



Once Upon a Time, “About 1.170 Results”: Exploring the Narrative Power of Search Engines

Paulan Korenhof¹

Received: 23 October 2023 / Accepted: 20 August 2024
© The Author(s) 2024

Abstract

Search engines play a pivotal role in online ecology and can have a significant impact on people, especially in the case of a name search. The pros and cons of removing search results have been at the heart of an ongoing debate revolving around “the right to be forgotten” (art. 17 of the General Data Protection Regulation). This article proposes to contribute the discussion by philosophically reflecting on the transformative power of search engines in relation to original content. It shows that the implications of search engines run deeper than the mere display of faulty or outdated content. In order to reveal and conceptualise the impact that search engines have on the information they present, this article operationalises Ricoeur’s notion of ‘semantic autonomy’ in a digital context. This offers a framework that is used to analyse the transformative power of search engines across several dimensions: the relation to authors, audiences, the message and the semantic value of content. The article concludes that search engines have a transformative power that may bypass human intentions on multiple levels and, to a certain degree, allows them to ‘tell a story’ on their own.

Keywords Semantic autonomy · Search engines · Materiality · Data subjects

1 Introduction

On the World Wide Web with its abundance of resources, search engines like Google Search, Bing, and Duckduck.go are the lifeline of users who are looking for information. However, anything can be searched with a search engine, including the names of individuals. This can lead to concerns with and even objections by the data subjects—the persons named or otherwise identifiable in search results.

✉ Paulan Korenhof
paulan.korenhof@wur.nl

¹ Wageningen University and Research, Wageningen, The Netherlands

Since the landmark *Google Spain* court case in 2014¹ and introduction of the General Data Protection Regulation (GDPR) in Europe in 2018, data subjects can request the erasure of specific search results referring to them. Art. 17 of the GDPR, the “Right to erasure (‘right to be forgotten’)”, gives individuals under certain conditions the right to have data relating to them erased. So far, Google search reports over 1.5 million removal requests seeing to over 6 million URLs since 2014.²

Given the pivotal role of search engines in online practices, the legal interference in their results caused a heated discussion in the academic and public realm (see e.g. Ambrose, 2012; Nunziato, 2017; Schimke, 2022). The core of the debate revolves around tensions between a right to erasure vis-a-vis the right to freedom of expression and information, focusing on questions of truthfulness, justice, and accuracy with regard to the inclusion and exclusion of information in search results. While undeniably a crucial debate, an exploration of a list of erased search results published by the BBC draws our attention to the implications of search engines beyond the mere inclusion or exclusion of information. The list of contested search results shows that people not only object to search results revealing crimes and misdemeanours, but also relatively unremarkable and even positive content. Examples are search results pointing to articles reporting on football fans raising money for children in need, interviews with recovered patients, and opinion polls on topics varying from games to politics.³ Even more, in a significant part of the articles the data subject seemed to be a voluntary contributor to the content. Despite content being voluntarily shared, contemporary, and seemingly unoffensive, data subjects thus may still object to the display of certain content by a search engine in response to a name search. This suggests that the way search engines package, represent, and contextualise personal information has semantic implications and raises the question: how do search engines semantically implicate original content when rendering search results?

The objective of this article is to critically explore the transformative power of search engines in rendering online content into search results. A focus on the philosophical implications of the rendering of search results contributes to understanding how these technologies shape and frame information about the world, including individual persons. Building on research that mapped issues in search engines with bias, discrimination, profiling and commodification practices (see e.g. Fletcher et al., 2023; König & Rasch, 2014; Noble, 2018), as well as foundational work on how search engines embody economic, political, epistemic and material power structures (see e.g. Haider & Sundin, 2019; Iliadis, 2022; Pasquale, 2015), this research aims to contribute to scholarship on the meaning-making power of search engines in the semantic shaping of content beyond the mere inclusion or exclusion of information. For this, the article sets out to offer a critical analysis of the semantic implications of

¹ CJEU, 13-05-2014, C-131/12, ECLI:EU:C:2014:317 (*Google Spain SL, Google Inc./AEPD, G*).

² Google Transparency Report, *Requests to delist content under European privacy law*. <https://transparencyreport.google.com/eu-privacy/overview?hl=en>, last accessed 15-05-2024.

³ Neil McIntosh, “List of BBC web pages which have been removed from Google’s search results”, *BBC News*, 2014. <http://www.bbc.co.uk/blogs/internet/entries/1d765aa8-600b-4f32-b110-d02fbf7fd379>, last accessed 17-10-2023.

search engines on a micro- and front-end level by bringing together phenomenological, hermeneutic, and semantic theories (Floridi, 2018; Ricoeur, 1991).

The article starts with an operationalisation of Ricoeur's concept of 'semantic autonomy' in a digital context by taking a 'material turn'. This concept offers a framework to analyse search engines as material systems that exert a certain 'autonomy' in their content-mediating practices seen from a user-level perspective. Based on the framework, in section three the article traces the transformative power of search engines over the content they present across three levels: the relation to authors, audiences, and the message of the content, and shows how, to a certain degree, search engines can 'tell a story on their own'. In section four, the analysis of the semantic autonomy of search engines is used to critically consider how they affect the semantic value of the content they present and may give rise to semantic value conflicts. This article concludes by drawing lessons from the framework.

2 The Matter of Semantic Autonomy

In order to unpack how search engines semantically alter content, I follow the lead of Coeckelbergh, Rijers, and Romele, and look for help in the work of Ricoeur (Reijers & Coeckelbergh, 2020; Romele, 2020; Romele et al., 2021). In particular, Ricoeur's conceptualisation of 'semantic autonomy' can offer valuable handholds to shed light on the transformative power of search engines. Ricoeur employs the concept to clarify and identify the implications of the material exteriorisation of a discourse in written text (Ricoeur, 1976, 1991). Ricoeur argues that with the inscription of a discourse in an exterior bearer, the discourse is distanced from its human speaker and instead "material 'marks' convey the message" (Ricoeur, 1976, p. 26). As a result, a materialised text has a certain semantic *autonomy*: a separate and influential existence of the inscribed bearer that *works on* the discourse and enables a wide range of effects that deeply shape our societies (Ricoeur, 1991). Think for example about the importance of the written word for constitutional states: without the ability to transfer laws and jurisprudence with almost no distortion over time and space, our contemporary legal system would be incredibly unreliable and open to serendipitous changes.

The particularly helpful contribution of Ricoeur is his dialectic analysis of the three directions in which the semantic autonomy of a material bearer works: towards the author (in our case: producer or co-producer of the original content), audience (search engine users), and the message (search results) (Ricoeur, 1976, 1991). Ricoeur's conceptualisation of 'semantic autonomy' shows that the autonomous role of the material bearer in meaning-making is not absolute, but always shaped in a dialectic relation to a text's author, audience, and message.

