

# **“ONE CAN IMAGINE ONE’S MAKING A CONSCIOUS CHOICE”**

## **AI and Algorithmic Awareness among Swedish Public Librarians**

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## **Title**

“One can imagine one’s making a conscious choice”: AI and algorithmic awareness among Swedish public librarians

## **Abstract**

In this thesis I provide insight into how librarians at public libraries perceive, understand, and interact with algorithms and AI in relation to their profession. My main focus lies in how librarians’ perceptions of algorithms and AI ultimately shape their actions. To achieve this aim I take my starting point from their privately held views of algorithms and AI. The material for the thesis is gathered by conducting qualitative interviews with seven public librarians in Skåne. I take a sociotechnical approach to my material and analyse my findings with the help of infrastructure theory and the algorithmic imaginary. Infrastructure theory is used to make visible the often hidden digital information infrastructure of algorithms and AI, while the algorithmic imaginary is used to draw out and analyse my participants’ views and understandings of the technologies. My participants’ interactions with algorithms through their patrons show that librarians are in a unique position to view the effects of the invisible infrastructure of algorithms, all while being aware of algorithms themselves. In contrast, I identify AI as a mostly invisible infrastructure to the participants in relation to their profession. However, even if the technologies are invisible, my participants still act according to them. What emerges is a view of AI and algorithms that is contextual and depend on where the librarians interact with them, professionally or privately. This view leads to contextual actions dependent on the circumstances the librarians find themselves in.

## **Keywords**

Library, Information, Library and Information Studies, algorithms, AI, algorithmic awareness, algorithmic imaginary, infrastructure

## **Titel**

“Man kan inbilla sig att man gör ett medvetet val”: AI och algoritmmedvetenhet hos svenska folkbibliotekarier

## **Abstract**

I denna uppsats ger jag en inblick i hur bibliotekarier på folkbibliotek uppfattar, förstår och interagerar med algoritmer och AI i relation till sitt yrke. Mitt främsta fokus ligger på hur bibliotekariernas uppfattningar av algoritmer och AI i slutändan formar deras handlingar. För att uppnå detta syfte tar jag min utgångspunkt i deras personliga syn på algoritmer och AI. Materialet för denna uppsats har samlats in genom kvalitativa intervjuer med sju folkbibliotekarier i Skåne. Jag tillämpar ett sociotekniskt tillvägagångssätt för att ta mig an mitt material och analyserar mina resultat med hjälp av infrastrukturell teori och the algorithmic imaginary. Infrastrukturell teori används för att synliggöra den ofta gömda digitala informationsinfrastrukturen bakom algoritmer och AI, medan the algorithmic imaginary används för att belysa och analysera mina deltagares syn och förståelse för teknikerna. Mina deltagares interaktioner med algoritmer genom deras låntagare visar på att bibliotekarier är i en unik position för att se effekterna av algoritmers osynliga infrastruktur, allt medan de samtidigt själva förblir medvetna om algoritmer. I motsats till detta identifierar jag AI som en mestadels osynlig infrastruktur för mina intervjuobjekt i relation till deras yrke. Däremot, även om teknikerna är osynliga handlar fortfarande mina deltagare i förhållande till dem. Det som framkommer är en syn på AI och algoritmer som något kontextuellt samt beroende av var bibliotekarierna interagerar med dessa, professionellt eller privat. Denna syn leder till kontextuella handlingar beroende på den situation som bibliotekarierna befinner sig i.

## **Nyckelord**

Bibliotek, Information, Biblioteks- och Informationskunskap, Algoritmer, AI, algorithmic awareness, algorithmic imaginary, infrastructure

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# 1 Introduction

My personalized algorithms do not know me. I am very rarely active on Facebook but from what I have glimpsed, my feed is filled with boomers, boomer memes and – since specifying my gender on the platform as “male” – sports. I have no interest in sports, but Facebook seems to think that this is what I should be interested in – sports, and slightly sexist memes. A similar dissonance arises on search engines like Google. When searching for clothes, Google seems to struggle when trying to figure out whether to show me advertisement and results targeted towards men or towards women. These are some of the instances that made me realise just how prevalent algorithms are in my own life and it is what piqued my interest enough to set me down this path of research.

Let me continue with a question – what is an algorithm? Over the course of writing this thesis I have learned that this seemingly simple question does not have a simple answer. If we avoid going into the mathematical aspects of algorithms – an endeavour I will gladly avoid – the simplest, most straight-forward definition of an algorithm I have encountered comes from Taina Bucher (2018). She describes how “an algorithm essentially indicates *what* should happen *when* [...],” (p. 24). Tarleton Gillespie (2014) explains algorithms as “encoded procedures for transforming input data into a desired output, based on specified calculations. The procedures name both a problem and the steps by which it should be solved” (p. 167). What these descriptions show is that algorithms, in their most basic form, are a sequence of inputs and outputs. The information that is fed to an algorithm dictates the outcome. Algorithms are then used “to select what is most relevant from a corpus of data composed of traces of our activities, preferences, and expressions,” (ibid, p. 168).

One of the many things data is used for is machine learning, when training artificial intelligence (AI). AI can take on many forms and is often part of larger technical systems such as algorithms, robots or machines. AI systems take the form of software on the web – like chatbots or search engines – but it can also be embedded into hardware like robots or cars – like an Alexa or a Tesla (Coeckelbergh, 2020, p. 68-70). AI is used to refer to multiple technologies, including machine learning,

where AI learn things from experience like image classification; natural language processing, like ChatGPT where AI mimics spoken language; and deep learning, where AI learns by example from humans. The latter system is used for, for example autopilot driving. What ties all of these different AI systems together is the software that makes their intelligence possible – the algorithms.

As society becomes more reliant on the internet and as our presence online continuously grows, so does our interaction with algorithms and artificial intelligence. We now face algorithms and AI in all aspects of our lives but even so, their prevalence often goes unnoticed (Haider & Sundin, 2019; Hobbs, 2020). These technologies are in most cases invisible to their users while they meticulously and carefully shape our online experiences. In addition, algorithms decide what information should be known as well as how to know it, how to participate in societal and political discourse, and help govern the flow of information (Gillespie, 2014). Algorithms do this by personalizing the content that is shown to us online. This is done through filtered search results, targeted advertising, and differential pricing to name a few (Hobbs, 2020, p. 523). In other words, algorithms tailor the information we receive and are subjected to based on, among other things, users' previous actions. As experts in information literacy, the tailoring of information undoubtedly affects librarians' profession.

Libraries and librarians are in a unique position when it comes to the dissemination of information. This sentiment is expressed in paragraph seven of the Swedish national library law, which states that public libraries shall work towards increasing knowledge about the ways information techniques can be utilized to increase knowledge and partake in culture (SFS: 2019:961, § 7). As experts in information literacy with a focus on digital inclusion, librarians in many cases exist as a mediator and bridge between the vast expanse of information on the internet and the public. The libraries provide patrons with access to computers and are in some cases their only means of going on the Internet. Aside from conducting their own searches on search engines and social media, many librarians interact with algorithms through their encounters with the libraries' patrons when providing support and help.

With what feels like a new AI chatbot being released every week, the field of studying AI and algorithms continues to grow more relevant by the day. The understanding of algorithms and AI becomes more pertinent if one is to keep up with the information landscape as it continues to expand, grow, and change at a very rapid pace. Even during the months of writing this thesis the landscape has changed drastically. A simple Google search of “AI” generated a first page filled with fresh articles and newspaper headlines written just within the last 24 hours.<sup>1</sup> There are many aspects of algorithms and AI to investigate and research. Today these technologies are investigated through concepts of power, labour, ethics, search engines, social media, Big Data, and classification, to name a few (Crawford, 2021; Coeckelbergh, 2020; Noble, 2018; Haider & Sundin, 2018; Bucher, 2018; Zuboff, 2019). Researchers have conducted interviews to explore the public’s perception of both algorithms and AI but there is still reason to investigate how people who work with the technologies perceive them.

Algorithms and AI are inextricably part of everyone’s online presence today, and the public library is not exempt from the influence of these technologies. In this thesis I seek to explore public librarians’ perception of the influence of algorithms and AI within their profession. Knowing how they reflect upon these technical developments provides new insight into how information literacy is being thought about and taught in a Swedish library context. This will allow me to infer how knowledge experts view algorithms and AI, the questions they receive from users, and the opportunities as well as potential threats they identify these technologies pose to their profession.

## 1.1 Research purpose and research questions

The purpose of this thesis is to provide insight into how librarians at public libraries perceive, understand, and interact with algorithms and AI in relation to their profession. As AI and algorithms are present in many aspects of life, I adopt a broad

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<sup>1</sup> Disclaimer: while searching I was logged into my own Google account which might have personalized the results.

perspective in this thesis and investigate the perception librarians have of these technologies in their professional setting as well as the perception they hold privately in their day-to-day lives. Additionally, my interest lies in exploring the ways librarians reflect upon the hidden and often invisible aspects of algorithms and AI. Investigating the effects that algorithms and AI have on librarians' practices and how they carry out their work is also of importance. I will explore these aspects from a sociotechnical standpoint, meaning that I am concerned with how technology and society influence and shape one another. To achieve the aim of the thesis I have devised the following research questions:

- How do librarians perceive and interact with AI and algorithms in their profession and day-to-day lives?
- How do librarians reflect upon and understand the ways AI and algorithms influence their profession and day-to-day lives?
- How does the perception of AI and algorithms influence the actions of librarians in their profession as well as day-to-day lives?

## 1.2 Why AI and algorithms?

At an early stage in the research process, I was only interested in algorithms and the ways in which they shape our online presence and affect the librarian profession. However, with the launch of ChatGPT in November of 2022, the discussions around artificial intelligence gained new life. Seeing as my focus was on algorithms in a library context, I assumed that a lot of the answers to my interview questions would be coloured by this seemingly novel software. Additionally, while initiating my examination, I noticed that research discussing algorithms rarely makes a difference between algorithms and AI when analysing the technological systems as information infrastructure. AI is made up of algorithms and is very often embedded within the same information processes as algorithms (Coeckelbergh, 2020, p. 70)

The theories that I employ which concern the infrastructure behind the two technologies of AI and algorithms and the imaginary concerning people's perception, can be applied to both AI and algorithms. The infrastructure behind AI and algorithms is very similar and they can both be analysed through similar themes



of power, labour, invisibility, data, and classification (see Crawford, 2021; Coeckelbergh, 2020; Noble, 2018; Benjamin, 2019). Asking questions about both AI and algorithms has allowed me to analyse if there is a difference in perception between these technologies and in that case, why.

