

A Critique of the Political Economy of Algorithms: A Brief History of Google's Technological Rationality

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Abstract: In this article, I argue that the debate about the irrational consequences of rationality, discussed within the tradition of the Frankfurt School, and applied to technology and machinery in the concept of technological rationality (Marcuse 1941; 1960; 2007/1964; 2009/1965), can help us better understand and criticise contemporary algorithmic capitalism. In particular, the dialectical relation between technics and technology proposed by Marcuse (1941) can help us better understand the contexts of building digital technologies as tools for control and dominance. I analyse Alphabet Inc.'s (Google) documents, such as the Securities and Exchange Filing (SEC) Form 10-Ks in the period between 2004 and 2016, as well as Search Quality Rating Guidelines (SQRG) between 2016 and 2017. Based on recorded corporate growth, I argue that the company developed on the foundation of three interconnected technological rationalities: organisational rationality of flexible management values and labour utilisation; informational rationality of generating value from advertising and audience labour; and rationality of surplus value accumulation based on reification of labour and consciousness. The company produces two main types of commodities: audience commodity and algorithmic commodity, each solidifying the company's control and dominance over Internet usage habits.

Keywords: Technological Rationality, Algorithms, Automation, Commodity Exchange, Labour, Reification, Value, Praxis

Acknowledgement: I would like to thank Christian Fuchs and WIAS International Fellows for informed and critical discussions about contemporary capitalism that helped solidify and sharpen the ideas developed in this article.

“Along with automation and the introduction of labour saving machinery and techniques in some parts of the economy, whole new industries have arisen and may be expected to arise.”

This quotation is from a 1955 report to the Congress of the United States by the Subcommittee on Economic Stabilization titled *Automation and Technological Change*. The Subcommittee gathered opinions from witnesses associated with production and industry, management and labour, as well as from experts in the field of technology and economics. In discussing the introduction of automation in post-war US economy there is a tone of balanced excitement and caution when it comes to the possible effects of these technologies on the economy. Automation was introduced during economic growth and low unemployment. The hearings were analysed in detail by Pollock (1955) who warned about the potential social and economic risks that automation might bring if introduced without oversight and adequate management.

Contemporary algorithmic automation promises to bring economic growth and multiple benefits to society. Algorithmic automation is not only influencing the efficiency of the production process in many industries, but also consumption in digital and online

markets of information exchange. Algorithms are aggressively implemented in areas such as finance, stock-markets, health, the Internet of things, public administration, job searches, government surveillance, self-driving cars, social media, and so on. A key difference compared to the post-war introduction of automation is the lack of broader institutionalised discussions and regulatory and policy debates prior to the introduction of such rationalities in society. Instead of managing the process, the US government is barely reacting to what many companies, especially in the Silicon Valley and Wall Street, are already doing without oversight or any democratic sense of direction. Major corporations use automated algorithms under a cloud of intellectual property rights (Pasquale 2015). Simultaneously, the discourse is to trust the benevolent nature of corporate oversight and to have faith in the neutrality and objectivity of technical tools devised for fulfilling our own desires and needs: as though algorithms can only bring multiple benefits to humanity. Yet major companies reduce the understanding of humanity and human experience to efficient or obsolete workers and streamlined consumption in the digital marketplace. Such cost reductions do not benefit citizens, but serve as tools for the automated accumulation of surplus value by processing information and metadata (Pasquinelli 2009; 2015).

This paper offers a critique of algorithmic capitalism by focusing on the corporate production, dissemination and global management of digital technologies by Alphabet Inc., a company that owns Google as one of its flagship corporate segments. To provide theoretical grounding, I will evoke the concept of technological rationality developed by Herbert Marcuse (1941; 1960; 2007/1964) and update his ideas to contemporary capitalism. In particular, I focus on the dialectic understanding of *technics* and technology (Ibid. 1941). Technics, or technical artefacts, are partial factors which relate to the apparatus of industry, transportation and communication. Technology, according to Marcuse, relates to the modes of production, organising and perpetuating social relations. In this paper, algorithms are understood as dynamically changing and opaque technical artefacts embedded within a broader mode of production which can be characterised as algorithmic capitalism. There is nothing inherently biased in algorithms as technical artefacts. They are tools built on the latest advancements in computer science and engineering. The problem with studying algorithms empirically comes from corporate ownership, lack of transparency and the difficulty in accessing and validating their technical premises and information management strategies. In this paper, algorithms are understood as analytical objects, situated within a broader context of the capitalist mode of production and framed by a complex technological rationality.

The empirical material consists of Securities and Exchange Commission (SEC) Filings such as Form 10-Ks in the period between the Initial Public Offering (IPO) of Alphabet Inc. in 2004 until 2016. In total, 13 market reports (Form 10-Ks) were analysed and coded to make sense of Alphabet's corporate development. Selected economic indicators published in these reports were also gathered, systematised and presented to provide key indicators of corporate growth. Other supplementary documents published by the company are also used. Most importantly, the Search Quality Rating Guidelines (SQRG) describe the construction of algorithmic quality, utility and relevance in global markets. Such documents provide insight into values embedded in algorithmic artefacts as essential components of algorithmic capitalism.

1. Digital One-Dimensionality

In the immediate aftermath of the 2001 dot-com bubble crash, new Internet companies entered, or expanded, into the re-emerging digital market with a cautious business

approach. As a way of regaining investor confidence, the new breed of Internet companies argued for user participation, collaboration, choice, access, creativity, obsolescence of mass communication, and transcendence of 'old' corporate models.¹ The digital discourse (Fisher 2010) promoting the balance between free access to Internet services and new business strategies was also supporting innovations in Internet advertising. Once hailed as flexible, cooperative, collaborative, and user-oriented, companies such as Apple, Alphabet, Amazon, Twitter and Facebook have now come to dominate the global Internet, turning it into a consolidated market² with major global implications. It is justifiable to wonder how certain ways of doing things through iTunes, Google searches, social networking, and online book purchasing become so dominant that we are nearly paralysed in terms of conceiving, providing and fostering alternatives. To answer that question a deeper philosophical approach is needed. At stake is not only a critique of corporate ownership, but more importantly, an understanding of how major companies establish control and dominance over Internet usage habits.

