

Hölig, S., & Hasebrink, U. (2019). *Reuters Institute Digital News Report 2019: Ergebnisse für Deutschland* (revidierte Ausgabe). *Arbeitspapiere des Hans-Bredow-Instituts: Vol. 47*. Hamburg: Hans-Bredow-Institut.

Holtz-Bacha, C., Langer, A. I., & Merkle, S. (2014). The personalization of politics in comparative perspective: Campaign coverage in Germany and the United Kingdom. *European Journal of Communication*, *29*(2), 153–170. https://doi.org/10.1177/0267323113516727

Holtz-Bacha, C., Lessinger, E.-M., & Hettesheimer, M. (1998). Personalisierung als Strategie der Wahlwerbung. In K. Imhof & P. Schulz (Eds.), *Die Veröffentlichung des Privaten - Die Privatisierung des Öffentlichen* (pp. 240–250). Opladen: Westdeutscher Verlag.

Introna, L. D., & Nissenbaum, H. (2000). Shaping the Web: Why the Politics of Search Engines Matters. *The Information Society*, *16*(3), 169–185. https://doi.org/10.1080/01972240050133634

Jansen, B. J., & Spink, A. (2006). How are we searching the World Wide Web? A comparison of nine search engine transaction logs. *Information Processing & Management*, *42*(1), 248–263. https://doi.org/10.1016/j.ipm.2004.10.007

Jarren, O. (2008). „Massenmedien als Intermediäre. Zur anhaltenden Relevanz der Massenmedien für die öffentliche Kommunikation“. *M&K Medien & Kommunikationswissenschaft*, *56*(3-4), 329–346. https://doi.org/10.5771/1615-634x-2008-3-4-329

Kahne, J., Middaugh, E., Lee, N.-J., & Feezell, J. T. (2011). Youth online activity and exposure to diverse perspectives. *New Media & Society*, *14*(3), 492–512. https://doi.org/10.1177/1461444811420271

Karvonen, L. (2009). *The personalisation of politics: A study of parliamentary democracies*. *ECPR monographs*. Colchester: ECPR Press.

Kepplinger, H. M. (2000). Die Dominanz der Medien und die Demontage der Politik. In A. Schorr (Ed.), *Publikums- und Wirkungsforschung: Ein Reader* (pp. 247–260). Wiesbaden: VS Verlag für Sozialwissenschaften.

Kitchin, R. (2017). Thinking critically about and researching algorithms. *Information, Communication & Society*, *20*(1), 14–29. https://doi.org/10.1080/1369118X.2016.1154087

Kliman-Silver, C., Hannak, A., Lazer, D., Wilson, C., & Mislove, A. (2015). Location, Location, Location: The Impact of Geolocation on Web Search Personalization. In K. Cho, K. Fukuda, V. Pai, & N. Spring (Eds.), *Proceedings of the 2015 ACM Conference on Internet Measurement Conference - IMC ‘15* (pp. 121–127). New York, New York, USA: ACM Press. https://doi.org/10.1145/2815675.2815714

Koch, W., & Frees, B. (2017). ARD/ZDF-Onlinestudie 2017: Neun von zehn Deutschen online. *Media Perspektiven*, *9*, 434–446.

Krafft, T. D., Gamer, M., & Zweig, K. A. (2019). What did you see? A study to measure personalization in Google’s search engine. *EPJ Data Science*, *8*(1), 7. https://doi.org/10.1140/epjds/s13688-019-0217-5

Langer, A. I. (2010). The Politicization of Private Persona: Exceptional Leaders or the New Rule? The Case of the United Kingdom and the Blair Effect. *The International Journal of Press/Politics*, *15*(1), 60–76. https://doi.org/10.1177/1940161209351003

Lewandowski, D. (2015). *Suchmaschinen verstehen*. Berlin, Heidelberg: Springer Berlin Heidelberg.

Machill, M., Neuberger, C., & Schindler, F. (2003). Transparency on the Net: Functions and deficiencies of Internet search engines. *info*, *5*(1), 52–74. https://doi.org/10.1108/14636690310473890

Mackenzie, A. (2005). The Performativity of Code: Software and Cultures of Circulation. *Culture and Society*, *22*(1), 71–92. https://doi.org/10.1177/0263276405048436

Magin, M., Steiner, M., Heinbach, D., Bosold, S., Pieper, A., Felka, E.-M., & Stark, B. (2015). Suchmaschinen auf dem Prüfstand – eine vergleichende Inhaltsanalyse der Qualität von Trefferlisten. *Medien & Kommunikationswissenschaft*, *63*(4), 495–516. https://doi.org/10.5771/1615-634X-2015-4-495

Magin, M., Steiner, M., & Stark, B. (2019). Suche im Netz - einseitige oder vielfältige Informationsquelle. *Media Perspektiven*, *9*, 421–429.

