‘You Have a New Memory’: Mediated Memories in the Age of Algorithms

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Abstract

This thesis explores the intersections of algorithmic systems and memory-making practices in everyday life, broadly asking what it means to *remember with algorithms*. The project investigates these intersections from various perspectives, drawing upon data from 26 interviews and four focus groups along with a documentary analysis of the technologies themselves. Chapter four investigates what I call 'algorithmic remembrance technologies,' that is, the platforms, apps, and features that mediate people's data past. Here, I examine their commercial rhetoric as well as their technical affordances and salient characteristics. In chapter five, the focus shifts to users and how people variously use and negotiate these technologies in everyday life. Drawing on interview and focus group data, the chapter argues that both people and algorithms participate in sociotechnical processes of 'emplotment', whereby mediated memories are used to weave stories of the self in the present. Chapter six also draws on interview and focus group data, and it examines how algorithmic systems affect and shape people's remembrance of the past. More specifically, it focuses on questions of temporality and timing in relation to automated systems, asking *when* algorithms come to matter in everyday life. Finally, the thesis conclusion seeks to bring all these different analytical threads together into one conceptual framework. It ultimately argues that the intersections of algorithms and memory in everyday life suggests what I call a shift from 'remembering to resurfacing' as well as highlighting the processes that underlie and propel this shift. I argue that this shift is underpinned, firstly, by *the eventfulness of algorithms*, that is, the diverse encounters, intersections, and crossings between people, socialities, and algorithmic systems in memory making; and secondly, *the positioning of users*, signifying the ways in which users increasingly place themselves in the way of algorithmic systems in order to be reminded and affected.

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Declaration

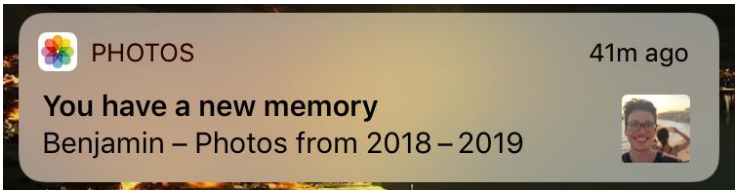
I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, university. All sources are acknowledged as References.

Benjamin N. Jacobsen

1.0 Introduction

1.1 'You Have a New Memory'

Late one evening in October 2018, I received a notification on my smart phone. The familiar ping of the typical iPhone notification is hardly enchanting. I was nonetheless curious to see what had grabbed my attention so late (or maybe reaching out and checking the notification was just an unconscious habit by now). It wasn't a particular tweet nor a late Amazon recommendation. It just read, 'You have a new memory'. It was a notification from the Photos app on my iPhone 6. The subtitle of the notification simply read 'Benjamin – Photos from 2018-2019' and it showed a variety of photos I had taken throughout the year. Other than the surprise of receiving this notification at such a late hour, I was struck by the notion that was being presented to me: that these memories, these digitals photographs, were somehow new. 'You have a new memory'. This time the subtitle read 'At the Shore of Saint Paul's Bay & Ghajn Tuffieha – Jul 21, 2018'. It showed a photo I had taken on a holiday in Malta with my family. It was unclear why I was being reminded of this particular picture at this particular time. Was it exactly six months ago or was I reminded of it on the day it had been taken? The answer seemed to be no in both cases. I didn't understand its logic. Other interesting notifications popped up in the following days and months: 'In Nature – 2018 – 2019', 'Best of the Year – 2018', or 'Gathering in Rabat-Malta – Jul 23, 2018'. My iPhone's Photos app seemed to be a site where algorithms and my memories converged to create something novel, a site where memories can be algorithmically staged and performed. This variegated convergence, this particular staging of memories, seemed most salient in those recurrent reminders from the Apple Memories feature: 'you have a new memory'. What does it mean for such 'memories' to be new? What are the implications of such 'new' memories, and what does this peculiar notion reveal about the intersection of algorithms and people's personal memories in everyday life? In other words, what happens when memory-making processes become, at least in part, algorithmic? What happens when algorithms meet remembering? These are some of the questions that this project seeks to investigate.[1]