1.1. The Rationality Debate

The first generation of Frankfurt School theorists developed a materialist critique of the irrational tendencies of rationality in culture, society and economy. Feenberg (2014, 120) argued that rationality was neither utopian nor dystopian, but instead demanded its situation within the political, where its consequences are a challenge to human responsibility. The position is evident in the early works of Horkheimer (1933) as a dialectical quest for understanding human character defined in the mutual influence between economic situation and individual characteristics.³ The quest was not to find the universal psychological characteristics of humans, but their social and historical determination. Critical Theory, promoted by Horkheimer (1937), called for a grounding in a critique of commodity exchange, which influences the human condition and leads to a heightening of social tensions. Similarly, Marcuse (2009/1965, 162) criticised the notion of rationality as neutral, formal, objective: "neutrality is *real* only when it has the power of resisting interference. Otherwise it becomes the victim, as well as the aid, of every power that wants to use it". Technology is, for Marcuse, a historical-social project built on the projected ruling interests of what society wants to do with "men and things".

The central debate about the 'irrational' tendencies of rationalisation can provide a broad conceptual apparatus for a critique of the type of technological domination promoted in algorithmic capitalism. Untangling the web of corporate control of choices in everyday life requires an understanding of the underlying logic of the technological rationality (Marcuse 1941; 2007/1964) of algorithmic capitalism. The contemporary

¹ Take for example the letter written by the founders of Google, Larry Page and Sergey Brin, from 2004 at the time when the company made its Initial Public Offering: "Google is not a conventional company. We do not intend to become one. Throughout Google's evolution as a privately held company, we have managed Google differently. We have also emphasized an atmosphere of creativity and challenge, which has helped us provide unbiased, accurate and free access to information for those who rely on us around the world." Available at <https://abc.xyz/investor/founders-letters/2004/ipo-letter.html>

² Top five US companies in terms of market capitalisation (in USD) in July 2017 were Apple (777), Alphabet (661), Microsoft (561), Amazon (478) and Facebook (463). Available at <http://www.nasdaq.com/screening/companies-by-industry.aspx?region=North+America&country=United%20States&marketcap=Mega-cap>

³ Horkheimer (1933, 17) uses the term "individuelle Kräfte" which could also be translated as individual strengths. He does not elaborate in detail what is meant by that. The entire passage explains how individuals are shaped by their social position and economic conditions.

dominating rationality in technical artefacts such as software, code, algorithms, devices and gadgets is presented as a rational universal whose production process and commodity nature are reified behind smooth technical designs. The rationality provides a biased, skewed and quantified representation of humans. Pathologies are becoming increasingly evident: in surveillance, privacy abuse, fake news, and other negative effects on democracy. The emancipatory potentials for conceiving alternatives need different types of rationalities that will abide by democratic procedures and oversight. The following section explains in more detail how Marcuse understands technological rationality and why it is relevant for contemporary capitalism.

1.2. From One-Dimensionality to Critical Rationality

Human labour is objectified in commodities exchanged in the market. Commodities acquire existence that makes the labour process invisible and intangible. That is the core idea behind commodity fetishism as described by Marx (2004/1867): social relations take the form of “relations between things”. There are multiple elements at play in Marx’s definition of commodity fetishism: a critique of commodity exchange, a critique of the ideological nature of commodity exchange, and alienation of human labour. Lukács (1972/1923) provided a strong elaboration of this basic assumption by outlining its objective and subjective dimensions. The objective dimension is the world of objects, commodities; governed by laws and invisible forces of generating power. The individual cannot modify the process by his or her own activity. The subjective dimension is the estrangement of man from him-/herself. The governing principles are rational calculations, mathematical analyses of work-processes, special laws governing production, and specialisation of operations that relate to use-values. The fragmentation of the object of production ultimately fragments its own subject. Human qualities and idiosyncrasies appear as sources of error when contrasted to abstract laws. Man becomes a mechanical part incorporated into a mechanical system (Ibid., 91). Marcuse (2007/1964, 172) took this line of thought one step further and introduced the role of technology as the “great vehicle of reification”. Reality becomes defined as a reality without substance, or rather, a reality in which substance is represented by its technical form, which becomes its content. Every signification and proposition is validated within the framework of men and things: “a one-dimensional context of efficient, theoretical, and practical operations” (Marcuse 1960, 135).

There is nothing controversial in the technical artefacts of machinery (Marcuse 1941, 41), for they are the result of the social conditions from which they emerge: “[t]echnics by itself can promote authoritarianism as well as liberty, scarcity as well as abundance, the extension as well as the abolition of toil.” *Technics* becomes a tool for control and domination under a rationality that favours commodity exchange and high profit rates. Machinery, therefore, has a double social role for Marcuse. On the one hand, it is a product of human society and social conditions. On the other hand, its objectified existence exerts a specific form of influence over the behaviour and consciousness of humans. Algorithms are precisely such artefacts. They are built through research and development investments, quality tested worldwide, and improved through continuous usage and the monitoring of Internet users’ activities. Simultaneously, such artefacts define human experience on the Internet by displaying, editing and recommending certain information for certain groups of people. Providing the right information, at the right time, and in the right location for targeted consumers is what makes them profitable. Once a single company such as Alphabet Inc. monopolises web search, the underlying rationality becomes quite literally one-dimensional.