### 1.3 Disposition

This thesis is divided into six chapters. In the introductory chapter I have, with broad brushstrokes, provided context for what I am researching and why, as well as presented my research purpose and research questions. In the following chapter I situate my findings in relation to previous research that I have found relevant to my thesis. I have focused on research concerning the invisibility of algorithms and AI, as well as provided some context for how algorithms and AI have been researched in a library setting. The third chapter explains the concepts of the theories I have employed – the algorithmic imaginary and infrastructuring (Bucher, 2018; Bowker et al., 2010). Chapter four explains the qualitative method of semi-structured interviews which I used to gather my material. I also describe the process of selecting informants as well as the ethical aspects I considered in this process. Lastly, chapter four will also touch upon how I went about analysing my material.

The thesis continues with an analysis of the material, where I combine the presentation of my results with my analysis of the material. With the help of theory and previous research, I explain my results in depth. The first subheading of the chapter regards the invisibility of algorithms and AI and gives an account of librarians' perceptions of algorithms and AI, as well as how they perceive library patrons' interactions with algorithms. This is followed by a section called *Agency* where I explain my participants' view on the importance of agency, as well as the actions they take in order to enact agency on algorithms. In the final chapter I answer my research questions followed by concluding remarks where I summarize, tie my thesis together and reflect upon my conclusions.

### 1.4 Delimitations

Writing about a topic that is constantly evolving and changing by the hour makes it difficult to demarcate and decide what to include in a thesis. While writing this

thesis the landscape of information studies and media studies has been going through a change, with the release of multiple AI-tools as well as social media platforms making dubious changes to try and stay afloat under new leadership. This study should be viewed as a product of its time where the gathering of the material happened between February and early March of 2023. It is also limited to its geographical location and should be viewed in a Swedish context.

## 2 Research summary

In this section I trace the general outlines of previous research about algorithms and AI that is relevant to my thesis. This research entails both algorithms' invisibility as well as their role in libraries. Aside from information studies, I also draw upon research about algorithms and AI from the adjacent fields of media studies as well as communication studies. An important thing to note when discussing the underlying systems of search, as well as those of social media, is that both algorithms and AI make up these systems and are often inextricable from one another (Coeckelbergh, 2020). When discussing algorithms relating to search and social media, I will automatically also be referring to the AI embedded within these systems.

### 2.1 Invisible algorithms and AI

Invisibility and its consequences are a main concern when researching algorithms from a sociotechnical standpoint. A large part of the previous research about algorithms investigates the role of search engines. In their book *Invisible Search and Online Search Engines* (2019) Jutta Haider and Olof Sundin address and relay the ways in which search is an invisible part of everyday life as well as the implications of this. The authors argue that search has become such a common and ordinary action of our everyday lives that it has become invisible to us. They call this phenomenon *search-ification* (p. 2). Search engines and the act of searching are part of a mostly invisible information infrastructure where the components that make search possible are hidden from its users. Algorithms are the underlying building blocks which make the invisibility of search possible. Information about algorithms and AI relating to how search and social media platforms work is often blackboxed and classified as commercial secrets by its developers. Blackboxed information means that it is hidden and made to be inaccessible – a reference to the black box on an aircraft. Renee Hobbs (2020) raises concerns about how “human agency might be threatened if the algorithms used to manipulate human decision-making processes are not transparent,” (p. 525). This does not mean that people need or should strive to access the underlying code that make up algorithms, which

most people would be unable to understand unless they work with these technologies. Instead, as Taina Bucher suggests throughout her book *If... Then: Algorithmic Power and Politics* (2018), algorithms are contextual, there is no wrong way to understand algorithms, and anyone can know them in relation to their own experiences. What both Bucher and Hobbs make clear, however, is that being oblivious to the prevalence and effect of algorithms leads to a lack of control and agency (Bucher, 2018, p. 46; Hobbs, 2020, p. 525).

Exploring ways that people engage and deal with algorithms has become a popular topic of investigation for researchers (Bucher, 2018; Haider & Sundin, 2019; Haider & Sundin, 2022; Hobbs, 2020; Olsson-Dahlquist & Sundin, 2020; Schellewald, 2022). A majority of studies about people's interactions with algorithms investigate how these affect their everyday lives. Stine Lomborg & Patrick Heiberg Kapsch (2020) use "decoding" as a point of departure when investigating people's understanding of algorithms (p. 746). The authors describe decoding as a concept within communication theory that highlights gaps that must be filled through socio-cultural interpretation before any communication becomes meaningful. In other words, decoding is what people do when filling in the knowledge gaps by interpreting the world before we can communicate in a meaningful way. Their findings suggest that people use strategies of decoding in order to understand, reinforce, or subvert algorithmic logics (p. 759). The study aligns with research that suggests that algorithms are blackboxed and that people do not know much about what algorithms do, what they are, or their implications (ibid). Additionally, the authors – albeit tentatively – suggest that being aware of algorithms does not necessarily lead to critical reflection or actions: "People's algorithmic imaginations may not be so lively, after all, when it comes to foreseeing possibly problematic scenarios of algorithmic decision-making systems, or the mechanisms of categorization, filtering and profiling, and so on, on which these systems rely," (Lomborg & Kapsch, 2020, p. 759). This is something that Haider & Sundin (2022) also note; that knowing about algorithms' downsides does not always lead to people avoiding them (p. 136). In relation to my thesis, it is interesting to investigate how librarians interpret, perceive, and interact with algorithms and if their responses align with this research.

Sebastian Schultheiß & Dirk Lewandowski (2020) build upon studies regarding users' knowledge about advertisements on search engines, specifically Google's business model. Their study shows that many users are unable to distinguish between advertisements and organic, not sponsored results, which leads them to selecting results based on incorrect assumptions (p. 285). The authors also examine how users' understanding of advertising influences their viewing and selection behaviour. Advertisements on Google have become almost transparent compared to "organic results" (p. *ibid*). Schultheiß & Lewandowski's results show that users with low-level knowledge of search engine advertising are more likely to click on ads than participants with a high level of knowledge. Additionally, participants with low level knowledge are reluctant to scroll down to organic results.

Because of their invisibility, algorithms are perceived as neutral and objective technology that is separated from human intervention. People view algorithms as strings of code that are made to simply analyse cold, hard data, which means that they are separated from emotions and sentiment as well as bias. Algorithms are often viewed as capable of being more objective than people can be (Bucher, 2018, p. 51-52). Critical algorithm studies and sociotechnical ways of studying algorithms distance themselves from this perception and instead highlight the ways that people's cultural and social norms are integrated into technology and software (Bucher, 2018; Benjamin, 2019; Coeckelbergh, 2020; Crawford, 2021; Gillespie, 2014; Noble, 2018; Zuboff, 2019). For example, researchers like Safiya Noble (2018) and Ruha Benjamin (2019) present ways in which these systems reinforce and reproduce racism under the guise of neutrality. One of the many examples is how search results on Google associated names seemingly belonging to Black people with having a criminal record (Benjamin, 2019, p. 9). The algorithms "were learning the racist preferences of some users and feeding them back to everyone else" (*ibid*, p. 10). The dangers of obscuring or ignoring the human aspects of code and technology's inception is that one wrongfully interprets these as unbiased: "These tech advances are sold as morally superior because they purport to rise above human bias, even though they could not exist without data produced through histories of exclusion and discrimination" (Benjamin, p. 12). Kate Crawford (2021) explains the ways that AI is often biased from training the system using problematic data sets (p. 89–93). AI systems are fed large sets of data which then lay the

groundwork for how AI systems ultimately make inferences and predictions (ibid, p. 97). What this implies is that the system has been trained to make inferences by itself, without direct human intervention. The view of unbiased or neutral technologies is marketed by developers and repeated by users, which leads to algorithms and AI being viewed as impartial and neutral because they are based on code. The notion of viewing AI as removed from human intervention has been highly contested by authors like Benjamin (2019) and Noble (2018). Noble highlights the ways in which Google's search engine reinforces racist stereotypes. She explains how search engines like Google have become so established that people have been socialised to believe that the results that are shown must be true, credible, and neutral (p. 25). Google's market dominance and growth as a company has also contributed to their image of neutrality and credibility. One of the consequences of this is that the everyday searcher does not reflect upon the company or people behind the algorithms (p. 24). The works of researchers like Noble and Benjamin highlight the ways that human bias is coded into algorithms at their inception. These authors turn the focus towards the developers and companies that create these systems, and their research shows that it is impossible to separate algorithms from human intervention. This is due both to the fact that algorithms are made by humans, but also because they are continuously shaped and influenced by people interacting with them.

Haider & Sundin (2022) conducted 32 pair interviews in a study that investigates adolescents' experience and understanding of algorithms and algorithmic systems. Haider & Sundin made use of the algorithmic imaginary combined with theories of temporality and infrastructural meaning-making. The authors explain how platforms and other information intermediaries are built on predictive analytics, which is to say that they are programmed to anticipate and "calculate what users will experience as relevant content, and many work as recommender systems," (p. 129). Platforms and search engines both work with predictive analytics. Google gathers data through their search function but also through a user's Google account, Gmail, Maps as well as any of the company's affiliated websites - like YouTube (Haider & Sundin, 2019, p. 64). Google gathers user data through every search, every click and with every interaction. Aside from profiting off the data by selling

it, the data is also being used to algorithmically curate and tailor search results (Haider & Sundin, 2019; Hobbs, 2020; Gillespie, 2014, Noble, 2018).

Much research focuses on the privacy issues surrounding search engines, algorithms, and user data. Tarleton Gillespie (2014) explains how a user's input is used for many more things than solely displaying a result after a search. In order for sites to present relevant information to its users, it must first anticipate what said user wants to know. The data is based on the user's immediate action, their previous actions, as well as actions taken by people deemed to be demographically and statistically similar to the user (p. 173). As Gillespie (2014) puts it: "digital providers are not just providing information to users but also users to their algorithms. And algorithms are made and remade in every instance of their use because every click, every query, changes the tool incrementally," (ibid). AI is also a part of the process when search engines and social media platforms collect user data (Coeckelbergh, 2020, p. 78). AI is embedded in many kinds of technologies which can lead to "the lines between AI proper and other forms of technology [being] blurred, rendering AI invisible: if AI systems are embedded within technology we tend not to notice them," (ibid). Seeing as AI and algorithms are intrinsically linked, AI is already an invisible part of our everyday lives.