[1] This reference to 'new memories' should not be seen as a standalone concept within the project. Rather, I take it as emblematic of a particular logic that is emerging in contemporary society, where the mediation of memories in everyday life has become increasingly algorithmic. It is this logic which will also be explored in more depth

Our societies are densely populated with algorithmic systems. They help mediate and facilitate everything from border security practices (Amoore and Raley, 2017) and predictive policing (Andrejevic, 2020), to the mundane conveniences of smart homes (Goulden, 2019) and recommendation systems used by platforms such as Amazon or Netflix (Hallinan and Striphas, 2016). It is a society that has melded with algorithms to such an extent that they have become part of the 'technological unconscious' (Thrift, 2004). The diverse capacities of algorithmic systems – to automate, sort, order, classify, and prioritise – has been a source of great anxiety for some (O'Neil, 2016), whilst for others they promise great societal and structural change (Domingos, 2015). Regardless of these dichotomous responses, it is evident that automated processes, software systems, and algorithmic operations are an entangled part of contemporary society. As such, it is reasonable to suggest that in such an intricate media landscape, memory and how we remember have inevitably become increasingly interwoven with proliferating algorithmic technologies. As Andreas Huyssen (2000, p. 29) claimed around the turn of the century, we cannot speak of memory as somehow separate from 'the enormous influence of the new media of all forms of memory'. If this was true around the turn of the century it has become even more relevant now. As memory and the experiences of revisiting and negotiating the past becomes increasingly dependent on and shaped by algorithms, it will also shape how we remember the past as well as how memory practices are understood and instantiated in everyday life.

Drawing on data from 26 interviews and four focus groups along with an analysis of industry documents and reports, this project seeks to find out whether algorithmic systems do, in fact, shape how we remember and how. It is guided by two overarching research questions:

1) to what extent and in what ways do algorithms affect people's remembering of the past?

2) what are the various (social) implications of algorithms mediating people's memories?

Given the recent developments in algorithmic media, machine learning, and AI, more research into their effects on memory are needed. In fact, the impact of algorithms on how memory is conceived and instantiated in everyday life have remained largely unexplored and under-

throughout the thesis. Moreover, 'new memories' should not be seen as a reference to Andrew Hoskins' (2011) term 'new memory', although his conceptualisation of the term serves as a good reminder: 'memory is always 'new' given its continually emergent state availed through the metaphors and media and technologies of the day' (Hoskins, 2011, p. 22).

researched (see Pereira, 2019; Prey and Smit, 2019; see also chapter two). However, there have been calls for more critical research into the ways memory is shaped by emerging technologies (e.g. Hoskins, 2018; van Dijck, 2007). There have also been calls for research into how apps such as Timehop, and now platform features such as Facebook Memories and Apple Memories, specifically 'facilitate memory work through the reminding of previous traces' (Özkul and Humphreys, 2015, p. 363). This thesis constitutes, in part, a response to these calls, seeking to unpack and investigate the various effects, dimensions, and implications of algorithms mediating memory and memory practices. Crucially, it seeks to grapple with and further examine the scope of the 'social power of algorithms' (Beer, 2009) by specifically asking how algorithms mediate memory. As such, this project aims to add to the research fields of both algorithm studies and memory studies as well as highlighting ways in which they can be used in conjunction with each other.

This thesis, as a result, focuses mainly on the social power and politics of algorithms and not on the data being recorded. Issues of data and data mining and how they relate to people's memory making practices is explored in greater detail in forthcoming work (see Benjamin and Beer, 2021). The thesis explores how people's encounters and orientations in the world are conditioned and shaped by algorithmic systems. As Taina Bucher (2018, p. 8) stated, I explore "*how* and *when* different aspects of algorithms and the algorithmic become available to specific actors." In other words, the thesis explores how and when the past becomes available to different actors, as well as their underlying processes.