One-dimensional technological rationality within capitalist social relations promotes efficiency and calculation, closes down alternatives and critical reflections. Rationality loses its liberating function and transforms into a logic of adjustment and ‘compliant efficiency’. Reason finds its resting place in the system of standardised control, production and consumption, where it reigns through efficiency and expediency (Marcuse 1941, 49). The “machine power” makes it the “most effective political instrument in any society whose basic organization is that of the machine process” (Marcuse 2007/1964, 5). Yet Marcuse follows the idea of control and domination with a possibility of reversing the political trend in the material conditions of the machine as “the stored-up and projected power of man”. Such a change is grounded in a “critical rationality”, a prerequisite for liberation over control and dominance: “it envisions the rational form of human association as brought about and sustained by the autonomous decision and action of free men” (Marcuse 1941, 55).

A surge of interest in untangling the negative consequences of rationally devised computational artefacts is a testament to the development potential of critical rationality in algorithmic capitalism. Current research on algorithms aims for opening the black box (Pasquale 2015) of algorithmic technics and demands more transparency and accountability (Diakopoulos 2016) of the social power of algorithms (Beer 2017). The grounding in the ideas of Marcuse helps further develop the debate by focusing on two additional problems: the hidden relations of algorithmic production, and reified consciousness of the commodity exchange of information commodities. It is precisely within the unconsciousness of the cultural horizon under which technology is designed that technology exerts its complete legitimising effectiveness (Feenberg 2010, 18). Uncovering the material foundations of search engine algorithms is the task of the following section.

2. Juggernauts of Algorithmic Capitalism: The Case of Alphabet Inc.

Alphabet Inc. (Google) is at the forefront of the development of algorithmic machinery for valorising information in contemporary capitalism. Google’s solutions emerged from the field of information retrieval and the algorithm for ranking online content based on the number of links websites receive from other sources on the web.⁴ The company started in 1998 and six years later made its initial public offering (IPO). It sold 19 million shares and raised 1.67 billion USD in capital, setting the company market value at over 20 billion USD.⁵ Over time, the complexity of the algorithmic solutions grew to a point where it now uses several hundred ‘signals’, other than the number of receiving links, to determine relevance and utility and to rank websites based on search queries and other criteria.⁶

The 2004 revenues were 3.189 billion USD, with 99% of the revenue coming from advertising.⁷ The revenues continue to rise steadily based on the scale of global operations and a dominant presence in capturing Internet advertising investments worldwide. The year 2015 was a benchmark for corporate development as the name of the company changed from Google to Alphabet Inc. to enable more independence of different company segments.⁸ Google is still one of the most important segments, and

⁴ See Brin and Page (1998). Available at <http://infolab.stanford.edu/~backrub/google.html>

⁵ Available at www.edition.cnn.com/2004/BUSINESS/08/19/google.ipo/

⁶ See a list of major algorithmic changes here <https://moz.com/google-algorithm-change>

⁷ Available at https://www.sec.gov/Archives/edgar/data/1288776/000119312505065298/d10k.htm#toc10062_2

⁸ “What is Alphabet? Alphabet is mostly a collection of companies. The largest of which, of course, is Google. This newer Google is a bit slimmed down, with the companies that are

algorithmic production remains the key business strategy for the company. In 2016, the recorded revenues were at 90.272 billion USD with advertising comprising an 88% share.⁹ Market capitalisation of the company in 2017 was 661 billion USD.¹⁰ Despite enormous growth, the legitimating digital discourse (Fisher 2010) still promotes the ‘rags to riches’ story of corporate development.¹¹

Alphabet did not invent algorithms. There is a longer history within computer science and engineering, as well as a lineage within philosophy and mathematics. In contemporary capitalism, Alphabet’s algorithmic model is supported by three technological rationalities: organisational rationality of specific management values and labour utilisation; informational rationality of generating value from advertising and audience labour (Smythe 2006/1981; Jhally and Livant 1986); and rationality increasing surplus value, reifying labour and commodity exchange.

2.1. Organisational Rationality: Capital-Labour-Ideology

The spirit of ‘networked organisation’ created a new type of capitalism. It smoothly installed itself into all aspects of society and managed to incorporate the heritage of 1960s ‘artistic and social critique’ into a new style of management that includes flexibility, sub-contracting, team-working, multi-skilling, flat-management, resistance to hierarchy, etc. (Boltanski and Chiapello 2007). Alphabet promotes such an organisational culture although it does not eradicate the inherent contradictions embedded in the highly centralised capital accumulation strategy. The aura of the start-up, and the academic roots and forward-thinking insights of its founders legitimise a disproportionate distribution of wealth within the organisational structure of the company.¹² This dynamic balancing act needs a steady flow of knowledge and labour to sustain corporate growth and dominance.

pretty far afield of our main internet products contained in Alphabet instead. What do we mean by far afield? Good examples are our health efforts: Life Sciences (that works on the glucose-sensing contact lens), and Calico (focused on longevity). Fundamentally, we believe this allows us more management scale, as we can run things independently that aren’t very related.” Available at <https://abc.xyz/investor/founders-letters/2015/index.html#2015-larry-alphabet-letter>

⁹ Available at

<https://www.sec.gov/Archives/edgar/data/1652044/000165204417000008/goog10-kq42016.htm#s9FFFC4C562B4028925242B6543354A33>

¹⁰ Available at <http://www.nasdaq.com/screening/companies-by-industry.aspx?region=North+America&country=United%20States&marketcap=Mega-cap>

¹¹ “Despite our rapid growth, we still cherish our roots as a startup and wherever possible empower employees to act on great ideas regardless of their role or function within the company. We strive to hire great employees, with backgrounds and perspectives as diverse as those of our global users. We work to provide an environment where these talented people can have fulfilling careers addressing some of the biggest challenges in technology and society.” Available at