Shoshana Zuboff's seminal work *The Age of Surveillance Capitalism* (2019) is concerned with what she calls, as the title suggests, "surveillance capitalism" – the concept refers to the ways in which the economic system of capitalism has created actors that trade, sell and exploit people's data for money. According to Zuboff, the right to data, privacy, and knowledge "has been usurped by a bold market venture powered by unilateral claims to others' experience and the knowledge that flows from it," (p. 7). The experiences Zuboff mentions, refer to our online presences and how these are viewed and claimed as "free raw material for translation into behavioral data" by surveillance capitalists (p. 8). The behavioural data that is collected is then used in order to influence, modify, and predict our behaviours in order "to produce behavior that reliably, definitely and certainly leads to desired commercial results," (p. 203). In other words, the goal with collecting user data is never mainly about supplying users with the most relevant results, but rather to make money. Zuboff explains how this system of surveillance and commercialised

experience extends beyond internet companies, and how this also influences the offline world we inhabit. By gathering immense amounts of data, the mechanisms of society are able to predict our behaviours and influence sectors that extend far beyond just targeted online ads. One of the arguments that Zuboff makes is that being digital and being online ultimately leads “to other’s commercial ends,” (p. 9). Arguably, Zuboff takes a macro perspective when investigating the network of building blocks and underlying infrastructure that make up the expanse of the system behind digital commercialism. I, on the other hand, investigate the micro perspective and am concerned with how the individual’s experience and behaviour is influenced by the specific – but still large – building block of algorithms and AI.

As mentioned previously, the prior research conducted concerning people’s interactions with algorithms has focused on people’s everyday lives. What has been missing from this research are the ways librarians – professionals who work and interact with these systems everyday – view algorithms and AI and their influence.

## 2.2 Algorithms and AI in libraries

As I have shown, the topic of algorithms is thoroughly researched within information studies. Previous research in this field explains how people in their everyday lives interact with algorithms and identifies a lack of algorithmic consciousness among the public. Olsson-Dahlquist & Sundin’s (2020) research confirms that the same lack of algorithmic awareness also exists in a Swedish context, among Swedish citizens in their everyday lives. The authors compare and contrast the views of two different generations – youths and adults. One of the aspects the study reveals is that even though its participants, young and old, claim that they know nothing or next to nothing about algorithms, they have still formed strategies to influence the information they are shown (p. 40). In addition, Olsson-Dahlquist & Sundin identify the ways public libraries can contribute to advancing the algorithmic awareness of the Swedish general population. The authors suggest that the pedagogical aspects of a librarian’s role could be expanded to include the dissemination of algorithmic awareness, by making the public aware of the invisible information infrastructures around us as well as how they affect how we see and understand our surroundings (p. 36).



Ridley & Pawlick-Potts (2021) make a similar claim as Olsson-Dahlquist & Sundin when it comes to public libraries, algorithms, and AI. They suggest that understanding and being aware of AI is a skill that is missing from digital and information literacy. Like many other researchers, they identify a lack of awareness of what algorithms and AI are and how they work. Ridley and Pawlick-Potts (2021) claim that libraries are in a unique position to advance, support and contribute to the algorithmic literacy of the public (p. 9).

In the master's thesis "Det är lite ge och ta: Google och folkbibliotekarieuppdraget" (2020), Linnéa Johansson and Lena Persson investigate Swedish public librarians' use of Google Search in their profession. By interviewing librarians, they find that even though librarians are critical towards Google as a company and a search engine, librarians still view Google Search as a helpful tool when searching for information as well as for answering questions from the libraries' patrons. In relation to my thesis, Johansson & Persson's research intersects with mine. I develop this topic of research as I widen the scope to include algorithms in more contexts than Google's search engine. However, when discussing algorithms in the context of libraries, Google's search engine is impossible to avoid and needs to be featured.

## 3 Theory

The theories that I am employing in this thesis both stem from a sociotechnical tradition. As briefly mentioned previously, the sociotechnical perspective strives to examine and highlight how society influences and shapes the technology we create, while also investigating how the technology in turn affects society (Pinch & Bijker, 2012; Levy, 2003; Peterson-Bishop et al., 2003). Pinch and Bijker (2012) state that technology is socially produced in a variety of contexts and that these contexts shape the technical characteristics of the object (p. 6; p. 14). In relation to algorithms, the social contexts surrounding their inception is often ignored or made invisible. Societal aspects are embedded into algorithms and AI which affect their functions, while their functions ultimately affect society and users back. When analysing how algorithms affect people, a lot of research focuses on the practices that occur when people interact with algorithms (Bucher, 2018; Haider & Sundin, 2022; Hobbs, 2020; Olsson Dahlquist & Sundin, 2020). Both infrastructuring and the algorithmic imaginary are concerned with the practices that arise from people's interactions with technology. Infrastructuring will help expose the invisible infrastructure of AI and algorithms and allow me to move these technologies to the foreground for my participants to consciously reflect upon. Then, the algorithmic imaginary will help bring out my participants' interpretations and understandings of algorithms and AI and allow me to investigate my material based on my participants' contextual relationships to algorithms and AI.

### 3.1 Infrastructure

Infrastructure is a broad concept with many offshoot branches and ways to analyse different systems. In this section I will explore and define concepts within *infrastructuring* that are pertinent to the analysis of my gathered material. The term "infrastructuring" is used to denote the study of invisible infrastructure (Bowker et al., 2010, p. 98). The kind of infrastructure that is relevant to this thesis is called *soft infrastructure*. While the word infrastructure may first and foremost conjure thoughts of physical infrastructure like railways, buildings, pipes or electricity, soft infrastructure refers to "more abstract entities, such as protocols (human and computer), standards, and memory," (Bowker et al., 2010, p. 97). These soft

infrastructures are services and structures that – like physical infrastructure – are required to maintain and uphold society. This term encompasses both algorithms and AI.

Algorithms and AI are a big part of what Bowker et al. (2010) call *information infrastructure*. In the simplest and shortest sense, information infrastructure refers to the services and facilities that are associated with the internet (p. 98). This term encompasses everything that makes digital information accessible and possible. The concept of infrastructure articulates that technologies like algorithms and AI only matter when viewed as part of larger systems in society. In other words, algorithms and AI should be viewed as having overarching societal effects as well as being part of larger societal structures – like, as Zuboff (2019) suggests, capitalism. Forsler (2020) describes infrastructures as relational, as “far reaching systems, embedded in technology, structures and social arrangements that emerge for people in practice” (Forsler, 2020, p. 57). The relationships between people and infrastructure are seen in people’s actions and practice, where infrastructures influence our actions. Algorithms and AI are irrevocably embedded in social processes and practices and have come to dictate people’s actions in ways that they are mostly unaware of (Beer, 2013, p. 70).

For an infrastructure to be successfully integrated into society it needs to become invisible to the people who use it. The process of invisible infrastructure relies upon individuals learning to use the infrastructure without reflecting upon their actions. One example of individuals not reflecting upon the infrastructure they use is exemplified in Haider and Sundin’s (2019) book *Invisible Search and Online Search Engines*. As mentioned previously, they explain a concept they refer to as *search-ification*. Search-ification refers to how online search – and the infrastructure that makes it possible – has become entrenched into our everyday lives and part of our daily practices (p. 79). Forsler (2020) explains the invisible relationship between individuals and infrastructure as: “[In order] to become [...] members of a certain community of practice, individuals must attain a naturalized relationship with the objects and standards of that infrastructure, or in other words, cease to see them” (Forsler, p. 60). That is to say, being part of a culture and society

means being fluent in the infrastructures in place – the infrastructure of search is no exception.

When it comes to a lot of technology – algorithms and AI being no exception – invisibility is to be expected by users and strived for by developers. The infrastructure behind technology is consciously made invisible both by its developers and the companies that own the technology in order to obscure the systems and processes that make things possible (Noble, 2018; Benjamin, 2019). Within the field of technology, developers and users alike strive for and expect seamlessness when interacting with technologies like algorithms and AI. This contributes to an infrastructure’s invisibility. While a seamless interaction with technology might sound like a perfect world, what becomes concealed through the process is “the politics, priorities and choices behind the systems which inhibits citizens from accessing and negotiating its underlying biases” (Forsler, p. 61). By being invisible, infrastructures cover up a myriad of the social conditions of their creation. A lot of information infrastructure truly only becomes visible in cases when it breaks down. *Breakdown* is a concept within infrastructuring which refers to when infrastructure that is usually invisible suddenly becomes visible because it stops working (Star, 1999, p. 382).

In order to expose the well-hidden infrastructure behind today’s use of algorithms and AI in a library context, this thesis will make use of a process Bowker & Star (1999) call *infrastructural inversion*. Simply put, this process means to foreground the hidden infrastructures by pointing them out and ultimately making invisible systems visible (p. 34). This invisible and naturalized infrastructure of algorithms in particular is expressed by Beer (2013) as he presents the ideas of Scott Lash: “[...] algorithms create realities, they constitute the social world in different ways, and they present us with limitations and boundaries that we then live by. We begin to see straight away [...] that algorithms could well be operating to create or maintain rules and orders without really being noticed” (p. 70). Infrastructural inversion will allow me to expose the concealed ways that algorithms work and exist in a library context.

### 3.2 The algorithmic imaginary

In this section I will explain the concept of the algorithmic imaginary and how I mean to analyse public librarians' perception of algorithms through this theoretical lens. Nick Seaver (2017) explains how algorithms are seen as elusive, "a modern myth" with a lot of significance and power, but without well-defined properties (p. 2). The difficulty to define and specify complex algorithms used by for example Google or Facebook, or within policing systems for that matter, has led to what Seaver calls a "terminological anxiety" within critical algorithm studies (ibid). He poses the question of if we are allowed to study algorithms without understanding the exact details of how they work. Pinning down and defining an algorithm is something that Seaver proposes is difficult even for those who work with development of different algorithms. Instead, definitions of algorithms are unstable, contextual and without one correct definition (p. 4). Because algorithms rely on context, it becomes important to explore how they are expressed in *practice* to not risk separating algorithms from the politics and the wider societal context that create them. This viewpoint which emphasises the importance of context, which Seaver names "algorithms as culture," rejects the notion that algorithms can be separated from the context, culture, and politics of how they came to be (p. 5). This approach opens up for a view of algorithms that focuses less on the technical side, and more on the social aspects of them.

By pointing to the intrinsic impact on culture that algorithms have, one can explore algorithms through their relationship with society. Like infrastructuring, Seaver (2017) sees the relationship between algorithms and society as an exchange where actions and practices are central to understanding algorithms as culture: "[...] algorithms are not singular technical objects that enter into many different cultural interactions, but are rather unstable objects, culturally enacted by the practices people use to engage with them," (p. 5).

When observing practices in relation to algorithms, the concept of the algorithmic imaginary, coined by Taina Bucher (2018), is an apt place to start. With influence from theories of imagined community, the algorithmic imaginary allows us to focus on how people *experience* algorithms, as opposed the knowledge they possess about algorithms. In other words, people's perceptions of what algorithms are is more important than how or what makes them work. Contrary to the theory of imagined

communities, Bucher also makes it clear that the relationship between algorithms and people is an exchange: “[...] it is not the algorithm, understood as coded instructions that enables or constrains actions, but, rather, the perceptions and imaginations that emerge in situated encounters between people and algorithms” (p. 117). In the spirit of the sociotechnical perspective, Bucher shows that, while people’s perceptions of algorithms influence and shape algorithms, algorithms also shape and influence people’s actions, habits and practices in return. Even if people do not necessarily understand how algorithms work, their perception of algorithms still influence their actions.