On the author-level, a written text embodies simultaneously a distanciation and a presence of its author. Authors are led by an understanding of how to put an action into words which prefigures their writing (Ricoeur, 1990). The materialisation of a discourse then distances it from its author and context of prefiguration by giving the inscribed text prominence over its meaning: "What the text means now matters more than what the author meant when he wrote it" (Ricoeur, 1976, p. 28). However, at the

same time the text itself suggests the presence of the author as a dimension of the text (Ricoeur, 1976, p. 30).

On the audience-level, a written text has a certain semantic autonomy with regard to the construction of its audiences and what it displays to them, while the audience plays a pivotal role in the construction of meaning of the text (Ricoeur, 1976). A written text shapes its audience by having a certain accessibility in space and time, as well as requiring its readers to have particular reading and language skills (Ricoeur, 1976). Meanwhile, audience members are free to engage with the text and interpret it in different manners. They thereby refigure the text in their own frame of reference (Ricoeur, 1990). With this, an audience appropriates the meaning of the text and counteracts on the semantic autonomy of the material bearer (Ricoeur, 1991).

On the message-level, the meaning of the text is configured by placing different elements together in a whole (Ricoeur, 1990). In this configuration, the material mediator frees the text “not only from its author and from its original audience, but from the narrowness of the dialogical situation, [and] reveals this destination of discourse as projecting a world” (Ricoeur, 1976, p. 37). Yet, at the same time, the inscription binds the ostensive character of the reference to the material bearer, thereby emphasising itself in its socio-temporal context as message that is being presented (Ricoeur, 1991).

While Ricoeur developed the concept of ‘semantic autonomy’ mainly in the context of writing, on a more abstract level we can approach his analysis as a foundation for exploring the transformative power of material bearers in all human information practices. Delving deeper into the material dimension, Ricoeur describes an inscribed discourse as something that is in a sense “a form is applied to some matter in order to shape it” (Ricoeur, 1976, p. 33). Later on, Ricoeur provides a brief but prolific viewpoint: “Because the painter could master a new alphabetic material—because he was a chemist, distillator, varnisher, and glazer—he was able to write a new text of reality” (Ricoeur, 1976, p. 41). With this, Ricoeur seems to open up the concept of ‘semantic autonomy’ for images. Continuing on this line, I suggest to understand any *form* of inscribed content, whether it be text, photos, or drawings as semantically meaningful in line with the concept of ‘semantic autonomy’. The matter to which the form is applied can be paper, wood, stone, but it also can be digital. This article therefore proposes to understand ‘semantic autonomy’ as the power of a material medium to exert influence on any content and thereby transform (even if only in a minor manner) its relation to the author, audience, and its message.

Yet, what Ricoeur’s exploration does not show is how the semantic autonomy of an inscribed object is constituted. While he mentions the inscription of text in different materials (“whether it be stone, papyrus, or paper” (Ricoeur, 1976, p. 26), Ricoeur seems to pay little attention to matter itself and does not delve into the question whether different materials have different properties and implications. Moreover, Ricoeur frames the role of matter rather passively: matter “is shaped” (Ricoeur, 1976, p. 33) and human beings can “master a new alphabetic material” (Ricoeur, 1976, p. 41). The question is if such framing does justice the role of matter in the constitution of the semantic autonomy of a materialised inscription: different materials have different properties and afford different uses. For example, pen and paper are more convenient materials for taking notes during a lecture than a chisel and slab of marble.

I therefore take a less passive approach towards to the medium's materiality and, connecting to contemporary scholars in philosophy of technology, understand this materiality as a bearer's directionality towards promoting certain actions, uses, and ways of engaging with the world, while concealing or prohibiting others (cf. Possati, 2022; Reijers & Coeckelbergh, 2020; Romele, 2020). By having different properties and characteristics, materials have distinct constitutions and degrees of semantic autonomy with different implications for their relation towards the author, audience, and message. Each material bearer, whether it be a newspaper, a message chiselled in stone, or an online news website, imprints its own specifics on the actualisation of the externalised discourse: e.g., its continuity (fleeting like words written on the beach, or persistent like those chiselled in stone), its flexibility (to what extent can the content be changed), the manner in which it can be perceived (read, touched, heard), and its context (its cultural, temporal, spatial, and informational embedding).

This materially informed operationalisation of Ricoeur's concept of 'semantic autonomy' allows us to scrutinise the three layers in the hermeneutic relations that search engines establish, giving us a frame to further unpack a search engine's transformative power in the semantic shaping of content.

3 Search and Discourse

In this section, we unpack the semantic autonomy of search engines and reflect on how they semantically transform original personal content when producing search results. We do this through the lens of our materially oriented uptake of semantic autonomy discussed in the previous section and divide the section into the three directions into which the semantic autonomy of material bearers work: in the direction of the author, the audience, and the message.

3.1 Author and Search Results

For the generation of search results, search engines make use of online content authored by others for their own, often profit-driven, service (Fuchs, 2012). In the context of this article, we are particularly interested in such content that is inscribed into the web by, or with the agreement of the data subjects themselves. When inscribing content into a material bearer, the author, medium, and message are involved in an interplay that gives shape to the final materialised content. The material bearer influences both the form (text, photo, drawing, etc.) and the message that the author is likely to inscribe. The precise interplay between the human inscriber and the inscribed material can take shape in different ways, involving various degrees of human intentionality and material semantic autonomy which are more or less aligned. For example, chiselling a text in stone is time and space consuming, while writing a text on paper far less so. The properties of paper compared to those of stone are therefore more inviting for certain inscriptions, like a grocery list that needs to be inscribed quickly, carried along, and has a fleeting relevance.

In this context, the Web is an interesting medium: it is relatively easy to inscribe as long as one has access to the right tools and services, while at the same time, the

presence of inscribed material can persevere online for a long time. Authoring online content entails the inscription (or better: encoding) of content into a discrete set of binary values (bits). This process is mediated by an interface that translates binary data into human-intelligible representations (visuals/audio) and back based on certain standards (this could be e.g., ASCII, UTF-8, JPG, PNG). The resulting ‘digital object’ consists of entangled layers of material bearers and materialised codification, ranging from humanly perceptible screen at the top layer, to program files, machine language, binary code, volts, and finally to silicon and copper as one moves down the layers (Hui, 2013). Materialising content into a digital object imbues it with the characteristics and affordances of digital technology. While the exact characteristics and affordances depend on the specifics of the application, there are some general characteristics that can be attributed to most online digital objects: they are flexible, easily reproducible, transmissible, and can be encoded from virtually anywhere at any time.