<https://www.sec.gov/Archives/edgar/data/1652044/000165204417000008/goog10-kq42016.htm#s9FFFC4C562B4028925242B6543354A33>

¹² Sergey Brin, Larry Page and Eric Schmidt hold significant control over Alphabet operations. As of December 31, 2016, Brin, Page, and Schmidt beneficially owned approximately 92.4% of Alphabet’s outstanding Class B common stock, which represented approximately 56.8% of the voting power of outstanding capital stock. Brin, Page, and Schmidt therefore have significant influence over management and affairs and over all matters requiring stockholder approval, including the election of directors and significant corporate transactions, such as a merger or sale of company or assets. See 2016 Form 10-K for more details:

There is a continuous demand for new knowledge, communication and experience in the production of search algorithms. “Immaterial labour” (Lazzarato 1996) is the driving force behind the creation of the informational and cultural commodities of web search. Alphabet’s research teams are armed with skills in areas such as: security and privacy, information retrieval, machine intelligence, data mining, machine perception, human-computer interaction, education, natural language processing, speech recognition, machine translation, network architecture, distributed systems, and so on.¹³ In addition to complex skills, an alignment with the mission of the company is necessary to perform the spirit of a flexible, creative and networked management structure and to ensure surplus value. Such an organisational rationality creates a “common framework of experience” and extends corporate control from the objective to the subjective world, ensuring the material reproduction of society (Marcuse 1941, 56). In other words, “the argument that Google is changing the world and changing it for the better encourages employees to align their sense of personal mission with that of the company” (Turner 2009, 80).

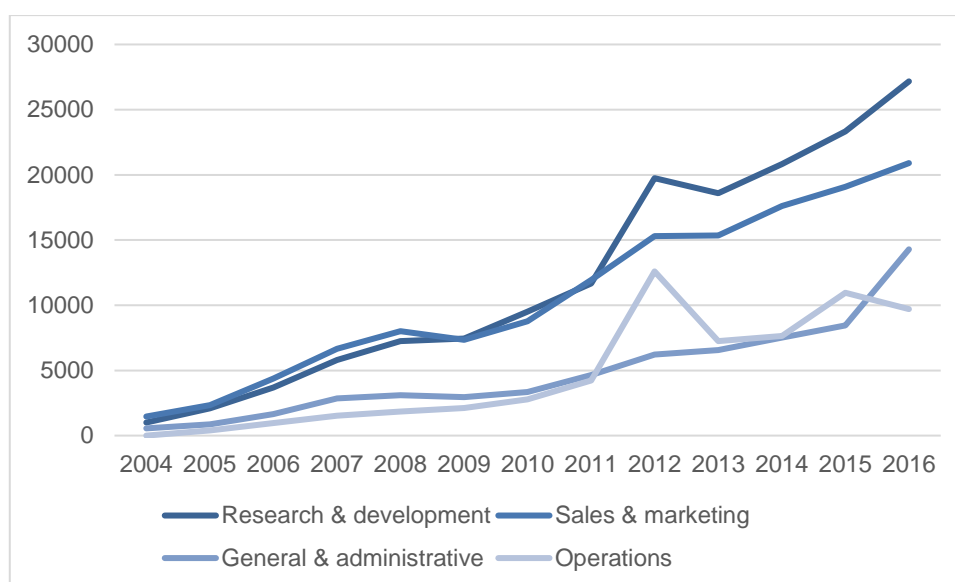


Figure 1: Labour power breakdown (2004 - 2016)

The above figure shows the change in the structure of labour power between 2004 and 2016 (Source: Author’s analysis based on Form 10-Ks). At the time of the IPO, the company structure was the following: 1,003 employees in research and development; 1,463 in sales and marketing; 555 general and administrative staff and no recorded staff in operations.¹⁴ The fact that the number of sales and marketing staff outnumbered research and development (R&D) staff shows how, at that time, the company needed to find profitable business models for its search engine algorithms. The key was attracting advertising investments. The number of R&D staff compared to sales and marketing staff was relatively equal until 2012. In August 2011, Google made one of its biggest acquisitions by purchasing Motorola Mobility Holdings Inc. for a reported

<https://www.sec.gov/Archives/edgar/data/1652044/000165204417000008/goog10-kq42016.htm#s9FFFC4C562B4028925242B6543354A33>

¹³ Available at <https://research.google.com/workatgoogle.html>

¹⁴ Available at https://www.sec.gov/Archives/edgar/data/1288776/000119312505065298/d10k.htm#toc10062_2

12.6 billion USD.¹⁵ The Motorola operating results and staff (16,317) were incorporated into Google's 2012 market results, displayed as a significant increase in the headcount of R&D and operations staff.¹⁶ The purchase was made for at least three different reasons. First, to increase the highly skilled labour power. Second, to obtain a large number of intellectual property rights, especially patents owned by Motorola. And third, to expand into the rising mobile telephone market, update Google's Android OS and mobile search services, and increase capital accumulation. Since 2012 R&D staff continues to outnumber other organisational staff. In 2016, the R&D staff count was 27,169, followed by sales and marketing with 20,902, general and administrative with 14,287 and operations with 9,695.¹⁷ The high numbers of R&D staff established show the need to stay on top of technological developments in the digital industry. While early market reports in the mid-2000s explicitly emphasised keeping up with technological changes, the more recent reports reflect the company's dominant position in defining and promoting new technological trends, most prominently artificial intelligence and machine learning. Attracting computer scientists and engineers from leading technical universities is one of the key corporate strategies for sustaining its globally dominant position.