Bucher focuses on stories when describing how users may “make sense” of the algorithms in their lives:

Stories account for events and experiences in ways that help actors make sense of what is going on in specific, situated encounters. [...] The imaginary, then, is to be understood in a generative and productive sense as something that enables identification and engagement with one’s lived presence and socio-material surroundings.

*Bucher, 2018, p.113*

The stories people tell about algorithms influence their relationship to them. The process which occurs at the intersection between people’s lived experience in relation to their socio-material surroundings is of interest to many who study society through a sociotechnical perspective. A concept that lies close to Bucher’s algorithmic imaginary is *sociotechnical imaginaries*. These are collectively held beliefs and thoughts of what technological and scientific progress and modernity means, as well as what the future should look like. Sociotechnical imaginaries are defined as “collectively held, institutionally stabilized and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order, attainable through, and supportive of, advances in science and technology” (Jasanoff & Kim, 2015, p. 4). While these are collectively held imaginaries, they can operate on a very small scale. For example, within a profession, multiple different beliefs of sociotechnical imaginaries can be held. However, there is a difference between the sociotechnical imaginary and the algorithmic imaginary. While the sociotechnical imaginary is explained as a collectively held view of the future, the algorithmic imaginary claims that there are no collectively held views. Instead, everyone’s relationship to algorithms differs

from each other because the algorithms they encounter are specific to that situation and person. Because algorithms are made to be highly personal, one cannot have the same experience or exact same view of algorithms as someone else.

According to Bucher (2018), thoughts and beliefs emerge from the individual and habitual spaces that people occupy, as people's perceptions of algorithms are informed by their own experiences and interactions with algorithms: "In other words, the algorithmic imaginary emerges from the public's beliefs, experiences, and expectations of what an algorithm is and should be," (p. 114). While people might not know what algorithms are or even be aware of when they interact with them, people nonetheless experience their consequences.

As I have shown, the algorithmic imaginary is concerned with how people experience and think about algorithms, as well as the practices that arise from this perception. The algorithmic imaginary analyses people's perceptions on an individual level, through personal stories. Infrastructural inversion on the other hand, is used to expose the hidden and ignored infrastructure that make the naturalized behaviours of our everyday lives possible. Its focus is on the community practices that arise from structures in society. The algorithmic imaginary will work as a tool to analyse and extract the ways that people still act according to an invisible infrastructure. Using both concepts of infrastructure and the algorithmic imaginary allows me to investigate how algorithms and AI exist in a library context where algorithms can be analysed both as something that acts upon people as well as something that is acted upon by people.

## 4 Method

In this section I explain how I through qualitative interviews gathered the material for this thesis. I present the process of choosing my participants as well as how the interviews were conducted. I also consider the ethical aspects of my study and ultimately explain how I analysed the gathered material.

### 4.1 Qualitative interviews

To capture the experiences of librarians in relation to AI and algorithms, I used qualitative interviews as a method. Qualitative interviews provide insight into the participants' experiences and are concerned with the social contexts that surround them (Eriksson-Zetterquist & Ahrne, 2022, pp. 77-78). While qualitative interviews give a narrow view and are not used to draw more general conclusions, interviews were a fitting choice for this thesis seeing as my interest lies in librarians' subjective experiences. Interviews are especially appropriate as a method since both theories I employ are concerned with the social aspects of and larger contexts surrounding algorithms. The interviews I conducted were semi-structured, meaning that while I prepared questions beforehand, I also remained open to the possibility of asking follow-up questions and branching out in the conversation (Eriksson-Zetterquist & Ahrne, 2015, pp. 59-60). Kvale & Brinkmann (2014) describe how qualitative interviews allow the interviewer to bring up new subjects, ask new questions and find new ways to approach a subject during the interview (p. 40).

### 4.2 Selection and realisation

When selecting participants, I decided to focus my research solely on public librarians in the county of Skåne. According to Ahrne & Svensson (2015), focusing on a singular environment brings the added benefit of getting better insight into that environment, while also adding a certain continuity to the study (p. 24). Additionally, the choice to limit my interviews based on geographical location was made so that the number of responses and interviews would correspond to the scope of the thesis. To find participants to interview, I used a combination of the two-stage sample and the snowball method (Ahrne & Svensson, pp. 40-41). The two-stage sample means first narrowing down the organization one wants to study



before finding suitable people to include in one's research, while the snowball method means that one gets in touch with new interview subjects through different key figures or a previous interview subject (ibid). In the first stage of the two-stage sample I chose to only inquire with librarians at public libraries. The second stage concerned choosing which individuals to interview. A problem that I was careful to try and avoid was that only people who were familiar with algorithms would show an interest in being interviewed. The goal was to encompass many kinds of librarians, both those who identified themselves as very knowledgeable and those who did not. Therefore, I was not interested in solely interviewing experts for this thesis. In order to avoid getting a partial one-sided view of librarians' experiences I made sure to explain in advance that I was interested in their *perceptions* of algorithms, as opposed to their *knowledge* about algorithms.

When finding librarians to interview, I looked at the webpages of public libraries in Skåne where they listed the emails of their library organization. I chose to inquire at libraries that were close enough and relatively easy to get to by train or bus since I wanted to conduct the interviews face to face. When the email to a specific librarian was listed, I emailed the librarian directly as I assumed that would give them a greater incentive to respond. Even though I did my best to dissuade anxieties about the knowledge needed to answer my questions, the responses I received from only emailing were very scarce. I therefore used the snowball method as a complementary method. I inquired with my supervisor, a peer, and my first interview participant and through this process I secured four out of my seven interviews. By asking three different key figures – my supervisor, peer, and interview participant – I also avoided getting similar recommendations or staying within solely one library organization.

All interviews were recorded to then be transcribed and analysed. The length of the interviews ranged from twenty minutes to one and a half hours. All interviews took place at the participants' places of work, except for one that had to be conducted through Zoom due to transportation issues. Initially, I meant to only interview people from different library organizations, but this proved to be difficult due to the low number of responses. In the end, I conducted seven interviews at six different libraries, belonging to five different library organizations. Out of the six libraries,

three of them were smaller district libraries. I chose to not let my participants see the interview questions prior to the interview since I did not want them to have prepared an answer beforehand. In this way, I could capture the immediate thoughts conjured by my questions about algorithms and AI.

Anna, Maria, Martin, Paul, Filippa, Johanna and Sonia have been interviewed for this thesis in their role as librarians. I have not used the real names of either the librarians or the libraries in this thesis, in order to respect their privacy. Anna, Maria and Johanna all work at smaller district libraries, while the rest work at larger municipal libraries. The libraries where Paul, Filippa and Martin work have a DigidelCenter which means they have designated spaces for digital resources that are always manned by librarians.

### 4.3 Ethical aspects

Kvale & Brinkmann (2014) as well as Ahrne & Svensson (2011) list multiple ethical aspects one should consider at the beginning of an interview study. The list includes informed consent, confidentiality, consequences as well as the author's role in relation to the interview subject (Kvale & Brinkmann, p. 105; Ahrne & Svensson, p. 31). In order to obtain informed consent, I wrote an agreement specifying the conditions of the interview as well as how the recording would be used in my thesis. Prior to every interview I had my interview subjects read and sign the agreement. Additionally, I made sure to explain that they retained the right to, at any point, retract their consent. I informed my participants that I would not use their real names but I also made sure to explain how I could not ensure their complete anonymity in case I chose to include details pertaining to the library which would make it possible to identify. Following Kvale & Brinkman's (2014) suggestions, I informed my interviewees about the aim of my thesis, who would gain access to it, the right to publish parts of or the whole interview, as well as how they could get access to the transcript of their interview if they so wished (p. 107).

I have conducted interviews where I am concerned with people's perceptions and feelings towards a subject people in general feel like they know little about, as shown by Ohlsson-Dahlquist & Sundin (2020). Not only has this made it difficult to find people to interview, but it has also been important to make sure that those

who agree to be interviewed never feel bad or uncomfortable for not having an answer to a question. At every step of the process I have done my utmost to make it clear that I am not concerned with their knowledge of algorithms or AI, but rather their experiences with these.

#### 4.4 Analysing the material

After transcribing the interviews, the material was analysed through coding. Coding, according to Gibbs (2018), is the act of defining what the data one is analysing concerns (p. 54). In this thesis, coding was used to index and categorize the material to establish and identify its themes (ibid).

When transcribing I omitted laughs, repeated words, as well as my own sounds of agreement. In cases where I could not hear what was being said I marked them with [...], an ellipsis in brackets. Parts that I deemed irrelevant to the analysis were omitted and replaced by a timestamp as well as a short description of what was said during the omission. The interviews were conducted and transcribed in Swedish. All direct quotes in this thesis have subsequently been translated into English. When translating I have done my best to capture, maintain and reproduce the essence of what my interviewees conveyed.

Haider & Sundin (2022) bring up some of the difficulties one can have when trying to capture people's perceptions of algorithms as they are elusive, multiple, constantly changing and often invisible systems. One of these difficulties lies in the inability to delimit the phenomenon enough so that people can speak about algorithms in a meaningful way (Sundin & Haider, 2022). This is the main reason why I did not want to limit my questions about algorithms too much, but instead let the participants speak freely about their own associations and experiences. In the end, I chose to combine their free associations with more specific questions about algorithms in an attempt to delimit the conversation about algorithms for the sake of my own analysis. As previously mentioned, as algorithms affect all parts of our lives, I have adopted a broad perspective and investigated librarians' perception of algorithms relating both to their profession as well as their everyday lives.

## 5 Presenting and analysing the interview material

In this section I present the results from my seven interviews, while analysing them with the help of theories as well as previous research. I start by analysing the material through aspects of invisibility and present the ways that my interview participants reflect upon and become aware of algorithms and AI in their profession. In this section I present the ways that librarians are unaware of the effects AI has on the library and how they see artificial intelligence as more elusive and less prominent in a library setting. Through the infrastructural concept of *breakdown*, I then explore how librarians encounter algorithms in situations where they perceive algorithms to fail. The section following invisibility and breakdown concerns agency and explains the librarians' responses concerning the importance of agency relating to algorithms. Furthermore, I present the actions that librarians take in order to exert their own agency upon algorithms, both in their professional role as well as their everyday lives.

### 5.1 Invisibility

Interviewing librarians about algorithms made it clear that their perceptions differ from one another. Some did not think about algorithms at all during their workdays, while others thought about them very often. However, when asked questions outright pertaining to algorithms in their lives, all seven of the librarians interviewed for this study showed varying degrees of algorithmic awareness. To some extent, this aligns with what emerges from research concerning the general public's awareness of algorithms, which suggests that people are mostly unaware of the effect that algorithms have on their lives (Hobbs, 2020; Bucher, 2018; Haider & Sundin, 2019; Beer, 2009). When asked about AI, two differing perceptions were visible, those who view AI as something positive or more objective compared to algorithms, and those who outright distrust AI. Many of my participants were more tentative when claiming knowledge about AI and they did not yet recognize the ways which AI influences the library. In this section I give an account of the ways in which librarians experience the invisibility of algorithms in relation to the libraries' patrons, as well as their own view of algorithms and AI. By using the

infrastructural concept of breakdown, I investigate the contexts of when algorithms become opaque to librarians.