Digital objects can be changed relatively easy by flipping some bits; words in files and pixels in images can be changed without leaving crossed out blotches, text can be added and deleted at any point in a document. Depending on the ‘location in cyberspace’ (i.e., the application), the flexibility often offers the possibility of ongoing change to the content by the author—think about the potential to continuously adjust a personal website, the option to edit posts, replace documents, etc. De Mul therefore argues that the online world offers more fluid and interactive narrative structures to express people’s identity (de Mul, 2002).

Like every materialised discourse, an online authored text is separated from the necessary closeness of its author’s physical being in space and/or time. However, its flexibility and accessibility afford the author to be at a ‘micro-distance’. Online, an author can consistently engage and meddle in the message that audiences receive, giving presence and possibly even offering a direct response. While the author remains an author in the sense that the content is written, the authorial meaning can be reduced to the point of instant written speech (or potentially even speech that is automatically authored). In this sense, we may be tempted to say that the Web has a relatively weak semantic autonomy, affording the author to be at close range. However, while the distance between author and content seems minimised, it is at the same time necessarily mediated by an electronic device that is always between author, message, and audience. Separated by a Web interface, audiences will have difficulty to be sure who or what is authoring the message—whether it be human or machine. It is therefore precisely the flexibility and accessibility that can also heavily increase the distance between author and content. By authoring online content, the content becomes embedded in the Web’s network and opened up for online processing like hyperlinking, reposting, mirroring—and indexing by search engines (Carr, 2010).

Authors of the original online content can exert some autonomy over whether their content is processed by a search engine, but only if they have control over the website on which their content is published: websites may use NoIndex/NoArchive tags or a robots exclusion protocol which prevent search engines from indexing (parts of) a website. Being indexed by a search engine, is thus an opt-out instead of an opt-in: consent is assumed, unless explicitly denied. However, when people inscribe content into the Web they may not always consider—and agree—that a search engine

may appropriate this content for search purposes (Tavani, 2016). Additionally, others may have copied and reproduced the content elsewhere from where it (again) can be indexed. While data subjects thus may willingly have (co)authored online content, they do not automatically also intend to have this content reproduced by a search engine: the reproduction is initiated by the search engine, following a ‘technological intentionality’ to appropriate online content (cf. Verbeek, 2005). This process alienates the author from ‘her’ content in the search engine, allowing her only indirect influence through adjustments at the source page or the filing of search result erasure requests. Hence, by being programmed as pro-active content collectors in a network, search engines bring about a new dimension in the relation between author and discourse where distance and presence are shaped in an interplay of connective reproduction. With their active role in *re*-presenting online inscribed discourses (making them present, but differently and elsewhere), search engines cash in on the networked and flexible characteristics of online digital matter. They render the discourse present while they increase its distance from the autonomy of its author. Search engines thereby exert a relatively strong semantic autonomy in the direction of the author by appropriating content into their own frame of reference.

3.2 Mediating Audiences

Like any material bearer, search engines transform the audiences of a discourse by at the same time limiting and expanding their audiences compared to the spatial, temporal, and cultural context of the author (Ricoeur, 1976). On the one hand, the materialisation of a discourse opens it up to a potential universal audience by expanding it in time and space (Ricoeur, 1991). On the other hand, this opening up is shaped and curbed by social and practical contingencies and limitations tied to the material inscription which requires audiences to be able to read, be able to access the text, and choose to engage with the content (Ricoeur, 1991). However, the digital materiality of online content—and in particular as presented in search engines—presses its own mark on this expansion and limitation.

Digital objects have a peculiar ‘materiality’: due to their binary structure, they are not necessarily fixated to a specific location in an information carrier. They do, however, require to be stored on a physical device somewhere. While the material carrier where the content is stored may be stationary, the binary character imbues the digital object with a potentially high transmissibility; they can easily and accurately be transported over cables and in the ether—as is done on the internet. In the strict sense, this is an affordance of the digital object’s replicability: a copy is transmitted while the object itself remains stored on the server. Imagine, if the original was sent, every picture on the Web would disappear from the server after the first view. Additionally, this replicability renders online content into a non-rival good, meaning that that the consumption of the good—viewing the content—by one person, does not diminish the usefulness of and access to the good for others (Quah, 2003, p. 13). Online technology thereby presses a strong mark on the access conditions of audiences: in theory it allows a potentially universal audience to view the same content simultaneously from virtually any location. Yet, digital materiality also imposes crucial limitations on

its audience access: in order to be perceived, a binary inscribed discourse needs to be decoded and translated into another format before it is perceptible and comprehensible to human beings. Staring at a computer chip tells us nothing about the content that it contains; the phenomenological digital object only exists for its audience through its processing by an output device (screen, printer, sound-card and speaker). To access a search engine, audiences thus need a sufficiently sophisticated device, the know-how to operate it, and an internet connection. With the ongoing development of internet connectivity, easy-to-operate devices, and efforts of public administration to improve digital literacy, search engines can reach a still expanding audience. Estimation is that currently the number of internet users worldwide is over 5 billion—almost 70% of the world population.⁴ Even more, search engines are commonly pre-installed on smartphones, tablets, and in most Web browsers (the question which search engine is pre-installed, is itself already a power struggle with regard to the control of information flows on the Web). Search engines can significantly expand the audiences of online discourses. Even more, it is precisely their immense power in connecting audiences with content that is at the heart of many societal concerns (Puschmann, 2019; Steiner et al., 2022; Trielli & Diakopoulos, 2019).

While search engines thus express a significant transformative power on audience access, their interplay with the two other factors that potentially limit an audience may be even more significant: the audience's ability to read the content and choose to engage with it. Contrary to a discourse on paper which is static in its presentation and thereby indifferent to its particular reader, the flexible and interactive potentiality of digital matter afford search engines to adjust their content to the language and interests of individual audience members and actively engage with the user's search action. The two pivotal mechanisms at play here are user profiling and autocomplete.

Search engines can profile a user based on for example the user's location data, IP, browser type, and search history, and use this to assemble and display a search result list that fits the user profile (Kliman-Silver et al., 2015; Le et al., 2019). While there is an ongoing discussion about the extent to which profiling shapes the search result list (Pariser, 2011; Puschmann, 2019; Zuiderveen Borgesius et al., 2016), especially given the increasing focus of large platforms towards centralisation and consolidation of information (Iliadis & Ford, 2023), it does seem to bring about fragmentation of users with regard to language, location and searches over time—even if personalised settings are turned off.⁵ By fine-tuning results to the user-profile, search engines increase the chance that a user can read the content and is likely to engage with it. This reactive engagement serves on the one hand to benefit the user, and on the other hand it commonly serves to generate profit by auctioning advertisement space based on data from this individuation (Kaplan, 2014; Zuboff, 2015).

This reactive engagement of search engines continues with the offering of 'auto-completions'. While for a human user to 'search' is a specific act with an intentional

⁴<http://www.internetworldstats.com/stats.htm>, last accessed 17-10-2023.