McAllister, I. (2007). The Personalization of Politics. In R. J. Dalton & H.□D. Klingemann (Eds.), *The Oxford Handbook of Political Behavior* (pp. 571–588). Oxford University Press.

McQuail, D. (2010). *McQuail's Mass Communication Theory* (6th ed.). London: SAGE Publications Ltd.

Microsoft Bing (n.d.). Bing News PubHub Guidelines for News Publishers. Retrieved from https://pubhub.bing.com/Home/Help

Microsoft Bing Ads (2016). Das Bing Network in Deutschland auf Wachstumskurs (visited: 04.11.2017). Retrieved from https://advertise.bingads.microsoft.com/de-de/blog/post/september-2016/das-bing-network-in-deutschland-auf-wachstumskurs

Miel, P., & Faris, R. (2008). *News and Information as Digital Media Come of Age* (Media Re:public). Retrieved from http://cyber.harvard.edu/sites/cyber.law.harvard.edu/files/Overview_MR.pdf

Möller, J., Trilling, D., Helberger, N., & van Es, B. (2018). Do not blame it on the algorithm: An empirical assessment of multiple recommender systems and their impact on content diversity. *Information, Communication & Society*, *21*(7), 959–977. https://doi.org/10.1080/1369118X.2018.1444076

Nechushtai, E., & Lewis, S. C. (2019). What kind of news gatekeepers do we want machines to be? Filter bubbles, fragmentation, and the normative dimensions of algorithmic recommendations. *Computers in Human Behavior*, *90*, 298–307. https://doi.org/10.1016/j.chb.2018.07.043

Nielsen, R. K. (2014). Varieties of Online Gatekeeping. *SSRN Electronic Journal.* Advance online publication. https://doi.org/10.2139/ssrn.2675055

Nikolov, D., Oliveira, D. F.M., Flammini, A., & Menczer, F. (2015). Measuring online social bubbles. *PeerJ Computer Science*, *1*(34), e38. https://doi.org/10.7717/peerj-cs.38

Olmstead, K., Mitchell, A., & Rosenstiel, T. (2011). *Navigating News Online: Where People Go, How They Get There and What Lures Them Away* (Pew Research Center's Project for Excellence in Journalism).

Pariser, E. (2011). *The filter bubble: What the Internet is hiding from you*. London: Viking.

Puschmann, C. (2019). Beyond the Bubble: Assessing the Diversity of Political Search Results. *Digital Journalism*, *7*(6), 824–843. https://doi.org/10.1080/21670811.2018.1539626

Risvik, K. M., & Michelsen, R. (2002). Search engines and Web dynamics. *Computer Networks*, *39*(3), 289–302.

Schroeder, R., & Kralemann, M. (2005). Journalism Ex Machina—Google News Germany and its news selection processes. *Journalism Studies*, *6*(2), 245–247. https://doi.org/10.1080/14616700500057486

Seaver, N. (2013). Knowing Algorithms. Retrieved from http://nickseaver.net/papers/seaverMiT8.pdf

Seymour, T., Frantsvog, D., & Kumar, S. (2011). History Of Search Engines. *International Journal of Management & Information Systems (IJMIS)*, *15*(4), 47. https://doi.org/10.19030/ijmis.v15i4.5799

Silverstein, C., Marais, H., Henzinger, M., & Moricz, M. (1999). Analysis of a very large web search engine query log. *ACM SIGIR Forum*, *33*(1), 6–12. https://doi.org/10.1145/331403.331405

Similar Web (2017). Top Websites in Germany: SimilarWeb Website Ranking (visited: 04.11.2017). Retrieved from https://www.similarweb.com/top-websites/germany

Singer, J., & Quandt, T. (2009). Convergence and Cross-Platform Content Production. In K. Wahl-Jorgensen & T. Hanitzsch (Eds.), *International Communication Association handbook series. The handbook of journalism studies* (pp. 130–144). New York: Routledge.

Singer, J. B. (2006). Stepping Back from the Gate: Online Newspaper Editors and the Co-Production of Content in Campaign 2004. *Journalism & Mass Communication Quarterly*, *83*(2), 265–280. https://doi.org/10.1177/107769900608300203

Singer, J. B. (2014). User-generated visibility: Secondary gatekeeping in a shared media space. *New Media & Society*, *16*(1), 55–73. https://doi.org/10.1177/1461444813477833

Sörensen, J. (2016). The German federal president in the press: Public officeholder or private citizen? *European Journal of Communication*, *31*(3), 243–259. https://doi.org/10.1177/0267323116629878

Steiner, C. (2012). *Automate this: How algorithms came to rule our world* (1. publ).