As this thesis will demonstrate in more detail, the intense embedding of social media platforms in society are just one example of where memory and algorithms can be seen to intersect. Social media platforms, or 'algorithmic media' as Taina Bucher (2018) calls them, have incorporated and developed features that analyse, classify, and routinely resurface digital memories to users. Given the enormous volume of user data stored on platforms such as Facebook, and given the amount of time platforms have now been embedded in everyday life, it is reasonable to suggest that these are becoming increasingly influential memory devices. They have become, as David Beer (2019b, p. 39) suggests, technologies 'giving us our own past back in digestible form.' Such digestible bits of data are frequently seen on platform features such as Facebook Memories where one can be reminded of, for instance, one's so-called 'winter memories.' Another example of where memory and algorithms can be seen to cross in everyday life is through the numerous memory apps on App Store and Google Play (e.g. Timehop). Moreover, several smartphones have also embedded functionalities that

algorithmically curate and resurface people's photos as 'memories' in the present (e.g. Apple Memories). As this project will show, we increasingly remember in and through algorithmic systems and platforms.[2] In short, we seem to remember with algorithms. The rest of this thesis seeks to flesh out exactly what this means.

Yet, memory features and platforms such as Facebook do not simply mediate or facilitate a backwards glance at our data past. As the thesis will show, they are also powerful actors operating within the social world. It is therefore vital that their politics, inherent assumptions, as well as their so-called 'style of reasoning' (Hacking, 1982), be questioned and investigated in more depth. It is also important to note that 'politics', in the context of this thesis, does not refer to specific political paradigms, but rather to 'ways of world-making' and 'the practices and capacities entailed in ordering and arranging different ways of being in the world' (Bucher, 2018, p. 4). As such, the power and politics of platforms and algorithmic systems are more about their capacity to shape and create new realities, rather than merely re-present whatever already exists. The same goes with memory and memory practices. Our relationship to the past is by no means neutral, nor does it remain fixed. Instead, memory is always-already imbued with politics and has a historical dimension as well. As Ian Hacking (1995, p. 200) observes, 'Memory has always had political or ideological overtones, but each epoch has found its own meaning in memory.' The ways memory is understood and practiced in daily life have always been sites of ongoing political tension, subject to wider societal and technological changes. Memory practices must therefore be further investigated and interrogated, paying particular attention to issues such as: *who* remembers, *what* is being remembered, what is *not* being remembered, and so on.

Similarly, memory features such as Apple Memories or Facebook Memories must also be interrogated for their potential to shape what can and should be remembered. As I show in later chapters, these features have the capacity to shape and define the parameters of what memories come to matter in the present and which ones do not.[3] Investigating the intersections of algorithms and memory in everyday life, both in terms of how algorithms mediate and how

[2] Throughout this project, I will use terms such as 'algorithmic remembrance technologies', 'algorithmic memory features', 'memory features', memory technologies', 'algorithmic technologies' interchangeably. They all refer to contemporary technologies that algorithmically mine, analyse, classify, re-package, and resurface people's past data as 'memories' in the present (e.g. Apple Memories' tagline 'you have a new memory'). These technologies will be discussed in more detail in chapter four.

[3] For other conceptualisations of the technological mediation of memory, see Heersmink and Carter's (2017) 'technologies of memory', Goodman and Parisi's (2010) notion of 'machines of memory' and Stiegler's (2010) 'mnemo-technologies' and 'industrialisation of memory'.

users are affected, are therefore crucial. We are ceaselessly shaped by such interlacing factors: what we remember, how we remember it, what we forget, why we forget it, what we constantly remind ourselves of, and what we are routinely reminded of. Similarly, we are shaped and affected by algorithmic systems to such an extent that 'we are it, and it is us. We could never stand outside it, even if we might wish to' (Amoore, 2020, p. 79).