⁵Google Search Help, *Why your Google Search results might differ from other people*, <https://support.google.com/websearch/answer/12412910>, last accessed 07-0-2024.

directionality towards a particular subject of interest, search engines become actively involved in the directionality of the search by offering the user a list of ‘autocompletions’ that suggest possible queries that start with the same letters or symbols. The offered suggestions are commonly based on an algorithmically calculated combination of the user’s previous search history, searches by other users, language, and trending topics.⁶ The feature tends to be appreciated because it saves users time, the burden of correct spelling, and it informs users about associated topics of which users may have been unaware (Ward et al., 2012). Users can therefore experience autocomplete as “extra brainstorming, but from the computer” (Ward et al., 2012, p. 12). While the autocompletions are devoid of human meaning for the search engine, they have meaning for human users. The autocomplete feature can affect the sense (search string) the user had in mind, as well as the user’s understanding of the reference (the object or person about which the user wants to find information) by highlighting certain personal information (mainly the popular and the recent trends) and establishing particular associations. However, drawn from queries performed by other users, autocompletions can reflect *any* informational relation searching users queried, including unjustified, incorrect, harmful, or discriminatory words or relations between references (Baker & Potts, 2013; Chander, 2016; Elers, 2014; Noble, 2018)—thereby suggesting their existence or relevance. This can also lead to unjustified connections between an individual’s name and other terms. A case where this took a problematic turn, was that of a former German First Lady. She was the victim of a false rumour that she had worked as a prostitute. As this spiked the general public’s interest, users tried to search online for information with the help of Google Search. The consequence of this mass search was that when typing in the First Lady’s name, it was autocompleted with terms like ‘prostitute’, and ‘escort’.⁷ With the autocomplete mechanism, search engines exert a transformative power on the context and direction of the search.

By individuating users and directing search actions, search engines influence the possible interpretations of a discourse. As human beings engage with a discourse, they ‘refigure’ the content into their own understanding and context (Ricoeur, 1990). Yet, as search engines steer audience intentionality and match profiles with content, they influence the context and understanding of the audiences they form. If even only a fraction of Pariser’s claims that the profiling practices on the Web envelops us in a filter bubble that matches content to our social and political preferences, it means that content is more likely to be interpreted by a relatively homogenous audience (Pariser, 2011). As such, search engines can set audience conditions that are likely to reduce differences in interpretations. For Ricoeur, it is precisely this scope and potentiality of multiple interpretations that is the counterpart of the medium’s semantic autonomy (Ricoeur, 1991). By being able to partially negate this counterpart, search engines have a strong semantic autonomy in the audience-content relation—even if it is still a topic of discussion to which extent they exert it.

⁶ See <https://support.google.com/websearch/answer/106230?hl=en>, last accessed 09-10-2020.

⁷ See Stefan Niggemeier, “Autocompleting [...]: Can a Google Function Be Libelous?”, translated by Paul Cohen, *Spiegel Online*, 2012. <https://www.spiegel.de/international/zeitgeist/google-autocomplete-former-german-first-lady-defamation-case-a-856820.html>, last accessed 20-10-2023.

3.3 The Message of Search

Search engines make a world hermeneutically present in the form of search results, answers to frequently asked questions, and increasingly by means of information boxes. This subsection explores the semantic autonomy of search engines with regard to the message of content. For this, we first zoom out and have a look at search engines as ‘semantic media’ from a macro-perspective. After that, we move to the micro-perspective where we trace the transformative power of search engines with regard to the production of a concrete search result overview as shown to a user.

3.3.1 Macro-Level: Prefiguring Ontologies

Contrary to their human users, search engines cannot deal with the variable understanding of words, like allegories, synonyms, or metaphors; they process the search string as a set of symbols devoid from any social or contextual connotation (Fuller, 2003). For a search engine, the search string does not have ‘meaning’ in the same way it does for human agents. ‘Meaning’ in the context of a search engine is given shape by means of algorithms that evaluate the search query based on diverse quantified values. However, the manner in which search engines give ‘meaning’ to a search, is changing over time. Initially, search was based on the sorting of content based on search string similarity. However, around 2012 search engines started to shift from information retrieval practices based on ‘words’ to practices based on ‘concepts of things’ (Iliadis, 2022). The goal was to move away from lexical oriented search to semantic search, thereby trying to produce content that connected to the meaning of what was sought i.e. the intended referent of the query (for example, a specific person). This shift goes hand-in-hand with the increasing tendency to offer answers to user queries as much as possible on the websites of search engines themselves (Fensel et al., 2020; Iliadis, 2022). As Iliadis frames it, “companies started to focus on products that try to guess our *intentions* and what we are trying to know by offering direct answers to queries based on *context* (...) [and] provide mechanisms for *actions*” [emphasis original] (Iliadis, 2022, p. 23). The more prominent and all-encompassing search engines become vis-a-vis authors and audiences, the stronger the implications of a search engine’s semantic autonomy in the construction of meaning.

A pivotal role in the information practices that render search engines into a “one-stop-shop” for accessing information, is played by ‘knowledge graphs’ (Iliadis, 2022, p. 24). Knowledge graphs are graph-based structures that operate on data by representing concepts (these can be objects, events, people or abstract concepts) and their semantic relations (Ehrlinger & Wöß, 2016; Fensel et al., 2020; Hogan et al., 2021). By doing this, they allow for retrieving implicit informational connections rather than only allowing queries requesting explicit informational matches (Fensel et al., 2020; Hogan et al., 2021). These knowledge graphs are used to produce information boxes (labelled by Google as ‘knowledge panels’) that contain what the search engine judges to be the most relevant content. The information boxes displayed by search engines are an articulation of power to decide what is most meaningful information about a particular concept (Iliadis, 2022). This discretionary power is not socially neutral: the content has an inclination for contemporary and simple mainstream con-

tent, bypassing cultural nuances, complex histories, and diversity in identity (Iliadis, 2022; Noble, 2018).

The formative processes that underpin search engines' knowledge representation and information retrieval practices have been extensively explored by Iliadis (2022). He shows how the design decisions underpinning the infrastructure and information organisation of search engines reflect and constitute certain ontologies in the computational as well as in the philosophical sense (Iliadis, 2022). First of all, the development of knowledge representation and information retrieval systems requires designers to make choices with regard to what is considered factual content, what accurate categories are to describe the world and what the relations between these categories are. Such decisions rest on the designers' ontological framework: their assumptions about what reality is, what exists in it and to what categories existing things belong (cf. Korenhof et al., 2023). Second, this in turn is materialised in a formal—computational—ontology. In this context, 'ontology' refers to the set of formal definitions, rules, properties, values and relational functions that represent the different elements in a certain subject area (Ehrlinger & Wöß, 2016; Hogan et al., 2021; Iliadis, 2022). These ontologies play a pivotal role in the production of search answers, in particular by serving as a schema layer for the knowledge graphs that produce the content in information boxes (Iliadis, 2022). Last, by mediating human actions and materialising content at an ontic level (i.e., the search results), search engines influence the meaning we give to our world. Blok therefore argues that concrete technologies are the prime drivers involved in ontological 'world-production' by framing the world in certain semantic relations (Blok, 2023). A concrete technology like a search engine therefore has an ontological impact in the philosophical sense and contributes to the constitution of a world-view—and in our name search cases, a view of individuals—understood according to the logic of a search engine's computational ontology (Blok, 2023; Iliadis, 2022).