Tavani, H. (2016). Search Engines and Ethics. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy (Fall 2016 Edition)*. Retrieved from https://plato.stanford.edu/archives/fall2016/entries/ethics-search/

Thorson, K., & Wells, C. (2016). Curated Flows: A Framework for Mapping Media Exposure in the Digital Age. *Communication Theory*, *26*(3), 309–328. https://doi.org/10.1111/comt.12087

Thurman, N. (2007). The globalization of journalism online. *Journalism: Theory, Practice & Criticism*, *8*(3), 285–307. https://doi.org/10.1177/1464884907076463

Trevisan, F., Hoskins, A., Oates, S., & Mahlouly, D. (2016). The Google voter: Search engines and elections in the new media ecology. *Information, Communication & Society*, *21*(1), 111–128. https://doi.org/10.1080/1369118X.2016.1261171

Trielli, D., & Diakopoulos, N. (2019). Search as News Curator. In S. Brewster, G. Fitzpatrick, A. Cox, & V. Kostakos (Eds.), *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (pp. 1–15). New York, New York, USA: ACM. https://doi.org/10.1145/3290605.3300683

Ulken, E. (2005). A Question of Balance: Are Google News search results politically biased? Retrieved from http://ulken.com/thesis/googlenews-bias-study.pdf

Unkel, J., & Haim, M. (2019). Googling Politics: Parties, Sources, and Issue Ownerships on Google in the 2017 German Federal Election Campaign. *Social Science Computer Review*, *7*, 089443931988163. https://doi.org/10.1177/0894439319881634

Upstill, T. (2018). Official Google Blog: The new Google News: AI meets human intelligence (visited: 08.05.2018). Retrieved from https://www.blog.google/products/news/new-google-news-ai-meets-human-intelligence/

Van Aelst, P., Sheafer, T., & Stanyer, J. (2012). The personalization of mediated political communication: A review of concepts, operationalizations and key findings. *Journalism: Theory, Practice & Criticism*, *13*(2), 203–220. https://doi.org/10.1177/1464884911427802

Vaughan, L., & Thelwall, M. (2004). Search engine coverage bias: Evidence and possible causes. *Information Processing & Management*, *40*(4), 693–707. https://doi.org/10.1016/S0306-4573(03)00063-3

Wallace, J. (2017). Modelling Contemporary Gatekeeping. *Digital Journalism*, *6*(3), 274–293. https://doi.org/10.1080/21670811.2017.1343648

Williams, B. A., & Delli Carpini, M. X. (2016). Monica and Bill All the Time and Everywhere. *American Behavioral Scientist*, *47*(9), 1208–1230. https://doi.org/10.1177/0002764203262344

Wolling, J. (2002). Suchmaschinen - Gatekeeper im Internet. *Medienwissenschaften Schweiz*, *2*, 15–23.

Wolling, J. (2005). Suchmaschinen? — Selektiermaschinen! In H. Krömker & P. Klimsa (Eds.), *Handbuch Medienproduktion: Produktion von Film, Fernsehen, Hörfunk, Print, Internet, Mobilfunk und Musik* (1st ed., pp. 529–537). Wiesbaden: VS Verl. für Sozialwiss. https://doi.org/10.1007/978-3-322-80462-4_41

Yalçın, N., & Köse, U. (2010). What is search engine optimization: SEO? *Procedia - Social and Behavioral Sciences*, *9*, 487–493. https://doi.org/10.1016/j.sbspro.2010.12.185

Yue, Y., Patel, R., & Roehrig, H. (2010). Beyond position bias. In M. Rappa (Ed.), *Proceedings of the 19th International Conference on World Wide Web: WWW'10 ; Raleigh, NC, USA, April 26 - 30, 2010* (p. 1011). New York, NY, New York, NY: ACM Digital Library; ACM. https://doi.org/10.1145/1772690.1772793

Zahedi, M. S., Mansouri, B., Moradkhani, S., Farhoodi, M., & Oroumchian, F. (2017). How questions are posed to a search engine? An empiricial analysis of question queries in a large scale Persian search engine log. In *2017 3th International Conference on Web Research (ICWR): Tehran - Iran, April 19-20, 2017* (pp. 84–89). Piscataway, NJ: IEEE. https://doi.org/10.1109/ICWR.2017.7959310