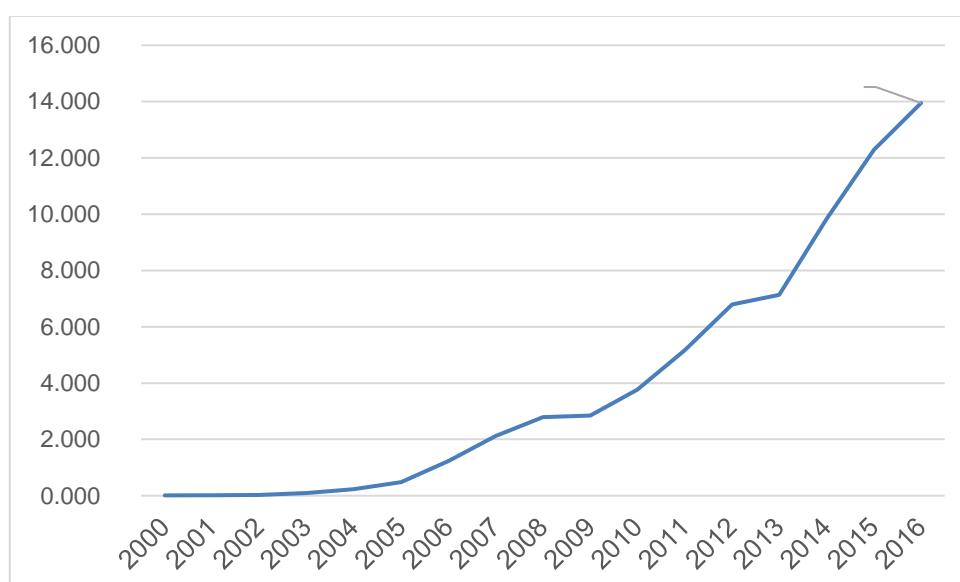


Figure 2: R&D spending (2000-2016) in billion USD

The company also maintains its global dominance through strategic acquisitions¹⁸ and substantial internal R&D investments. In 2016, the total R&D costs were 13,948 billion USD (see Figure 2 [source: author's analysis based on Form 10-Ks]). The main costs of R&D include compensation and related costs for personnel responsible for the research and development of new products and services, as well as significant improvements to existing products and services. The outward image Google promotes is a

¹⁵ Available at https://www.sec.gov/Archives/edgar/data/1288776/000119312512025336/d260164d10k.htm#toc260164_2

¹⁶ Available at https://www.sec.gov/Archives/edgar/data/1288776/000119312513028362/d452134d10k.htm#toc1452134_2

¹⁷ Available at <https://www.sec.gov/Archives/edgar/data/1652044/000165204417000008/goog10-kq42016.htm#s9FFFC4C562B4028925242B6543354A33>

¹⁸ See a list of major acquisitions made by 2015 here <http://www.businessinsider.com/googles-ten-biggest-acquisitions-2015-1>

well-known dimension of workplace creativity and innovation. This forms an integral part of the organisational rationality included in every market report since 2004. It serves to solidify the image of the ‘non-conventional’ company among its shareholders. Simultaneously, in the context of social media and the Internet, there is an increase in non-wage labour contributing to the value of social media companies (Fuchs 2010; 2012; Fisher 2015). Furthermore, the company’s commodities are situated within a dual relationship between Internet users seeking information and content, and information producers seeking users and audiences. Alphabet mediates this relationship by producing two main types of commodities, discussed in the following section.

2.2. Informational Rationality: Commodity Exchange and Value

There is no lack of discussion on how actual commodity exchange occurs in social media companies and how value is created: audience commodity (Fuchs 2010; 2012; Fisher 2015), network surplus value (Pasquinelli 2009; 2015), rent (Rigi and Prey 2015; Rigi 2015), etc. have all been examined. From the vantage point of the rationality debate, different capital accumulation strategies have the same goal – maintaining global dominance and control over humans and nature (Marcuse 1960; 2007/1964). Alphabet’s profit-making rationality separates so-called ‘organic’ from paid search results.¹⁹ Free web search service remains one of the main reasons for the company’s strong grasp over user experience. Such a position helps build consumer trust and legitimacy, while allowing for the accumulation of economic and cultural capital (Hillis, Petit and Jarrett 2013).

The advertising model is based on what the company calls “performance advertising”: delivering relevant ads that users will click on and engage directly with the advertisers.²⁰ AdWords²¹ is the primary auction-based advertising program, which allows ads to appear on Google services and services of Google Network Members – partner websites and third-party websites across the Internet. Alphabet collects a complex array of information based on search queries, geographic location, language, device (PC, mobile phone, or tablet), and other parameters that may be of interest to advertisers. As the most visited global website²² with a highly dominant and monopolistic position in the search engine market, the incentive for advertisers to place their ads through the Google system is highly attractive. The largest share of Google’s revenues (Figure 3) comes from advertising. The maintenance of a close relation with users is the main corporate strategy for attracting advertising investments and accumulating

¹⁹ “In general, it could be argued from the consumer point of view that the better the search engine is, the fewer advertisements will be needed for the consumer to find what they want. This of course erodes the advertising supported business model of the existing search engines. However, there will always be money from advertisers who want a customer to switch products, or have something that is genuinely new. But we believe the issue of advertising causes enough mixed incentives that it is crucial to have a competitive search engine that is transparent and in the academic realm.” (Brin and Page 1998)

²⁰ Available at <https://www.sec.gov/Archives/edgar/data/1652044/000165204417000008/goog10-kq42016.htm#s9FFFC4C562B4028925242B6543354A33>

²¹ Available at https://adwords.google.com/intl/en_au/home/#?modal_active=none

²² Available at <http://www.alexa.com/topsites>

capital. The position is evident throughout the history of the company: in the 1998 academic article by Brin and Page, the 2004 IPO letter,²³ the market reports between 2004 and 2016, and in current PR campaigns.²⁴