### 5.1.1 Transparency

All librarians said that algorithms aided them when using search engines, while only Anna and Martin said that algorithms do not help them in their profession at all. On the question if she encounters algorithms in her profession, Anna responds that she imagines that she does, but that it is not something that she actively thinks about. This is also the case for Filippa who, when asked about if she interacts with algorithms in her profession, answers that she is certain that she does but she never reflects on their presence during her workday. Even though some of the librarians say that they are not aware of the ways algorithms influence their profession, they are all quick to follow-up and express that algorithms most likely influence them in ways they are unaware of. In contrast, Johanna and Martin are both aware of algorithms in their professional role and find themselves reflecting on algorithms now and again. They are both quick to provide examples of when they encounter algorithms while at the library – through search engines and with library patrons. Even though the librarians are divided when it comes to how often they actively think about their interactions with algorithms in their day-to-day lives, they are all, after some consideration, able to provide examples of when they encounter algorithms, both privately and professionally.

In contrast, providing examples for when they interact with AI did not come easy to my participants. Their experience with AI seems to be in line with what research suggests is the case for people who do not work closely with algorithms – that is to say that they are mostly unaware of the effects of AI. Anna, Sonia, Filippa, Maria, Johanna and Paul see AI as an issue for the future and do not perceive AI as something that affects their profession here and now. However, both Johanna and Martin mention the speed at which these developments move and are aware of the rapid changes that occur in relation to AI and Chatbots especially: “A lot is happening right now that will set the standard for how we will work with these things in the future, or how it will exist,” (Johanna, 2023). When asked if he interacts with AI in his profession, Martin says that he probably does, but not to the same extent as he does algorithms. He sees that AI could be integrated into the

automated return system they have at his library “but I probably interact with [AI] in ways I do not know or understand. I am open with that,” (Martin, 2023). Martin shows an awareness of the fact that spotting what functions on the internet have underlying AI-technology is not easy. When asked if he thinks AI influences or will influence his profession, Martin says that “the influence today exists, and I am happily unaware of it, but [AI] will influence everything from the library’s patrons, how they are, what they can access, to how we [librarians] shall work going forward,” (Martin, 2023). My participants’ guesses of how AI can come to affect their profession in the future involve creating texts through chatbots and other natural language processors. Some of the responses could be coloured by the questions in the interview pertaining to ChatGPT. Paul is the only participant who mentions that he thinks Chatbots could give rise to a new way of searching for information. I argue that the responses from my participants indicate that, to my interviewees, AI systems seem to be even more transparent than algorithms. Most of the librarians cannot point to where AI exists in a library setting today – parallel to the algorithms, in search engines and on social media – but they are also aware that it might only be a matter of time before public librarians will come to experience an increased frequency of professional encounters with AI.

However, most of the examples my participants gave regarding professional encounters with *algorithms* happen when interacting with the libraries’ patrons; both when conducting searches for them, and when helping patrons at their computers. Anna believes that algorithms affect her profession through the ways that they affect the patrons of the library. One example that she brings up is how literature becomes popular through algorithmic influence on social media platforms, which then makes library patrons request that literature. Martin makes a difference between the internal and external ways in which he interacts with algorithms. Internal ways include the library’s social media presence like Instagram, Facebook, and YouTube, while the external way is through the library’s users. The library Martin works at is part of the Digidel network and his work often involves helping patrons at the computers. Because of this, he experiences algorithms directly through the patrons’ searches. According to Martin, users do not reflect upon their searches, there is no awareness of sponsored posts that lead

to the wrong website and people rarely know that one can type a URL into a search bar.

Librarians become aware of algorithms through their interactions with library users. Even so, none of the librarians, except for one, can recall having ever explicitly received questions about algorithms from a library user. None of the librarians have received any questions about AI from patrons, something some of them express as being even further away from people's minds than algorithms. The librarians provide three main reasons for why they think library patrons do not ask them about algorithms or AI, the first being that, as research suggests, the library users might not know to ask about it. Algorithms and AI are invisible to them and so they do not know that algorithms or AI exist. The second reason is at the opposite end of the spectrum - that library patrons might think they already know enough about algorithms and AI, and so they do not feel the need to ask. Lastly, they identify that patrons might not be aware that the library is a place one can turn to for this information. As research suggests, people mainly view libraries as providers of literature (Olsson-Dahlquist & Sundin, 2020).

During the interviews, every librarian mentions increasing awareness about algorithms and AI as one of the most important aspects when it comes to algorithms and AI. In relation to algorithmic awareness, they mention filter bubbles, storing data and information, and the fact that algorithms shape and tailor results. In relation to awareness pertaining to AI the participants bring up training data, Chatbots and deepfakes after our conversations. Librarians' responses pertaining to themselves and the library patrons indicate that they perceive the infrastructure behind AI and algorithms as obscured. As explained before, invisibility is one of the defining features of infrastructure as Star & Ruhleder (1996) illustrate it: "infrastructure is transparent to use, in the sense that it does not have to be reinvented each time or assembled for each task, but invisibly supports those tasks," (p. 113). My participants view this invisibility as a problem and highlight the dangers of not knowing AI and algorithms. To Maria, the aspect of information manipulation in relation to algorithms and AI can be seen as a "kind of modern warfare" (Maria, 2023). Paul echoes this sentiment when he, in relation to deepfakes, explains how it can be a frightening weapon for propaganda and other destructive purposes.

Martin brings up the concrete example of information pertaining to the war in Ukraine as a place where AI manipulated information flourishes.

Librarians explain algorithms as a recipe, an underlying invisible software, or magic. Most of the participants tentatively express that they *think* they know what an algorithm is, but that they are more confident in expressing what algorithms *do*. Interestingly, they think the opposite when it comes to AI. When speaking about AI, the librarians state that they are mostly sure about what AI is, but, for many of them, defining what AI can do is considerably more difficult. Filippa explains that this is because AI can do so many things: “AI could be everything,” (Filippa, 2023). Some of my participants struggled to exemplify concrete instances of AI. However, the participants either themselves mention, or show recognition when I mention, deepfakes – manipulated images and videos made to look real – and natural language programs like Chatbots. After mentioning these concrete examples, the librarians often had a lot to say about these topics. Some participants viewed AI as more trustworthy than algorithms with the explanation that algorithms are used for commercial means, while AI is not. Additionally, Filippa viewed AI technology very positively and gave examples of smart technology that could help control the lamps, temperature, or blinds in the library room. However, she also mentioned not being comfortable with what she called “Big Brother AI”, AI which purpose is to filter the content she receives (Filippa, 2023). On the other hand, some librarians explicitly stated that they distrusted AI more than they did algorithms because of the danger that AI can pose when it comes to manipulated information. The librarians with a more negative view of AI also lifted instances where AI could be helpful, such as automated customer service or when automating dangerous jobs.

Bucher (2018) explores three methodological ways of tackling algorithms. The one that is pertinent to this thesis is the phenomenological approach which focuses on meaning-making that emerges through people’s encounters with algorithms.

[...] Experience and the knowledge people derive from it is situated and contextual. [...] Not everybody needs to know what algorithms are or how they work, but the ‘fact that we do not understand the Why and the How of their working and that we do not know anything of their origin does not hinder us from dealing undistributed with situations, things and persons’.

*Schultz 1946, p. 463, see Bucher, 2018, p. 62*



Not knowing how technical systems work does not inhibit people from dealing and interacting seamlessly with them. When asked if she knows what an algorithm is and what it does, Sonia brings up the fact that she does not need to know how algorithms work in order to explain what they do or what they lead to. She makes an apt comparison to electricity and how she does not necessarily need to know what underlying infrastructure makes the light shine in order to explain how a lamp works. When asked if she believes she *could* find information about underlying algorithms should she want to, Sonia expresses some doubt: “It feels pretty difficult. [...] All I know is that *a* selection is made. And it feels difficult to find out in an easy way,” (Sonia, 2023). Martin expresses a similar sentiment when asked the same question: “But it is not made to be accessible. That’s kind of the secret of social media. It’s not made for you to access,” (Martin, 2023). Some information is source code that is intentionally blackboxed company secrets and made unavailable to the public. Knowing algorithms is not an easy task, even for those who create it: Hobbs (2020), like Seaver (2017), explains how “even those who create algorithms cannot fully understand the machine-learning mechanisms by which decisions are reached,” (p. 525). But people do not need to understand tech language for the code to have an effect on them. Being unable to read or understand source code, as Bucher (2018) argues throughout her book, does not make their understanding of algorithms any less valid. As will be shown in a later section, people's understanding of algorithms still shape their interactions, regardless of where the limits of our understandings go.

### 5.1.2 Breakdown

Allow me to return to Sonia’s analogy of electricity. Since electricity prices soared to new heights at the tail end of 2022, electricity has become an infrastructure that has started to shape people’s lives in new ways. The high fees made people actively consider their actions as they found the best times during the day to do laundry, do the dishes or shower when the price of electricity would be lower. My own family members downloaded multiple apps so they could compare and track when the prices would drop. As is the case with infrastructure, we take it for granted until breakdowns occur. The difference between infrastructure that relates to electricity compared to infrastructure related to algorithms, is that we know how to turn a lamp on and off, but can we say the same for algorithms? Can we opt out of algorithms?

Exploring breakdown in relation to algorithms is tricky since algorithms are so dynamic, integrated in the digital, and technologically *always work*. Algorithms on social media platforms and search engines never stop working. Haider & Sundin (2019) rethink the ways of breakdown in relation to search engines since they very rarely truly experience breakdowns. Therefore, the authors urge their readers to think of breakdown in new ways: “The notion of infrastructure as situated, relational and emergent in use also means that breakdown occurs not just by itself in the technical, material structure, but also in relation to practices and situations,” (p. 57). By viewing breakdown in this way, new forms of breakdowns emerge, where practices and situations become impossible or go wrong.

Paul gives an example of an infrastructural breakdown when a library user had used the computer to access the municipality’s personnel website. The person had used Google, clicked on the first result, and ended up trying to log onto the website for another municipality and Swedish region. “That’s when I thought ‘here’s something where the computer gets it wrong, the algorithms get it wrong for this specific person,’” (Paul, 2023).

Martin recounts his own experience of breakdown outside of work, when the YouTube algorithm showed him an advertisement that upset him:

If an advertisement pops up as it did at one point – and I will never understand why, and I apologise, I don’t mean to step on anyone’s toes – but suddenly I got advertisements, or a “you might be interested in this?”-[recommendation] and it was from SD Riks, the Swedish Democrats’ YouTube channel, and I cannot for the life of me understand what my essence has exuded to ever receive that kind of advertisement. So, I really tried my best to block that content and channel.