However, it is crucial to clarify what exactly is meant by terms such as 'algorithms' and 'mediated memories'. Although they are analysed in much more depth in chapter two, it is worth briefly mentioning them here, since these are overarching concepts within the project. Moreover, with current algorithmic remembrance technologies, there is a heavy emphasis on visual representations of the past such via digital images. Indeed, for these technologies, digital images are often equated with memories. It is also necessary to touch on this 'visual' aspect of contemporary memory practices. How, then, can these different notions – algorithms, mediated memories, and the visual – be understood? First, the issue of algorithms.

1.2 Defining Algorithms

What is an algorithm? The term can be understood in various ways. The concept has a long history, dating back to 9th-century Persia. Etymologically, the word 'algorithm' has strong affinities to mathematics and *arithmos*, that is, the realm of numbers and calculability (Striphas, 2015). In recent history, however, algorithm has acquired a distinctive meaning within the domain of computer science. From a formal perspective, algorithms are essentially seen as calculative step-by-step procedures employed in computer software to process input data in order to generate a desired output (Kitchin, 2017). As Robert K. Hill (2015, p. 47) stated, algorithms are fundamentally mathematical constructs 'accomplishing a given purpose under given provisions.' In this vein, algorithms have also been understood as 'the operations performed on data', highlighting the interdependence of algorithms, data, and broader digital infrastructures (Bucher, 2018, p. 22). Algorithms, from this perspective, are processes aimed at computational problem-solving.

The reference to 'algorithms' in the thesis title is not meant to suggest a reified, essentialised, nor homogeneous object. Rather, it is meant to suggest the widespread proliferation of the 'logic of algorithms' in today's society (Totaro and Ninno, 2014), which for some has signalled an increasingly 'algorithmic culture' (Hallinan and Striphas, 2016). As such, it is crucial to also acknowledge the social power of algorithms and the impact they have on most

aspects of society. Broadly speaking, algorithms are often used to perform tasks such as prioritization, classification, association, and filtering (Diakopoulos, 2014). They produce outputs which can be made actionable in certain societal contexts, whether that is enabling high-frequency trading (Mackenzie, 2018) or identifying suspicious individuals at a border control (Amoore and Hall, 2009). Algorithmic operations can also be seen at work in instances such as: Google Search predictions, YouTube algorithms classifying video material, recommendation systems such as Amazon ('customers like you'), and memory features like Facebook's Year in Review (Jacobsen, 2020b). As Louise Amoore (2020) put it, we increasingly find ourselves living life in and through the algorithm.

Yet, it is important to bear in mind that there is a plethora of different algorithms, aimed at solving a multiplicity of problems in equally many contexts. This is important to point out as algorithms are developed to perform different tasks for different purposes. As such, there have been various attempts at grouping algorithms in order to make sense of them. For instance, one overarching way has been to distinguish between so-called 'rule-based' algorithms and 'machine-learning algorithms' (e.g. Bueno, 2019; Fry, 2018). That is, algorithms that either correspond to 'a set of finite instructions' or algorithms understood as 'evolving data able to adapt' to external inputs (Parisi, 2013, p. 10). In the case of the former, the necessary steps and instructions are already pre-written by the programmer, and the algorithm 'simply' follows the procedure in a step-by-step fashion. Machine learning algorithms, on the other hand, are feed vast amounts of training data with the aim that they might generate a set of rules themselves. In a sense, they are algorithms that develop other algorithms. Machine learning can also be further differentiated into supervised, unsupervised, and reinforcement algorithms (for more detail, see Amoore, 2020; Domingos, 2015; Mackenzie, 2017). These attempts to distinguish between algorithms, although it can be reductive, they do help us understand the complexity of algorithms and the vast array of functions they may perform based on the contexts in which they operate. It also sensitises us to the fact that algorithms are never singular things (Zietwitz, 2016); rather, they are always-already embedded within other algorithms, data structures, and larger data assemblages. As Rob Kitchin (2017, p. 20) points out, algorithms often exist within complex, multi-layered systems, 'embedded within hundreds of other algorithms'. In fact, outside of these data assemblages, outside of code and stacks of data, algorithms lose their efficacy and meaning.