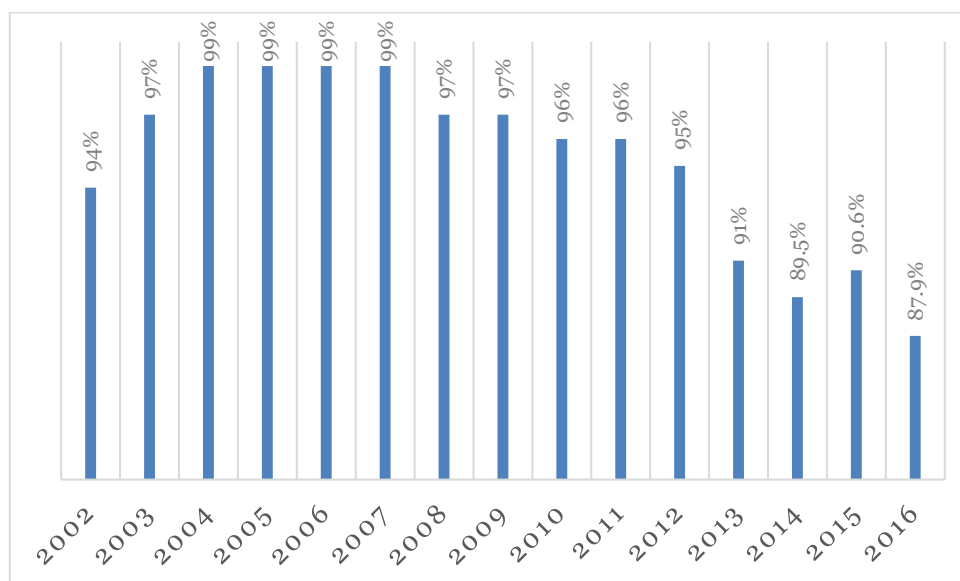


Figure 3: Share of advertising revenue within total revenue (2002-2016). Source: author's analysis based on Form 10-Ks.

The free service strategy attracts users, while the audience commodity (Fuchs 2012; Fisher 2015) attracts advertisers. This social relationship would not be possible without automated machines that process information input/output. I argue there are two main types of commodities that Alphabet produces: one is the audience commodity for the online advertising market. The company is able to commodify global audiences and trade that information in the digital advertising market. In fact, by offering a global service it controls the prices of digital advertising and attracts the majority of advertising investments worldwide.²⁵ In 2016, Google held a 71.41% market share of global desktop search and 91.61% of the global mobile and tablet web search.²⁶ The enormous amount of gathered data is not possible to process without automated algorithms. The second commodity the company produces are algorithms themselves. Yet they are not simply traded on the market as a commodity. Intellectual property rights (IPR) ensure that the web search solution the company developed through R&D investments, acquisitions and other strategies remains the most dominant solution to web search worldwide. IPR ensures the monopoly over algorithmic search services. In July 2017, there were 15,073 patents assigned under the old company name Google, and an additional 18 under the new company name Alphabet.²⁷ Paid labour of the company's

²³ Available at <https://abc.xyz/investor/founders-letters/2004/ipo-letter.html>

²⁴ Available at <https://www.google.com/search/howsearchworks/mission/web-users/>

²⁵ Google and Facebook captured 64 % of all the growth in global ad spend between 2012 and 2016. Available at <https://www.zenithusa.com/top-30-global-media-owners-2017/>

²⁶ Available at <https://www.netmarketshare.com/search-engine-market-share.aspx?qprid=4&qpsp=2016&qpnp=1&qptimeframe=Y&qpcustomd=1>

²⁷ Available at <http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetacgi%2FPTO%2Fsearch->

R&D staff, as well as continuous usage and unpaid labour by Internet users, produce the algorithmic commodity. The audience commodity is profitable through its exchange value in the digital advertising market; the algorithmic commodity is profitable through stock trading and financial capital. The first commodity is the source of control over humans: audiences and their labour. The second commodity is the source of control over IPR which secures the monopolistic position in the search engine market.²⁸ These two commodities are not exclusive. In fact, one is not profitable without the other, and both require paid and unpaid labour. Profits are ensured through different informational rationalities.

2.3. Algorithmic Machinery: “The Great Vehicle of Reification”

Marcuse (2007/1964, 172) argued that technology becomes “the great vehicle of reification” in advanced industrial societies: “[t]he social position of the individual and his relation to others appear not only to be determined by objective qualities and laws, but these qualities seem to lose their mysterious and uncontrollable character; they appear as calculable manifestations of (scientific) rationality”. Algorithms, engineered calculations and estimates of human needs increasingly determine the relations between humans in algorithmic capitalism. The more people use social media and the Internet, the more metadata of their online presence circulates for surveillance and commodity exchange purposes. Smooth interfaces, and free-of-charge online services blur the awareness of data-gathering practices: “[t]echnology serves to institute new, more effective, and more pleasant forms of social control and social cohesion” (Ibid., xlvi). Reification blurs the consciousness of contradictions embedded in corporate technologies, as well as the relations of production necessary for their maintenance and commodity exchange within the political economy of algorithmic capitalism.