*Martin*

These breakdowns lead to the infrastructure becoming immediately visible in ways it usually is not. Bucher’s (2016) research also exemplifies this when users interact with Facebook: “People generally started to notice the Facebook algorithm in moments of perceived breakdown,” (p. 36). Breakdowns can make one reflect upon the mechanisms that make up an infrastructure, as it did in Paul’s case, or lead to emotional responses, as in Martin’s case. Paul’s and Martin’s experiences exemplify that people carry an expectation of how an algorithm is supposed to act, what it is supposed to lead to. It is not until an algorithm does something unexpected that these expectations come into sharp focus (Bucher, 2016, p. 35-36). Martin

illustrates the ambivalent relationship he has with algorithms with an example of the discount he receives at the supermarket after purchasing chocolate pudding multiple times: “The perfect algorithm is when it understands ‘this is what he wants.’ And then when one gets ads from SD Riks, then [the algorithm] is broken,” (Martin, 2023).

What this section has shown is that even if some of the librarians do not think about algorithms during their workday, their answers still indicate that librarians are aware of the ways that algorithms exist and influence their day-to-day work. They are also conscious of the fact that most of their patrons, as well as other people in their surroundings for that matter, are unaware of the effects of algorithms. In the next section I explore the ways in which librarians work to claim agency over algorithms.

## 5.2 Agency

In this section of my analysis, I focus on the ways that librarians enact agency upon algorithmic systems. As shown in the previous section about invisibility, algorithms shape our online experiences in a myriad of ways that people might not be aware of. In this section, my focus will shift to investigate how librarians, through their actions, influence and shape the algorithms back and work to tailor their online experience. I include the ways in which librarians enact resistance to algorithms as well as the instances when they choose not to. In this section I draw on the concepts of agency that are found in Bucher’s *If... Then: Algorithmic Power and Politics* (2018). Bucher uses Karen Barad’s definition of agency when stating that “agency is not an attribute that someone or something may possess, but, rather, a name for the process of the ongoing reconfiguration of the world,” (p. 51). Agency is a relational, fluid and contextual process that changes depending on the situation one finds themselves in. As introduced in the theory section, the idea of the algorithmic imaginary that Bucher utilises focuses on what algorithms *do*, as opposed to what they are (Bucher, 2018, p. 42, p. 49). When it comes to agency, Bucher similarly urges her reader to ask *when* agency occurs in relation to algorithms, rather than asking who or what has agency or where agency lies. As Bucher explains, the *when* in agency relates to the perception of algorithms as plural, multiple, and reliant on the context they are found in (p. 48). The question of *when* is also posed by Star &

Ruhleder (1996) in relation to infrastructure. The authors suggest that instead of asking *what* constitutes an infrastructure, we ask *when* infrastructure is (p. 72). Being able to ask *when* infrastructure is suggests that it is fluid, dynamic and dependent on context. As Star & Ruhleder explain, infrastructure is relational and “only becomes infrastructure in relation to organized practices,” (p. 113). Depending on the situation, the person, and the context, infrastructure takes on different roles or meanings. Haider & Sundin (2019) exemplify how infrastructure is situational and contextual with the help of search engines:

Search engines are co-constructed every time they are used through the data that we, as users, are consciously and unconsciously providing them with. When we search for something, the search engine constitutes us as searchers at the same time as, with our data, we co-produce the search engine. Our actual doings co-construct the search engine.

*Haider & Sundin, 2019, p. 71-72*

There are many ways of understanding algorithms and context is key to understanding the ambivalent relationships that people have with algorithms (Bucher, p. 43-44). By exploring algorithms in relation to agency, many of the contextual interactions and perceptions of my participants come to light.

### 5.2.1 The importance of agency

The invisibility of algorithms leads to a lack of agency for those who use them, because in order to claim agency, one must first be aware. David Beer (2009) writes that awareness leads to actions that ultimately shape the information people see, by influencing algorithms (p. 997). The importance of agency is something that the interview participants often bring up during our interviews. While none of them use the word *agency*, they use similar words like *integrity*, *control*, *awareness* or *claiming ownership* which are all aspects of agency as put forth in the literature by Bucher (2018) and Hobbs (2020) to name a few.

To Johanna, integrity feels like the most important reason to highlight algorithms when speaking to library users. Johanna mentions that knowing about data collection, moderated feeds, and information bubbles is necessary in order to have integrity online. If given the chance, Johanna would want to convey the value of people owning their presence online:

Because the internet is so vast and one might think that they have access to everything there, and they do, but they might have to work to access some parts of it, because it is not the first thing that one will be presented with.

*Johanna*

On the question of how she feels about algorithms, Maria answers:

[...] It can be quite easy to get stuck in the cake videos, to not move forward from that and instead just receive more of the same. And if you're not aware of that, the world can become very small. So, there is a worry surrounding that. Not so much for my own sake, I feel like I can handle it thus far myself.

*Maria*

Both Johanna's and Maria's responses call into question what the tailored content leads to. Like Johanna, Maria is concerned with the limitations of the personalization of algorithms and brings up the dangers of only being fed the same kind of content all the time. The world becomes small because the information you see is selected and tailored to your worldview. Renee Hobbs (2020) presents a study which shows that, depending on people's previous online behaviours, Google presents some users with mainstream media sources, while other people receive results where the media source reflects their special interests. This led to Google providing tailored news sources to people who wanted to see radical, racist, or sexist content (Hobbs, 2020, p. 523). The information and content that one is shown is filtered and tailored based on what algorithms think you want to see, and it makes it more difficult to find information that the algorithm does not think interests you. Hobbs exemplifies what she calls "the filter bubble paradox" through Netflix: as you provide more information about what you like watching, the narrower your options become (Hobbs, 2020, p. 523).

Research shows that a higher level of algorithmic awareness has boosted people's overall feelings of control when it comes to social media platforms (Hobbs, p. 524). The issue of control is something that is closely tied to agency and Maria brings up the dangers of blindly trusting search results and how letting AI or smart appliances provide you with information leads to giving up control: "If I only trust the results I get and don't think for myself, or if I leave a bunch of stuff for Alexa where I don't think for myself or decide for myself, it's a bit similar. I relinquish some of the control, I think," (Maria, 2023). Paul also thinks of algorithms and AI as somewhat elusive and uncontrollable. Martin says that he does not believe he can

*control* algorithms, but rather that he can *handle* them. The difference between the two words seems to lie in a perception of how algorithms are so prevalent that there is nothing one can do other than learn to live with them. Regardless, knowledge of algorithms grants power to use algorithms to one's advantage. Without this knowledge, one does not even realise it is an option. So, in what ways do librarians' knowledge grant them power? In the next section I present the ways in which librarians take action to establish agency and control over the content they interact with online.

### 5.2.2 Librarians' agency

All seven librarians agreed that there exists a lack of knowledge about algorithms in society, and that this can pose a problem to media literacy. Furthermore, some also expressed that this lack of knowledge is a democratic issue. It is evident that there exists, among the participants, a concern about the dangers of the vast influence algorithms have on people. When it comes to feeds, ads and other algorithms, human intervention is key. These algorithms are shaped through human intervention: "Users matter because it is their data, their clicking behavior, preferences, network relations, and communicative actions that provide the data for algorithms to act on," (Bucher, p. 53). Without users, algorithms would not be able to tailor content, and so – whether it is through their input or through their output – humans are always implicated in algorithms. It is a reciprocal, fluid relationship. As such, distinguishing where agency starts and who it belongs to in a relationship between humans and algorithms is not as easy as it may seem.

When asked about their interactions and encounters with algorithms, both Martin and Maria expressed that they were confident they could "handle" algorithms (Martin, 2023; Maria, 2023). What these answers indicate is that, while algorithms may pose a problem for other people, the same issues do not exist for those who are aware of the presence of algorithms. However, as mentioned previously, simply knowing about the problematic effects of algorithms does not necessarily mean that people act to avoid them (Haider & Sundin, 2022; Lomborg & Kapsch, 2020). This is something I touch upon later when I bring up fatigue in relation to the actions of librarians. Nevertheless, Martin and Maria seem cognizant of the fact that an awareness of algorithms also grants one the tools to deal with them (Hobbs, 2020;

Beer, 2009). If, and how, people use these tools is up to the individual. During our interviews, the librarians presented multiple ways in which they handle and deal with algorithms in their profession as well as their day-to-day lives.

#### *5.2.2.1 Work*

Sonia, who oversees her library's social media presence, has learned to deal with algorithms by figuring out how to make them work best for her. On Instagram, instead of posting a photo, she will make short videoclips, because the algorithm seems to prioritize that media format. This way of actively using the algorithm to boost one's presence online is one way of claiming agency over the algorithm. Gaming the algorithmic system by figuring out what makes the content "algorithmically recognizable" is brought up by Bucher. It is not a new phenomenon, and as Bucher (2018) puts it "people have always developed strategic efforts to be seen and recognized by information intermediaries," (p. 110). Sonia was the only person I interviewed in charge of their library's social media channels, but some of the other librarians mentioned a difficulty in reaching out to an audience. Martin also mentioned an example involving videos, where his library had filmed and uploaded videos to YouTube. Martin viewed this as a waste of time and money since there was a lack of demand for this kind of content from the library patrons:

It's like- no one requests this, so there's no one who will see it either. Because if there had been a demand for it then the algorithms would have picked up on that at an early stage like "here's something that people want" but there's no demand, no one is interested and no one looks for it.

*Martin*

Martin shows an awareness of the algorithms' ranking system, and, like Sonia, he knows that in order for something to become visible on platforms, there needs to exist a demand for it. Fighting the algorithm to become visible is something that anyone trying to reach out to an audience online has to face.

When the librarians were asked about their relationship to sponsored posts and the actions they take when interacting with search results on Google, it becomes clear that these actions are contextual. Not only do their actions depend on if they are at home or at work, but they also depend on who the librarians search *for* – for themselves or a library user – and what information they are searching for.

It depends on what type of searches I do, if they're for work or for a library user or if it's information that will be used in some other way. Or if it's for myself. If I am searching because I am going to travel somewhere, then I can surf around the web. It's a bit different. But then again, I am aware that searches are directed by [algorithms]. But I am of course more meticulous with a search if it is for a library user compared to if I just want to know a piece of trivia for myself for fun.