Given their complexities and their entanglements within various contexts, it is often stated that algorithms and the way inputs are processed are black-boxed, inscrutable, and

opaque. This idea of the opacity and inscrutability of the algorithm and the challenges this poses is well established in the academic literature (e.g. Ananny, 2016; Annany and Crawford, 2018; Dourish, 2016; Zarsky, 2016). Wendy Chun (2008), for instance, argued that we cannot fully know software because it is but a gathering of heterogeneous relations, both human and nonhuman: 'its effectiveness depends on a whole imagined network of machines and humans' (p. 299). This idea of the black boxing of algorithms has found traction especially as a result of Frank Pasquale's (2015) influential book *The Black Box Society.* Pasquale argued that we increasingly find ourselves living in a 'black box society', where people remain visible to institutions and companies, but where society's inner mechanisms remain unknown, secret, inscrutable, or opaque to people. As in an interrogation room, transparency only goes one way. For Pasquale, this is a society whose authority is 'increasingly expressed algorithmically' and where certain algorithms remain proprietary information and trade secrets for large corporations (p. 8).

Although this claim can sometimes be seen as problematic (Bucher, 2018), this project does not seek to open the black box, so to speak. Rather, it seeks to explore what happens when the black box spills out into the social world. The project investigates the social implications of particular implementations or instantiations of algorithmic procedures in everyday life: on various social media platforms, mobile apps, and phone software features. In other words, I seek to examine how algorithms are executed in the world, shaping and limiting its various socio-cultural parameters, and ultimately affecting people and their everyday lives (Kitchin, 2017; Willson, 2017). In short, how algorithms come to figure as powerful social actors in the world (Beer, 2017). Yet, what is meant by this notion of algorithms as powerful? Scott Lash (2007), for instance, argued that part of the power of algorithms emanates from their capacity to *generate* realities. More precisely, they constitute 'virtuals that generate a whole variety of actuals' (Lash, 2007, pp. 70-71). In other words, the social power becomes visible as they recursively sort, classify, and shape everything from what people see on social media (Bucher, 2012b) to notions of identity (Cheney-Lippold, 2011, 2017; de Vries, 2010). Conceptually speaking, algorithms help to 'reontologise the world' (Mittelstadt et al., 2016, p. 5).

The 'kinds' of algorithmic systems discussed in this project are not the ones used to regulate stock market prices or automatically pinpoint and predict terrorist suspects. Instead, they are embedded within what I will 'algorithmic remembrance technologies'. These are features, apps, databases, and platforms that perform a particular set of functions: they store, analyse, classify and resurface people's past data as 'memories' in the present (more on this in

chapter 3). Some of these technologies follow a more 'rule-based' algorithmic framework (e.g. Timehop), whereas others make use of machine learning algorithms and neural networks (e.g. Facebook Memories, Apple Memories). More specifically, this project examines instantiations of algorithmic procedures that 'make generally reliable (but subjective and not necessarily correct) decisions based upon complex rules that challenge or confound human capacities for action and comprehension' (Mittelstadt et al., 2016, p. 3). Algorithmic remembrance technologies are avenues for storing, re-visiting and being visited by one's data past, by aspects of the data past that come to matter to users. They are undergirded by complex rules and seek to make reliable decisions in the form of resurfacing data memories. Algorithmic systems can therefore be seen as 'apparatuses of mattering' (Amoore, 2020), that is, both in terms of how the data past is made matter as well as how it is made to matter to people in the present. This project specifically investigates how algorithms mediate and make the data past present as well as the repercussions of this. But as algorithms make powerful yet 'subjective decisions' about the world and about people's data past, the outcome of algorithmic processes are never fully determined. As a result, they leave room for contingency, resistance, and mutual moulding.[4] As Kate Crawford (2016) argues, the production and implementation of algorithms should be seen as variegated 'contested spaces': spaces where humans and algorithms meet, interact, and are interwoven in complex and sometimes contested ways.