Google’s search engine is dominant worldwide. More usage creates more audience commodities and improves the algorithmic machine. Localisation, languages and geographical barriers are no match for the adaptability and global information control of the algorithm. The machine captures “living time and living labour time and transforms the *common intellect* into network value” (Pasquinelli 2009). The machine does not produce surplus value but serves to accumulate and augment surplus value based on the exploitation of the general intellect (Pasquinelli 2015). Google’s search algorithm provides and captures information flows and controls relevant information. Moreover, by providing dominant solutions to web search, Alphabet routinises the process of information dependence and steers the development of human needs and capacities. It

[bool.html&r=0&f=S&l=50&TERM1=Google&FIELD1=ASNM&co1=AND&TERM2=&FIELD2=&d=PTXT](#)

²⁸ IPR protection has a prominent position in all market reports between 2004 and 2016. Alphabet is under a continuous legal struggle to maintain its dominant position. From the 2016 market report: “We rely on various intellectual property laws, confidentiality procedures and contractual provisions to protect our proprietary technology and our brand. We have registered, and applied for the registration of, U.S. and international trademarks service marks, domain names and copyrights. We have also filed patent applications in the U.S. and foreign countries covering certain of our technology, and acquired patent assets to supplement our portfolio.” In another example: “Our patents, trademarks, trade secrets, copyrights, and other intellectual property rights are important assets for us. Various events outside of our control pose a threat to our intellectual property rights, as well as to our products, services and technologies.” Available at

<https://www.sec.gov/Archives/edgar/data/1652044/000165204417000008/goog10-kq42016.htm#s9FFFC4C562B4028925242B6543354A33>

closes alternatives to the availability of information and situates itself in a position of power to define contemporary social reality. The table below shows what Alphabet values most in terms of searchable web content.

March 28 2016	March 14 2017
Shopping or financial transaction pages: webpages which allow users to make purchases, transfer money, pay bills, etc. online (such as online stores and online banking pages).	Shopping or financial transaction pages: webpages which allow users to make purchases, transfer money, pay bills, etc. online (such as online stores and online banking pages).
Financial information pages: webpages which provide advice or information about investments, taxes, retirement planning, home purchase, paying for college, buying insurance, etc.	Financial information pages : webpages which provide advice or information about investments, taxes, retirement planning, home purchase, paying for college, buying insurance, etc.
Medical information pages: webpages which provide advice or information about health, drugs, specific diseases or conditions, mental health, nutrition, etc.	Medical information pages : webpages which provide advice or information about health, drugs, specific diseases or conditions, mental health, nutrition, etc.
Legal information pages: webpages which provide legal advice or information on topics such as divorce, child custody, creating a will, becoming a citizen, etc.	Legal information pages : webpages which provide legal advice or information on topics such as divorce, child custody, creating a will, becoming a citizen, etc.
Other: there are many other topics which you may consider YMYL, such as child adoption, car safety information, etc.	Other: there are many other topics which you may consider YMYL, such as child adoption, car safety information, etc.
	News articles or public/official information pages: webpages which are important for maintaining an informed citizenry, including information about local/state/national government processes, people, and laws, disaster response services, government programs and social services, news about important topics such as international events, business, politics, science, and technology.

Table 1: Changing search quality standards (2016-2017). Source: Search Quality Rating Guidelines (SQRG).

Once produced by in-company workers, Alphabet uses worldwide search quality tests (Bilić 2016) to determine if search algorithms actually find what the company defines as local search relevance and utility. The highest quality standards are set for the so-called Your Money or Your Life (YMYL) websites.²⁹ The above table shows that Google systematically favours the exchange-value of information. Shopping, financial transactions, financial information pages, health and legal information are a high priority in these guidelines. Businesses running such websites are the ones heavily investing in online advertising, and advertising comprises the bulk of Google's revenues. Top industries contributing to Internet advertising in 2015 and 2016 were retail, financial services, the automobile industry, the telecom industry, leisure and travel, consumer packaged goods, consumer electronics and computers, pharmacy and healthcare and so on.³⁰ Such information does have use-value. However, this value is only available

²⁹ The latest version of search quality rating guidelines is available here <https://www.google.com/insidesearch/howsearchworks/assets/searchqualityevaluatorguidelines.pdf>

³⁰ Available at <https://www.iab.com/insights/iab-internet-advertising-revenue-report-conducted-by-pricewaterhousecoopers-pwc-2/>

through market-related mechanisms of advertising investments, visibility and PR campaigns. The ultimate decision on what is displayed and what is not displayed is left to a single entity – Google. As a monopolistic access point to global information, Google did not formerly have quality standards for improving the use-value of information in a more democratic, plural, equality-related sense. Only after the outbreak of ‘fake news’ in 2016 and the subsequent public outrage did the company introduce “news articles or public/official information pages”.³¹ There is a broader use-value of information in contemporary society outside commercial content and the exchange-value of information. The news operates within the market but, ideally, offers positive market externalities in the form of quality content, professional journalistic standards for fostering democratic processes and informed citizenry – issues previously low on the agenda of the information-processing algorithmic machinery of Google. There was simply not enough financial incentive to process such information.

Changes to algorithmic relevance also show the limits of technical solutions for interpreting nuances of human behaviour. Nonetheless, after the breakout of fake news, search engine usage and audience labour transformed the algorithm into a more efficient machine. Algorithms are reified objects in a double sense. First, they hide the labour process necessary for their production. Second, algorithms hide the exchange value of the audience commodity (Fuchs 2012; Fisher 2015) as well as the surplus value accumulation of the exploited labour of the general intellect (Pasquinelli 2009; 2015). The algorithmic machinery becomes a mediating factor between labour, value and surplus value in algorithmic capitalism. In-company labour power and worldwide audience labour produce the audience commodity and the algorithmic commodity, while the algorithmic machine accumulates surplus value for company owners.