The constitution of a search engine's semantic autonomy on a micro-level thus takes place within the framework of these macro-level ontology building practices. These ontologies reflect an pre-existing understanding of the world, what is to be represented, and what the appropriate symbolic practice is (cf. Ricoeur, 1984). This pre-existing framework *prefigures* the production of search results. Similar to how the human world-understanding of an author prefigures the text an author writes, we can thus understand a search engine's ontology as *material prefiguration* for the search results it produces (see Possati, 2022; Ricoeur, 1991; Romele, 2020).

3.3.2 Micro-Level: Configuring Search

One of the key points Ricoeur makes is that the semantic autonomy of a material bearer brings about an "emphasis of the message for its own sake at the expense of the reference" (Ricoeur, 1976, p. 36). In the case of search engines, this emphasis is literally expressed in the form of search results: references to original content. The meaning or context that the user may have had in mind is replaced by the mechanisms of the search engine that combine the user profile with the search engine's ranking and selection processes. The search engine produces a list with search results generated its databases in which copies from online content are stored. The meaning-

configuring workings of search result production can be traced across two levels: the relation between a single search result and the original content, and the mutual relation between search results in the ranked overview.

The semantic autonomy of search engines affects the message of the original content by representing it in a new inscription: the search result. For the production of a single search result, algorithms extract part of the original content by reproducing a fragment together with a hyperlink pointing to the source webpage (this is different in the case of information boxes, where the references are commonly lacking, see Iliadis, 2022). This reference-fragment commonly reflects the part of the original content that is the closest match to the search string. This extraction can even see to a marginal part of the original content, like a footnote of a text. In a material sense, search engines thus transform the form, appearance, context of the content, as well as shape the manner of potential engagement. By highlighting a reference-fragment, search engines magnify the presence of the reference—not unlike a magnifying glass (as is often appropriately used as search pictograph)—, while cutting off its original context. This is at the core of one of the biggest implications of search engines for a data subject: the microlevel retrieval of a search string can reveal the occurrence of a personal name even in the smallest details. For example, search engines can single out a post of a particular person in an big online discussion and highlight its presence. By doing so, search engines actively restructure the context and focus of the original discourse into a new perspective. This restructuring brings about a new kind of augmentation of that which it reproduces (cf. Ricoeur, 1976, p. 42).

As search engines augment references and offer them to searching users, they can alter what the author may have understood as meaningful access to the discourse. For example, while people can be open to the general public in an interview about particularly personal experiences with regard to for example health care, discrimination, relationships, or school, this openness is *contextualised*: it is about a topic, not about them as individuals. The target audience of these discourses are those who are interested in the *topic* that is being discussed, not in the particular individual. A search result can flip this focus around—especially in response to a name search—and thereby reverse the focus of the original content. Instead of a sub-element in a topic discourse, the topic becomes attached as predicate to the data subject's name. This focus reversal afforded by a name search can de-anonymise data subjects from the mass of content and highlight their individual presence, thereby deforming its original context and crossing the contextual expectations of the data subjects (cf. Nissenbaum, 2009). Search engines thus configure meaning by functioning as a spotlight: by switching the spotlight from the main character to someone in the chorus in the background, the search engine can direct the attention of the audiences to the secondary and present it as a leading element.

In order to further unpack the semantic autonomy of search engines in the configuration of search results, this article proposes to make a small sidestep to the essay *The Work of Art in the Age of Mechanical Reproduction* of Benjamin (originally published in 1935). In this essay, Benjamin argues that when a camera captures an actor on film, while being “[g]uided by its operator, the camera comments on the performance continuously” (Benjamin, 2008, p. 17). As the camera reproduces the performance of the actor, it does this from its own perspective (i.e., the camera can provide

close-ups, distant viewing, cut-outs, etc.) and thereby expresses a certain view on the performance—a ‘commentary’. Along these lines, it can also be said that a search engine ‘comments’ on online content by reproducing it according to the standards of its own framework; as the search engine’s algorithms fragment and recontextualise the original discourse, a certain perspective on the meaning of the content in relation to the search string is construed. The search engine’s augmentation is a ‘comment’ on what what is important and may deserve attention.

This ‘commentary’ does not stop at the single search result, but extends towards a larger meaningful whole when a search engine assembles multiple fragments in a ranked overview. By presenting particular search results, search engines imply the importance of certain information in relation to the search string. This is not unlike the effects of classic rhetoric where “[b]y the very fact of selecting certain elements and presenting them to the audience, their importance and pertinency to the discussion are implied” (Perelman & Olbrechts-Tyteca, 1969, p. 116). At the same time, relations between different references are established by the act of placing them together (Mayer, 2009, p. 68). Search engines thereby add new value to the results; “[w]hat search uncovers is not just keywords but also the inherent value of connection” (Kelly, 2007, p. 90). This combination of fragments affects their mutual interpretation by turning them into each others’ context. In this, search engines function as authoritative voices in an external position that ‘comment’ on the value of the content, imply its importance in relation to the query, and suggest relations between references by placing them together. Search engines thereby realise a kind of ‘emplotment’ (cf. Possati, 2022; Romele, 2020). Emplotment is the ascribing of a plot to a set of separate events, or as Aristotle phrases it, “the arrangement of the incidents” (Butcher, 1951, p. 25). It is a ‘configurational act’ that mediates between the actual events and the narration of these events, by organising these events in a particular manner (Carr, 1991, p. 64). In order to emplot a search result list, a search engine’s algorithms select and rank fragments of original discourses on request and assemble these on the spot for the searching user. They offer a technically materialised new narrative based on the logic of a relevance ranking and thereby exert a high degree of semantic autonomy.