*Maria*

In some instances, the algorithm does not matter that much. An obvious but important distinction to make, however, is that one instance which Maria mentions is related to her work, while the other is something she does at home. Maria feels a professional responsibility that influences her actions, which becomes different depending on the context. The answers librarians provided indicate that they know of ways that algorithms influence them, while some think about it more in their day-to-day workdays than others. Even though they are aware of algorithms and some of them intentionally take actions to influence algorithms and search results in a myriad of ways, during instances where they search on behalf of library users, or help library users conduct searches of their own, none of them point out algorithms to the users. One of the actions Paul takes in relation to algorithms is that he has a default setting on his web browser that clears any ads on his computer at work. This is not the case on the public computers, and when asked if he guides users to avoid ads when they search, Paul tells me that he usually does not do that: "I usually just, like, if they want to go somewhere and I see that there's a sponsor at the top that doesn't lead to where they want to go I usually just say 'take that one [instead]'," (Paul, 2023). As shown in the previous section on invisibility, no library user has ever asked my interviewees about algorithms during a visit to the library. When asked about why they do not raise awareness about algorithms in those instances, both Johanna and Maria say that one has to weigh one's options and decide on what the primary goal of the meeting with the library user is – is it to help them find the information they seek, or is it to educate them on something that they might not be ready to digest and have not asked for? What this indicates is that the actions of librarians are highly contextual and that algorithms matter more sometimes, and other times they matter less.

It is a part of my job as a librarian so it is something that I try to convey to people, while it can also be difficult for example to use Duckduckgo and say: "let's try using this search engine." That would only make it more difficult for a person who isn't used to the digital. That's when one needs to weigh the options – what's more important here?



Allow me to reuse the quote from the theory section by Nick Seaver (2017): “[...] algorithms are not singular technical objects that enter into many different cultural interactions, but are rather unstable objects, culturally enacted by the practices people use to engage with them,” (Seaver, p. 5). The responses from Johanna, Maria, and Paul indicate that they have an awareness of this contextual relationship and must choose when to interact with algorithms, and when to let them slide.

#### 5.2.2.2 Day-to-day

In their day-to-day lives, my participants handle algorithms differently than how they do at work. Returning to Martin’s expression of “handling algorithms”, when asked to specify what he actually means by this, Martin gives blocking content as an example. He blocks content, people, and bots on social media to control what is shown to him. To quote him directly: “I block like *hell!*” This is one of the most immediate and outright examples of directly influencing the algorithm that my participants provided.

The five librarians who received a question about sponsored results said that they tried to avoid clicking on sponsored ads. As I have shown, for most of them, this response is contextual and applies to a situation when they search for themselves, and not when interacting with library patrons. Martin thinks that advertisements are alright as long as they accurately predict what he is actually interested in, but that he would rather direct them himself: “And I try to do that by not limiting myself to the websites I know or the sources I know and so on,” (Martin, 2023). This way of controlling the algorithm, by choosing which links to click, is something that Bucher (2018) calls “clicking consciously” (p. 109). Martin also expresses that he writes the website’s URL into the search bar when he can, and that is something he laments that not enough people do. According to Martin, people do not know how to get to websites anymore unless it is through Google. Writing the URL into the search bar is something that Maria also prefers to do when going to websites she is familiar with. She also expresses very strongly that when she makes a choice to not click on a sponsored post, it is on purpose.

Maria: Then again, I don’t know if it makes a difference to them. I’m sure they get that their ads still benefit them, but if I won’t click on their link then they at least won’t get my click.

[...] It's interesting, does it make a difference? On the other hand, it's a small everyday action that, even if my non-click on their advertisement doesn't make a difference in the vast ocean...

Interviewer: It still feels good?

Maria: I make that conscious choice. But if that conscious choice is affected by a bunch of other subconscious advertising... One can imagine that one's making a conscious choice.

This response shows that this activity matters for Maria to feel like she is in control of her search. In a study about TikTok users' relation to algorithms, Andreas Schellewald (2022) concludes that the activities which people used to navigate their feeds were less about feeling powerful, and more about not feeling helpless (p. 8). What both Maria's answer and Schellewald's study indicate is that people do not take these actions because they want to enact change on a larger scale, but rather to feel like they are able to affect *something*. Maria's response also indicates that, even if a person is aware of algorithms' existence and reflects upon their effects, there is still a limit to what can be known about them.

Clicking consciously is something that Martin, Maria and Johanna bring up as something they do a lot in their everyday lives when it comes to social media and YouTube. As exemplified in the previous section about breakdown, this often happens when the algorithm shows them content they do not identify with. Both Johanna and Martin bring up very similar instances of receiving political advertisements they did not want to see. The actions they took differed from one another: Johanna watched the advertisement out of spite because she reasoned that it would count as a waste of money for the political party, since they were advertising to someone who they would never be able to convince. Martin, as mentioned in a previous example, blocked and reported the content until it eventually disappeared. When recounting this instance, Johanna admitted that she did not know if it actually made a difference or not, but as was the case with Martin's and Maria's examples, even though the knowledge is limited these actions are based on the imagined effects and consequences the action will have. Even if Johanna, Maria, and Martin do not know why something is shown or if a choice not to click something actually makes a difference, when they know that there is an underlying algorithm, they can try to act in an informed way.

Johanna and Paul mention that they have tried search engines like Duckduckgo, which focuses on privacy and does not use algorithms to show any personalized

search results. However, both librarians explain that they have not used it for any considerable amount of time before going back to Google. To Johanna, this is frustrating since she does not want to use a search engine that stores information about her, but she also finds Duckduckgo difficult to navigate: “That is also something I am frustrated about, that it is so difficult to step away from this world that is built on storing information,” (Johanna, 2023).

### 5.2.2.3 *Fatigue*

An important thing to note, that also contributes to librarians’ contextual actions concerning algorithms, is a kind of fatigue that can appear when interacting with them. Being aware of the constant presence of algorithms can make dealing with them feel like an endless uphill battle:

It feels as if it requires more effort from a person to try and understand why one is shown some results when one knows that algorithms exist. Then again, one could also ignore it and be lazy and let it do it for you and not care that someone might make money off of it. One can become a bit paranoid if one thinks about algorithms too much.

*Sonia*

Sonia’s sentiment is echoed by participants Johanna and Martin, who acknowledge a loss of energy and a tiredness related to always being aware of algorithms:

But I guess that’s also a human instinct, it’s difficult to be committed and to care, we know that. Some days it’s difficult just to put on your shoes, but you do it because it’ll be cold otherwise.

*Martin*

Occasionally I have been very careful not to click on any sponsored results. And that has been a conscious choice, because I don’t want a company to earn money indirectly off of me, and I want to do what I can in those instances. But I also think that I sometimes fall into one of those [moods] “I don’t have the energy. I just want to end up in the right place.” And then the sponsored result is at the top, so then I click it. So, I think it has to do with where I am on the curve at that moment. Because I do think about these things and well, [it depends] where I am at that time, what I have the energy to care about at that moment.

*Johanna*

I avoid [sponsored ads] for the most part. Sometimes I can be a bit lazy and click on it because it’s at the top. If it’s the company that I was looking for.

*Maria*

This is further evidence that at some point, avoiding algorithms becomes an inconvenience and not worthwhile. Bucher explains how “the sites and situations through which people encounter and experience algorithms arguably shape ways of

thinking, talking and feeling about them,” (Bucher, p. 115). Librarians encounter algorithms in many various ways – through their social media feed, through the ranking of search results, through personalized advertisements – but they also experience them either in a personal capacity or as a professional. These different ways of encountering algorithms influence librarians’ perceptions, actions and their understanding of algorithms. My findings show that librarians have an ambivalent relationship to algorithms and that the actions they take in relation to algorithms heavily rely upon the context and situation at hand. When they encounter algorithms in their own feeds or through the searches they conduct for themselves, they avoid sponsored ads, hide or block content as best they can, try search engines focusing on privacy and that do not use algorithms to show personalized search results. When searching on behalf of a user, they do not take the same care to avoid sponsored content or personalized algorithms as long as it leads the user to the correct website. The same goes for when the librarians help users with their own searches – pointing out the correct link regardless of if it is sponsored or not. I continue this discussion relating to the discrepancy between librarians’ feelings and their actions in the next chapter.

## 6 Discussion and conclusion

Infrastructure theory and the algorithmic imaginary have allowed me to investigate the ways algorithms and AI influence my participants in their profession and daily lives. Through infrastructural inversion I have moved algorithms and AI to the foreground for my participants to consciously reflect upon. Their interactions with algorithms have shown that they are in a unique position of viewing what effects algorithms as an invisible infrastructure have on their patrons who are unaware of their existence, while at the same time being able to reflect on the ways algorithms permeate their own online presence. In contrast, AI has been a mostly invisible infrastructure to my participants and has been analysed as such. The algorithmic imaginary has been utilised to tackle the invisible infrastructure of AI and algorithms. Even if the technologies are invisible, people still act according to them, and the algorithmic imaginary has proved to be a fruitful way to draw out my participants' interpretations and understandings of algorithms and AI. What has emerged is a contextual and situational view of algorithms and AI, which in turn leads to contextual actions that also depend on the circumstances the librarians find themselves in. In this section, through the lens of infrastructure theory and the algorithmic imaginary, I return to my research questions and provide my answers to them. I also propose topics for further research as well as a section of concluding remarks where I consider the effects of my research.

### 6.1 Perceive and interact

Returning to my first research question: how do librarians perceive and interact with AI and algorithms in their profession and day-to-day lives?

The librarians had an ambivalent relationship to algorithms. At the beginning of each interview, I asked my interviewees how they felt about algorithms. In some instances, they viewed algorithms as important, good, convenient, or helpful. At the same time, these feelings were mixed with more negative ones, or even contradictory feelings: algorithms were dangerous, sneaky, unhelpful, frightening, and elusive. While most of them were more sceptical towards algorithms and viewed them as being used for commercial ends, the librarians also made it clear

that the absence of algorithms would make it impossible to search and browse the web. What emerges is a view of algorithms as necessary, but not uncomplicated.

When asked about AI, often times in relation to algorithms, the responses were a bit more divided. Some participants viewed AI as more trustworthy than algorithms with the explanation that algorithms are used for commercial ends, while they did not view AI to do the same. One participant had a very positive view of AI and was excited for the opportunities AI posed for the library, but she made it clear that there also existed AI-technology that she did not trust. Some of the other librarians explicitly stated that they distrusted AI more than they did algorithms. In these instances, our conversations steered towards the repercussions of deepfakes, manipulated videos and images as well as texts and articles written without a source. The librarians who viewed AI negatively also pointed to instances where AI could be beneficial, for example when automating dangerous jobs. What becomes clear is that librarians are aware of instances when AI can be used for more positive means as well as the more negative aspects of the technology. They also show an awareness of the fact that their mixed feelings are contextual and based on which situation they encounter algorithms and AI in.

These instances of trust and mistrust, as well as positive and negative feelings concerning algorithms and AI relate back to Bucher's (2018) notion of *when* algorithms matter and the perception of algorithms as plural and dynamic (p. 48). Algorithms and AI are not static technologies designed to do solely one thing. The ambivalent feelings and emotions of my participants reflect the dynamic relationship they have with algorithms and AI where their interactions and perceptions are contextual, fluid, and ever-changing.