3. Pathologies of Algorithmic Capitalism

There is a growing global case for an argument that algorithmic capitalism delivers a 21st-century “pathology of reason” (Honneth 2006). Take, for example, such issues as surveillance, privacy violations, algorithmic bias, fake news, exploitation of paid and unpaid labour, technological unemployment, automated consumerism, commodification of knowledge, energy expenditure of server maintenance, electronic waste, and so on. In a 2017 survey of the “algorithm age”, the Pew Research Centre gathered the opinions of more than 1300 technology experts, scholars, corporate practitioners and government leaders. There were seven main topics cutting across different opinions: algorithms will spread everywhere; good things lie ahead; humanity and human judgment are lost when data and predictive modelling become paramount; biases exist in algorithmically organised systems; algorithmic categorisations deepen divides; unemployment will rise; and the need grows for algorithmic literacy, transparency and oversight.³²

³¹ See an article about the process of re-writing the algorithm to combat fake news <https://www.bloomberg.com/news/articles/2017-04-25/google-rewrites-its-powerful-search-rankings-to-bury-fake-news>

³² Available at <http://www.pewinternet.org/2017/02/08/code-dependent-pros-and-cons-of-the-algorithm-age/>

3.1. Moving Forward

Marcuse's dialectic³³ position was a critique of corporate and administrative technological rationality from the position of human values, judgment, and liberation. The repressive, one-dimensional, technological rationality can be overthrown by way of the "Great Refusal" – "the protest against that which is" (Marcuse 2007/1964, 66). For Marcuse (2013/1962, 290), humanity implies a certain intelligence to understand and transform the human condition. An individual cannot develop free and autonomous thinking on his/her own: "[t]his is an historical and social responsibility which civilization can, or at least should, carry out against raw nature and against all repressive social and intellectual forces." Marcuse's understanding of humanity is a valuable reminder of its ethical and normative ideal. However, we still need concrete steps and ways of promoting such advancements in our socio-historical configuration. Various authors have proposed solutions to deal with corporate accumulation and commodification of information on the Internet and through Google's search engine: re-appropriating network value (Pasquinelli 2009), expropriating and transforming it into a public, non-profit, non-commercial organisation (Fuchs 2011), and breaking out of core network dynamics by not using such services (Mager 2012).

I argue for a combination of policy, practice and *praxis*, to alleviate the irrationalities of rationally devised machinery in algorithmic capitalism. First, policy and regulatory responses have been gaining pace. Most prominently, the European Commission opened several anti-trust investigations against Google (Alphabet) because of its dominant position that stifles market competition in the European Economic Area. The European Commission fined Alphabet 2.42 billion EUR in June 2017 for favouring its own comparison-shopping service in its search results.³⁴ Other investigations are ongoing. All testify to the one-dimensionality of Google's algorithms and the type of control and dominance they exert. Second, a changed practice of Internet users could have an adverse effect on the corporate behaviour of the company. As shown throughout this paper, Google is heavily reliant on user input for the production of the audience commodity and the algorithmic commodity. Furthermore, scientific practice of computer science and engineering needs to embrace a stronger understanding of social dynamics and human conditions.³⁵ Finally, the contradictions within algorithmic capitalism need to reach a level of societal consciousness to enable socially and democratically meaningful action. The unity of thinking and doing, the *praxis*, requires a raised consciousness within the current conditions before any change can be made into a historical reality. The company has essentially been co-funded by the usage labour of the platform, thus creating an unequal distribution of wealth between citizens and company owners. This has been well-established in many critical studies of social media and the Internet. Furthermore, funded by advertising revenue capture from many industries worldwide, the company pauperised the news industry and created a massive gap in the way citizens access trustworthy and democratically meaningful information. The essential step is to use this awareness in order to regain control over key democratic

³³ Fuchs (2016, 121) argues that Marcuse understood Hegelian dialectics as a) the dialectic between the subject and the object, b) the dialectic of the individual and society, c) the dialectic of the subjective and the objective dialectics of capitalism, d) the dialectic of chance and necessity, e) the dialectic of essence and appearance, and f) the dialectic of essence and existence.

³⁴ Available at http://europa.eu/rapid/press-release_IP-17-1784_en.htm

³⁵ For example, the Association of Computer Machinery (ACM) recently issued a statement on algorithmic transparency and accountability. Available at: <https://techpolicy.acm.org/?p=6156>

functions of information processing. Without firm control over algorithms, any dissent will be recorded as a glitch in the system. The system will then adapt and the company will become even more efficient. The ultimate goal for *praxis* is to regain control over algorithms.

4. Conclusion

Drawing on Marcuse (1941; 1960; 2007/1964), algorithms can be conceived as a product of human society and social conditions. In addition, the objectified existence of algorithmic artefacts exerts influence over the behaviour and consciousness of humans. Alphabet's algorithmic capitalism model is supported by three technological rationalities: the organisational rationality of flexible management values and labour utilisation; the informational rationality of generating value from advertising and audience labour (Smythe 1981; Jhally and Livant 1986); and rationality increasing surplus value, reifying labour and commodity exchange. The company produces two main types of commodities. First, the audience commodity (Fuchs 2010; 2012; Fisher 2015) for the advertising market. Second, the algorithmic machine for the search engine market. Company engineers and Internet users produce the audience commodity and the algorithmic commodity. Reification (Lukács 1972/1923; Marcuse 2007/1964) blurs the consciousness of contradictions embedded in algorithms, as well as the relations of production necessary for their maintenance and commodity exchange in the market. Algorithmic machinery mediates labour, value and surplus value. Company employees and audience labourers produce the audience commodity and the algorithmic machine, while the algorithmic machine accumulates surplus value (Pasquinelli 2009; 2015) for company owners. Reclaiming algorithms under social and democratic control requires a combination of policy, practice and *praxis* – a raised consciousness of the contradictions and struggles embedded within corporate technologies and a series of steps for gaining control. Algorithms will continue to expand in multiple areas and continue to create struggles and contradictions between human values, judgements and corporate control and dominance. It is important to remember that technologies are not neutral or objective (Marcuse 2009/1965) – they are either good or bad for humanity, depending on who is in control.

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