This act of emplotment takes place in a ‘black box’: how the search results are selected and produced is hidden from the user (Pasquale, 2015). Despite the black boxing of the ranking process, some of the general algorithms that underpin search engines have been disclosed by developers and researchers. A famous algorithm is Google’s PageRank. PageRank ranks a website based on the number of links to that website, as well as the estimated ‘importance’ of the website that does the linking (Page et al., 1999). The more a website is linked to—especially by important others—the more ‘authoritative’ the website is taken to be and the higher ranked (Pasquale, 2015, p. 64). However, this relevance by proxy of quantified popularity is not always on par with human expectations and intentions. When users are linking a lot to a specific website to point it out as bad or untrustworthy, they can inadvertently give the website an authoritative status and turn it into a top search result (Pasquale, 2015, p. 73). What is interesting here, is that PageRank utilises precisely that part of the original discourse which Ricoeur marks as a dialectical counterpart of a text’s semantic autonomy. Ricoeur argues: “On the one hand, it is the semantic autonomy

of the text which opens up the range of potential readers and, so to speak, creates the audience of the text. On the other hand, it is the response of the audience which makes the text important and therefore significant” (Ricoeur, 1976, p. 31). By technically interpreting the response of the audience to original content, PageRank gives substance to a search engine’s semantic autonomy with regard to the configuration of a discourse revolving around relevance by proxy of popularity.

4 Semantic Autonomy and Semantic Value Conflicts

In this section, I employ the analysis of the previous section to critically consider how the semantic autonomy of search engines affect the semantic value of the content they present.

Being able to give meaning to and make sense of our experiences, ourselves, and the world around us is pivotal for human life: we make life choices, built identities, social relations, engage in politics, leisure and diverse transactions based on the meaning we attribute to things, people, and concepts. It is precisely this meaning- and sense-making that gives value to our experiences, identities, and world conceptualisations (Floridi, 2018). Floridi therefore frames the meaning-value of any semantic ‘resource’, like ideas, paintings, songs, inventions, sciences, narratives, games, customs, and experiences as “semantic capital” (Floridi, 2018, p. 481). For semantic capital to be productive, it is important that its projected narratives are editorially curated: semantic capital that reflects conflicting, erroneous, or outdated meaning loses meaning-making value (Floridi, 2018). The goal of the editorial curation is thus “to ensure that our semantic capital remains coherent and hence works as effectively, efficiently and productively as possible” (Floridi, 2018, p. 489). Given the importance of semantic capital in our lives, Floridi stresses that we need to explore the semanticisation by digital technologies as they “offer new forms of availability, accessibility, utilisation, and capitalisation of semantic capital” (Floridi, 2018, p. 496).

Search engines generate semantic capital and thereby affect the semanticisation of our lives, identities, and realities. As Noble states, a search engine “does not merely present pages, but structures knowledge, and the results retrieved in a commercial search engine create their particular material reality” (Noble, 2018, p. 148). By making online content searchable, zooming in, selecting, and ranking, search engines can compose a certain narrative about a data subject for a searching audience, in particular when a subject’s name is used as input for the query. In this, the semantic autonomy of search engines transform the semantic value of the original content they present in the direction of the author, the audience, and the message (depicted in Table 1).

On the level of the author, search engines overturn the interplay between distanciation and presence of the author by appropriating the original content and imbuing it with search value, and in case of commercial search, also a monetary use-value. Search brings the content to the audience’s informational present, while the social and temporal context of the original source, like the dropping of content to the bottom

Table 1 Semantic autonomy transformations

Level of interference	Semantic autonomy search engine	Semantic value transformation
Author	Distantiation Presence	Appropriation (search value)
Audience	Expansion Limitation	Coordination (coherence value)
Extraction	Message Material embedding	Emplotment (priority value)

of a page with the passing of time and the expectations of authors with regard to the audience, may be bypassed, crossed or even nullified.⁸

Search engines also go beyond the mere expansion and limitation of audiences, by actively matching audiences with content. They figure as curators of online meaning-making tailored to particular audiences and presenting what counts as primary knowledge. By coordinating the access of audiences to content based on social-cultural similarity (location, language, search history) and offering their own logic of primary knowledge production (information boxes, frequently asked question boxes) they produce semantic capital with a strong degree of coherence. This can be a fictional coherence that is not in line with the reality of the different narratives that various groups of people may have around a particular topic or person. Meanwhile, due to their pivotal position, search engines monopolise meaning and can drown out local epistemic cultures and diversity in narratives (Iliadis, 2022). While according to Floridi's theory on semantic capital the coherence of a narrative contributes to its semantic value, we need to be aware that a search engine's algorithmically produced semantic homogeneity is likely to be an underuse of the rich heterogeneous semantic value human beings can give to places, things, and identities.

The production of meaning in the search result narrative, the message, takes place in an interplay between the extraction of a reference from the content (freeing it from its original setting) and then binding it in a new form and recontextualising it in an algorithmically driven plot that thickens around the data subject. Search engines reframe the narrative to one of a relevance ranking, giving meaning to content based on priority. The act of ranking "is itself information that also reflects the political, social, and cultural values of the society that search engine companies operate within" (Noble, 2018, p. 148). In this ranking plot, the highest semantic value is attributed based on the logics of search ontologies, in which attention as assessment factor as well as commodity plays a key role. In case of a name search, the resulting presented personal narrative is a particularly thin or skewed one that boils down to a few identity references—references that potentially even do not revolve around the individual, or only do so in a marginal manner and have little meaning for the referent herself. This can reduce the freedom

⁸Yet, it is important to mention here that the original content may itself blur its relative age. The meta data of online content may mark it as being created on the upload date, while in fact they may be much older. This would especially be a potential issue with regard to old analogue archives that are scanned in and uploaded.

of the data subject to shape her own identity.⁹ Especially in the case of individuals with a limited online presence, a specific reference can become a salient predicate attached to their name due to the authoritative status of a particular source, like the content of popular media or an online newspaper archive. Search engines can thus “set a *spectacular value* for anything and anybody” [emphasis original] (Pasquinelli, 2009, p. 159). The production of semantic capital by search engines can render narratives in which data subjects become ‘flat’ characters, or worse, racial, gender or cultural discriminatory stereotypes.

Based on the analysis, this article argues that search engines employ a meaning-making logic that is not necessarily semantically productive when considered from a human, and more broadly speaking societal, perspective. By bringing potentially minor, private, irrelevant or outdated aspects of a data subject into focus, search engines can augment their meaning beyond the reasonable, while at the same time they can reduce the presence of valuable heterogeneous semantic capital by mainstreaming and coordinating the content audiences can access. A search engine’s transformations of original content turn the search result overview into a territory of semantic value conflicts. Authors, data subjects, and audiences may regard a search result or the full overview as the presence of semantic capital that is unproductive, misused, underused, or depreciated through time (cf. Floridi, 2018). However, for a search engine operator the content has a (commercial) use-value more than a meaning-value, which is best supported by adding search value to all accessible content, offering coherent answers to searches, and stimulating search use and attention as much as possible. The result is that the search result overview becomes a field of strife as data subjects, authors, audiences, and search operators struggle over the production of semantic capital by search engines.