## 6.2 Reflect and understand

The second research question guiding this thesis was: how do librarians reflect upon and understand the ways AI and algorithms influence their profession and day-to-day lives?

The librarians were divided when it came to how often they thought about algorithms during their day-to-day work. Some of them mentioned never reflecting upon algorithms at all, while others said that they were very aware of the instances

when they met algorithms in their profession. Even though claiming not to think of algorithms, the librarians could provide examples of how algorithms influence their profession when asked. The instances they identified were on social media, on search engines, and through patrons. A few librarians provided examples of interactions with patrons where they both experienced infrastructural breakdowns and became aware of algorithms' shortcomings. All librarians knew of algorithms and could speak of them either in a professional setting or were aware of how they are affected by algorithms in their day-to-day lives. Combining librarians' thoughts and feelings about algorithms relating to their profession and private lives allowed me to explore the plurality of algorithms and investigate how they are viewed in multiple contexts. The research of Hobbs (2020) and Haider & Sundin (2019), among others, claiming people have a low algorithmic awareness does not fully apply to my participants since they all show a varying degree of awareness of algorithms. The librarians' awareness of algorithms is more in line with Olsson-Dahlquist & Sundin's (2020) research whose participants claimed they knew very little, or next to nothing about algorithms, but were still able to provide examples of strategies to influence the information they were shown (p. 40). Similarly, even my participants who claimed to not reflect upon algorithms' existence were all able to provide examples of when they interact with algorithms, both in a professional manner as well as in their day-to-day lives.

When speaking about social media platforms and search engines in relation to algorithms, none of the librarians identify AI as a part of this process. When asked about algorithms in relation to their work the librarians can all identify instances where they interact with these. When asked about AI however, many of them say that AI surely affects them in ways that they do not know, however none of them mention that AI is a part of the same processes as the algorithms we have already mentioned. This might be because algorithms have been taught as a part of media literacy for a while, while AI is still a relatively new phenomenon that has only recently received more media focus. Consequently, AI seems to be more hidden in these processes than algorithms are, which leads to AI being more difficult to conceptualise and exemplify. Instead, AI is spoken about in other circumstances, in many cases unrelated to the library. The invisibility of AI has made it difficult to

discuss its repercussions in relation to the librarians' profession during my interviews.

### 6.3 Influence actions

Lastly: how does the perception of AI and algorithms influence the actions of librarians in their profession as well as day-to-day lives?

The participants take actions to avoid, influence, and steer algorithms to get the outcomes they want. These actions include avoiding sponsored ads, manually blocking content and people, using adblocking services, clicking consciously, writing the URL directly into the search bar, and on occasion switching to search engines like Duckduckgo. These are all actions my participants take in their everyday lives, on their own computers or when conducting searches for themselves. In their professional role, when conducting searches for patrons, my participants do not go out of their way to avoid or point out algorithms. The patrons who need the most help at the computers are often older or completely new to the technology. My participants state that pointing out algorithms to patrons when they are not susceptible to the information risks to further complicate the technology. The librarians' ambivalent relationship to algorithms influences what actions they take. The librarians act contextually depending on who they conduct searches for, as well as where they conduct their searches – at home or at work. The actions I have mentioned do not extend to include AI because, as previously stated, the librarians do not at the time of the interviews see themselves interacting with AI, so they do not know how to take actions to avoid or influence this technology.

Also worth noting is the aspect of fatigue in relation to algorithms. Some of my participants mention how a constant awareness of algorithms can lead to people becoming overwhelmed and tired. These emotions directly influence my participants' actions where their awareness of algorithms in some cases leads to inaction rather than them taking actions to avoid algorithms.

### 6.4 Further Research

There were many interesting conversations that emerged during the interviews that could be considered for further research. A recurring conversation was that of the



role of libraries and the extent of their tasks and responsibilities as contributors to education. This is not a new topic of conversation; however, I believe it would be interesting to research this through the lens of how AI might come to affect public libraries, especially in the context of the future of search. Technical advances have always been something that libraries have had to keep up with, but what is the perception of these advances? During my interviews I asked questions about AI and ChatGPT. At the time, few interviewees had heard about ChatGPT which made it difficult to integrate into this thesis. I imagine that discussions about ChatGPT will continue to flourish and will eventually find its way into the public library sector. The question of how librarians receive this novel technology seems to me like an interesting topic of research.

## 6.5 Concluding remarks

The aim of this research has been to provide insight into how librarians at public libraries perceive, understand, and interact with algorithms and AI in relation to their profession. Using their privately held views of these technologies as a starting point, I found that my participants' perceptions, understandings and interactions with algorithms and AI technologies were contextual. Infrastructuring allowed me to make visible the workings of algorithms and AI for my participants to reflect upon. Complementing the theory, I used the algorithmic imaginary to draw out and ultimately analyse my participants' views and understandings of the technologies. Their responses indicated that they view algorithms and AI differently depending on the situation. This contextual difference is the clearest when the librarians explain how they themselves take actions to influence algorithms privately, while they professionally do not.

My participants all highlighted the importance of raising awareness of algorithms and AI, however pointing out algorithms to patrons while helping them conduct searches was not something the librarians did. According to my participants, a lot of the patrons who need the librarians' help at a computer are elderly people or people who do not have any experience with computers. The help they need often concerns locating their email or using the printer. In cases like these, the library primarily functions as a facilitator of the computer. Teaching the patrons about algorithms and AI in those cases may have a reverse effect and only serve to

complicate the technology further and risk alienating the patron in the process. However, as stated by my participants, being aware of algorithms and AI is crucial to understanding why, how, and where one's information is being gathered, redistributed and tailored. Additionally, as manipulated videos and images are circulating more frequently and manipulated information is being used for real life warfare, knowledge and awareness of AI and algorithms have become a way to protect against their influence. Thus, as stated by all of my participants, helping patrons understand algorithms and AI should be a part of the pedagogical aspects of a librarian's role. For this interaction to be fruitful to a patron it should happen in a place where the librarian and patron are both susceptible to listening and learning.

I have also identified a lack of awareness of the ways AI influences as well as how it might evolve to influence the library sector. At the time of our interviews, most participants were unaware of how Chatbots can be used similarly to search engines, but as AI becomes more prominent in other parts of our society, I believe, as do some of my participants, that it is only a matter of time before AI becomes a more prominent part of the library sector in Sweden.

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## Appendix 1. Consent form

First and foremost, I'd like to thank you for agreeing to this interview. The interview is conducted as part of the course "Examensarbete – masterkurs ABMM54" at the master's program in ALM with a focus on library and information studies at Lund University.

My interest lies in investigating how librarians at public libraries experience algorithms in their profession. My focus is on if and how one reflects upon algorithms in a library context. I have become interested in this ever since noticing that my own searches have become more and more influenced by algorithms. What interests me most is if you in your professional role reflect upon questions concerning algorithms and not how much knowledge you possess about algorithms. I will therefore not ask questions concerning the technical side of algorithms.

The interview will be recorded in order to be transcribed and used as a basis for the thesis. The recorded version of the interview will only be available to me as the author. At the end of the course, or when the thesis has been graded the recorded interview will be deleted. If you would like a copy, you are more than welcome to contact me and it will be sent to you upon our request. I will also share my thesis with you before it is published. Neither you or the library will be referred to by name in the thesis, however I cannot guarantee complete anonymity. The interview is estimated to take between 45 and 60 minutes and you retain the right to interrupt and stop the interview at any point.

With your signature you indicate that you have understood what your participation entails, as well consenting to how this information will be used.

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**Participant's signature**

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**Date**

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**Interviewer's signature**

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**Date**

## Appendix 2. Interview guide

1. Can you tell me about your role at the library? How long have you been a librarian? How long have you worked at this library?
2. What are your qualifications? When did you graduate?
3. What do you think about when you hear the word “algorithm”? Why do you think that is?
4. What feelings do you get when thinking about algorithms?
5. Would you say that you know what an algorithm is and what it can do?
6. What do you think about when you hear the word “AI”? Why do you think that is?
7. What feelings do you get when thinking about AI?
8. Would you say that you know what AI is and what it can do?
9. Were you taught anything about algorithms or AI during your education?
10. Have you had a chance to take part in lectures about algorithms or AI in your profession?
11. Do you encounter algorithms in your profession?
  - If yes – can you give an example?
  - If no – why do think that is?
12. Do you encounter AI in your profession?
  - If yes – can you give an example?
  - If no – why do think that is?



13. Do you feel like algorithms affect the library and your profession?
- If yes – in what way?
  - If no
    - Have you or your colleagues reacted to or noticed recommended posts or accounts on any of your social media?
    - When it comes to searches on Google, how do you choose which result to click on? (Do you avoid sponsored results?)
    - Have users ever asked about algorithms – their feed on social media/Google searches?
14. Do you feel like AI affects or will affect the library and your profession?
- If yes – in what way?
  - If no – have you heard about ChatGPT? Do you have any thoughts about how it can come to influence your profession?
15. Do you think algorithms benefit and ease your profession?
- If yes – in what way?
  - If no – how come?
16. Do you think AI will benefit and ease your profession? In what way?
17. Do you view algorithms as objective?
- If yes – in what way?
  - If no – why not?
18. Do you view AI as objective?
- If yes – in what way?
  - If no – why not?

*Retrace and explain what has been said during the interview. Explain how I will ask questions concerning the library user and algorithms/AI.*

19. Have library user ever had questions about algorithms?

- If yes: What did you talk about?
  - Did you feel like you had enough knowledge about algorithms to respond confidently in that situation?
- If no: why do you think that is?
  - If a user did have questions about algorithms (about their social media feed or why Google shows specific results) would you feel like you had enough knowledge about algorithms to respond confidently in that situation?
- What do you think is/would be important to highlight and bring up in a conversation concerning algorithms? What would you like for the library patrons to take from a conversation like that?

20. Have library users ever had questions about AI?

- If yes: What did you talk about?
  - Did you feel like you had enough knowledge about AI to respond confidently in that situation?
- If no: why do you think that is?
  - If a user did have questions about AI (about ChatGPT or a similar software) would you feel like you had enough knowledge about AI to respond confidently in that situation?
  - What do you think is/would be important to highlight and bring up in a conversation concerning algorithms? What would you like for the library patrons to take from a conversation like that?

21. Do you believe that algorithms have a place in media and information literacy?

- If yes – to what extent?
- If no – how come?

22. Do you think that algorithmic awareness is becoming more important in regard to general education?

- If yes/no – how come? Could you elaborate?

23. Do you have any thoughts about the ethical dilemmas surrounding algorithm and AI?

24. Do you have any more thoughts about algorithms and AI that you feel like I have not asked about? Is there anything you're wondering about?

25. May I get in touch if I come up with any follow-up questions?