This struggle is characterised by a fundamental inequality of arms: the means of semantic capital production lies in the hands of search engine operators. Meanwhile, authors have to convert to robot.txt or changing the original context of they want to exert any power over the semantic capitalisation of their content in search results. Audiences need to play around with the settings offered by the search engine operators, delete browsing histories or use for example Tor to increase the semantic diversity of the content. A data subject’s only option is to file a request with search engine operators to delist a search results based on their ‘right to be forgotten’, art. 17 GDPR. Compared to the semantic autonomy of search engines, authors, audiences, and data subjects stand relatively powerless. If we want online semantic capital to be productive for human beings and society at large, it is therefore pivotal to critically rethink the current mechanisms that give shape to the semantic autonomy of search engines.

⁹ It goes beyond the scope of this article to connect the implications of search engines to theories of identity construction. For future research, it is worthwhile to explore the semantic autonomy of search engines in the context of Ricoeur’s conceptualisation of an individual’s ‘narrative identity’ on the axis of ipse- and idem-identity (cf. Hildebrandt et al., 2009; de Vries, 2010).

5 Conclusion

Narrating is the act of bringing a story to an audience. Search engines play a pivotal role in bringing stories to audiences as they help us to navigate through the abundance of content on the internet. However, as these narratives can have far-reaching implications for individuals, as well as for (digital) society at large, it is important to understand the nature of the potential problems. This article therefore aimed to offer insight into *how* search engines transform content they reproduce as search result.

To this end, the article studied search engines through the lens of Ricoeur's notion of 'semantic autonomy' in combination with Floridi's notion of 'semantic capital'. While Ricoeur did not consider digital technology, his analysis of the relations between medium and discourse offer a useful frame for understanding the mechanics at play. In order to maximise the use of this framework, the article put forth 'material turn' to semantic autonomy that allows to differentiate between information bearers with different material characteristics. The resulting framework unpacks the transformative power of search engines on the level of the relation to the author, audience, message of the content and its meaning-value.

Search engines have a significant semantic autonomy, which can lead to the situation that even if the original content is unproblematic and authored by the data subject herself, the transformation of this content by a search engine can give rise to problems. When offering users search results, search engines do not narrate the story exactly as it is authored by the original content providers, but instead curate and comment on the original content and its value in relation to the search string. By selecting, framing, organising, and presenting snippets of original content—referring potentially to anything from the old to the new and from the public to the private—in a ranked collection of search results, the search engine takes on the role of an external authoritative voice that tells an audience what is valuable. In this role, the search engine becomes the author of a new story in which it realises a certain plot: it configures a set of references originating from multiple narrators into an overarching new narrative and sets the context and audience for the story—although this story's plot is thin by being limited to a ranking of the value of content and/or its source.

The semantic autonomy framework gives us a deeper insight into the transformative power of search engines in meaning-making on a micro-level. It thereby can help us to better understand *how* problems occur that underpin for example right to be forgotten requests. Scrutinising the relation between contested search results and the authors, audiences, message and meaning-value of the original content may help to consider what is proportional, and whether more systematic changes should be considered.

Last, taken more generally, the framework can be used beyond the scope of search engines, and may be of help to offer deeper insight in for example the implications of ChatGPT for the relation between author, audience, message and meaning-value on the one hand, and the content produced by ChatGPT on the other hand.

Acknowledgements I would like to express my gratitude to Prof. Dr. Bert-Jaap Koops and Prof. Dr. Ronald Leenes, as well as the members of Privacy & Identity Lab in general, for their support during the time

that most of the research underpinning this article was performed. I would also like to think the reviewers for their helpful suggestions and inspiring comments for the revision of the article.

Data Availability Not applicable.

Declarations

Conflict of Interest The author reports no conflict of interest.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Ambrose, M. L. (2012). It's about time: Privacy, information life cycles, and the right to be forgotten. *Stanford Technology Law Review*, 16, 369.
- Baker, P., & Potts, A. (2013). 'Why do white people have thin lips?' Google and the perpetuation of stereotypes via auto-complete search forms. *Critical Discourse Studies*, 10(2), 187–204.
- Benjamin, W. (2008). *The work of art in the age of mechanical reproduction* (Vol. 10). Penguin.
- Blok, V. (2023). The ontology of technology beyond anthropocentrism and determinism: The role of technologies in the constitution of the (post) anthropocene world. *Foundations of Science*, 28(3), 987–1005.
- Butcher, S. H. (1951). *Aristotle's theory of poetry and fine art: With a critical text and translation of the Poetics. With a prefatory essay, Aristotelian literary criticism* (Vol. 42). Courier Corporation.
- Carr, D. (1991). *Time, narrative, and history*. Indiana University Press.
- Carr, N. (2010). *The shallows: How the internet is changing the way we think, read and remember*. Atlantic Books Ltd.
- Chander, A. (2016). The racist algorithm. *Michigan Law Review*, 115, 1023–1045.
- de Mul, J. (2002). *Cyberspace odyssey*. Klement.
- de Vries, K. (2010). Identity, profiling algorithms and a world of ambient intelligence. *Ethics and Information Technology*, 12(1), 71–85.
- Ehrlinger, L., & Wöß, W. (2016). Towards a definition of knowledge graphs. *SEMANTiCS (Posters, Demos, SuCCESS)*, 48(1–4), 2.
- Elers, S. (2014). Maori are scum, stupid, lazy: Maori according to google. *Te Kaharoa*, 7(1).
- Fensel, D., Simsek, U., Angele, K., Huaman, E., Kärle, E., Panasiuk, O., Toma, I., Umbrich, J., & Wahler, A. (2020). *Knowledge graphs*. Springer.
- Fletcher, R., Kalogeropoulos, A., & Nielsen, R. K. (2023). More diverse, more politically varied: How social media, search engines and aggregators shape news repertoires in the united kingdom. *New Media & Society*, 25(8), 2118–2139.
- Floridi, L. (2018). Semantic capital: Its nature, value, and curation. *Philosophy & Technology*, 31, 481–497.
- Fuchs, C. (2012). Google capitalism. *tripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society*, 10(1), 42–48.
- Fuller, M. (2003). *Behind the blip: Essays on the culture of software*. Autonomedia.
- Haider, J., & Sundin, O. (2019). *Invisible search and online search engines: The ubiquity of search in everyday life*. Taylor & Francis.
- Hildebrandt, M., Koops, E. J., de Vries, K. (2008). *D7.14a: Where idem-identity meets ipse-identity: Conceptual explorations*. FIDIS. http://www.fidis.net/fileadmin/fidis/deliverables/fidis-WP7-del7.14a-idem_meets_ipse_conceptual_explorations.pdf

- Hogan, A., Blomqvist, E., Cochez, M., d'Amato, C., Melo, G. D., Gutierrez, C., Kirrane, S., Gayo, J. E. L., Navigli, R., Neumaier, S., Ngonga Ngomo, A. C., Polleres, A., Rashid, S. M., Rula, A., & Schmelzeisen, L. (2021). Knowledge graphs. *ACM Computing Surveys (CSUR)*, 54(4), 1–37.
- Hui, Y. (2013). What is a digital object? In H. Halpin & A. Monnin (Eds.), *Philosophical engineering: Toward a philosophy of the web* (Chapter 4, pp. 52–67). John Wiley & Sons.
- Iliadis, A. (2022). *Semantic media: Mapping meaning on the internet*. John Wiley & Sons.
- Iliadis, A., & Ford, H. (2023). Fast facts: Platforms from personalization to centralization. *Social Media+Society*, 9(3), 20563051231195546.
- Kaplan, F. (2014). Linguistic capitalism and algorithmic mediation. *Representations*, 127(1), 57–63.
- Kelly, K. (2007). Scan this book! In S. Levy (Ed.), *The best of technology writing* (Chapter scan this book!, pp. 69–93). The University of Michigan Press.
- Kliman-Silver, C., Hannak, A., Lazer, D., Wilson, C., & Mislove, A. (2015). Location, location, location: The impact of geolocation on web search personalization. *Proceedings of the 2015 internet measurement conference* (pp. 121–127). ACM. <https://doi.org/10.1145/2815675.2815714>
- König, R., & Rasch, M. (2014). *Society of the query reader: Reflections on Web search* (Vol. 9). Institute of Network Cultures.
- Korenhof, P., Giesbers, E., & Sanderse, J. (2023). Contextualizing realism: An analysis of acts of seeing and recording in digital twin datafication. *Big Data & Society*, 10(1), 20539517231155061.
- Le, H., Maragh, R., Ekdale, B., High, A., Havens, T., & Shafiq, Z. (2019). Measuring political personalization of google news search. *The world wide web conference* (pp. 2957–2963). <https://doi.org/10.1145/3308558.3312504>
- Mayer, K. (2009). On the sociometry of search engines. In K. Becker & F. Stalder (Eds.), *Deep search. The politics of search beyond Google* (pp. 54–72). Studein Verlag.
- Nissenbaum, H. (2009). *Privacy in context: Technology, policy, and the integrity of social life*. Stanford University Press. <https://doi.org/10.1515/9780804772891>
- Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism*. New York University Press. <https://doi.org/10.2307/j.ctt1pwt9w5>
- Nunziato, D. C. (2017). The fourth year of forgetting: The troubling expansion of the right to be forgotten. *University of Pennsylvania Journal of International Law*, 39, 1011.
- Page, L., Brin, S., Motwani, R., & Winograd, T. (1999). *The pagerank citation ranking: Bringing order to the web*. Stanford InfoLab.
- Pariser, E. (2011). *The filter bubble: What the Internet is hiding from you*. Penguin UK.
- Pasquale, F. (2015). *The black box society: The secret algorithms that control money and information*. Harvard University Press.
- Pasquinelli, M. (2009). Google's pagerank algorithm: A diagram of cognitive capitalism and the rentier of the common intellect. In K. Becker & F. Stalder (Eds.), *Deep search: The politics of search beyond Google* (pp. 152–162). Studien Verlag. https://www.mondotheque.be/wiki/images/3/33/Pasquinelli_Googles_PageRank_Algorithm.pdf
- Perelman, C., & Olbrechts-Tyteca, L. (1969). *The new rhetoric. A treatise on argumentation (translation of la nouvelle rhetorique. traite de l'argumentation)*. Presses universitaires de france (1958). notre dame.
- Possati, L. M. (2022). Can we interpret the code? A Ricoeurian perspective on software. In *Software as hermeneutics: A philosophical and historical study* (pp. 61–98). Springer.
- Puschmann, C. (2019). Beyond the bubble: Assessing the diversity of political search results. *Digital Journalism*, 7(6), 824–843.
- Quah, D. (2003). Digital goods and the new economy. CEPR Discussion Paper.
- Reijers, W., & Coeckelbergh, M. (2020). *Narrative and technology ethics*. Springer.
- Ricoeur, P. (1976). *Interpretation theory: Discourse and the surplus of meaning*. TCU Press.
- Ricoeur, P. (1984). *Time and narrative* (Vol. 1, K. Mclaughlin & D. Pellauer, Trans.). Chicago UP.
- Ricoeur, P. (1990). *Time and narrative* (Vol. 1). University of Chicago Press.
- Ricoeur, P. (1991). *A Ricoeur reader: Reflection and imagination*. University of Toronto Press.
- Romele, A. (2020). *Digital hermeneutics: Philosophical investigations in new media and technologies*. Routledge.
- Romele, A., Reijers, W., Coeckelbergh, M., et al. (2021). Introduction: Hermeneutic philosophy of technology: A research program. In W. Rijers, A. Romele, & M. Coeckelbergh (Eds.), *Interpreting technology Ricoeur on questions concerning ethics and philosophy of technology* (pp. IX–XXII). Rowman and Littlefield.

- Schimke, A. (2022). Forgetting as a social concept. contextualizing the right to be forgotten. In M. Albers & I. W. Sarlet (Eds.), *Personality and data protection rights on the internet: Brazilian and German approaches* (pp. 179–211). Springer. https://doi.org/10.1007/978-3-030-90331-2_8
- Steiner, M., Magin, M., Stark, B., & Geiß, S. (2022). Seek and you shall find? A content analysis on the diversity of five search engines' results on political queries. *Information, Communication & Society*, 25(2), 217–241.
- Tavani, H. (2016). Search engines and ethics. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Fall 2016 ed.). Metaphysics Research Lab, Stanford University.
- Trielli, D., & Diakopoulos, N. (2019). Search as news curator: The role of google in shaping attention to news information. *Proceedings of the 2019 CHI Conference on human factors in computing systems* (pp. 1–15). ACM. <https://doi.org/10.1145/3290605.3300683>
- Verbeek, P. P. (2005). *What things do: Philosophical reflections on technology, agency, and design*. Penn State Press.
- Ward, D., Hahn, J., & Feist, K. (2012). Autocomplete as a research tool: A study on providing search suggestions. *Information Technology and Libraries (Online)*, 31(4), 14.
- Zuboff, S. (2015). Big other: Surveillance capitalism and the prospects of an information civilization. *Journal of Information Technology*, 30(1), 75–89.
- Zuiderveen Borgesius, F., Trilling, D., Möller, J., Bodó, B., De Vreese, C. H., & Helberger, N. (2016). Should we worry about filter bubbles? *Internet Policy Review. Journal on Internet Regulation*, 5(1).

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.