Through mediating, facilitating, and shaping people's memory practices, algorithms can be seen to do active work in the world. Not just in terms of processing input data in order to generate certain desirable outputs, but also in terms of carving out novel ways of remembering the past and working on the present. This project therefore draws on an STS-inflected understanding of algorithmic systems (e.g. Latour, 1988, 1992), seeing them as actors in the world, limiting and shaping the boundaries of knowledge, agency, and, in this case, memory. As such, algorithms should be understood not simply as mathematical formulae, but also as social actors embedded within various assemblages. In chapters five and six, for instance, algorithms can be seen as embedded within broader platforms and applications whilst simultaneously forming an integral part of people's everyday memory practices. Here, they are understood and examined in terms of their social efficacy, in relation to the work they perform in the social world. As this project seeks to show, examining how algorithms operate in the

[4] Taina Bucher (2017), in her article 'The algorithmic imaginary', investigates how algorithms are shaped by people's perceptions on social media. In other words, how people conceived of 'the algorithm' had a performative impact on how they related to the social media platform, which in turn shaped what content the Facebook algorithm made visible to them and how often.

world also helps us rethink how we understand memory and how we remember the past in everyday life. As David Beer (2017, p. 3) points out, algorithms help us 'rethink some entrenched assumptions about agency, transparency, and normativity.' Before exploring the question – what does it mean to remember with algorithms – it is also crucial to clarify what is meant by memory and, more specifically, the notion of 'mediated memories' that will be used in the thesis in relation to the emphasis on the visual in contemporary society.

1.3 The Visual Turn and Mediated Memories

The digital environment, in which memory and contemporary memory practices are embedded, are heavily underpinned by the visual. In recent years, there has been an acceleration in the production, circulation, and consumption of digital images on social media platforms. This had led some to argue that the emergence of popular image-sharing platforms such as Instagram and Snapchat, as well as the increased image circulation on other platforms such as Facebook and Twitter, constitutes social media's so-called 'visual turn' (Gibbs et al., 2015, p. 258). This turn towards the visual is also echoed in David Beer's (2019a) work on the data analytics industry. For Beer (2019a, p. 8), the notion of 'data gaze' showcases how 'the visual, the optic and the material are privileged in the knowledge that forms around data analytics'. Moreover, in the context of mediated memories, these developments are also suggested by Andrew Hoskins's (2009, p. 34) claim that 'we inhabit a more vivid image-driven environment' than previously before.[5] The link between memories and digital images is seemingly unavoidable.

Although Hoskins wrote this in relation to the emergence and proliferation of Web 2.0 and mobile phones, the sociotechnical gravitation towards the visual has greatly intensified in the recent decade. Technologies such as Timehop, Facebook Memories, Apple Memories, Snapchat Memories, Amazon Photos, and Google Photos demonstrate this development, as they are characterised by a drive towards mining, operationalising, and animating digital images. As the project will discuss in more detail later, these features showcase a heavy emphasis on resurfacing and circulating digital images as 'memories' to users in the present. For instance, past images of family and pets are considered by Facebook's in-house researchers as being 'memory gold', supposedly bound to elicit a positive response from users if they were resurfaced in the present (Konrad, 2017).

[5] For more on the changing implications of the image in an age of algorithms, see Uricchio (2011).

That being said, before examining what the effects are of algorithms mediating people's personal memories, it is necessary to first unpack what is meant by 'mediation' and how it relates to memory and remembering. In her book *Mediated Memories in the Digital Age* (2007), which this thesis title is a nod to, media scholar José van Dijck explores the role of digital technologies in facilitating and shaping the documentation and re-visiting of the past. Proposing the notion of 'mediated memories', van Dijck defines them as 'the activities and objects we produce and appropriate by means of media technologies, for creating and re-creating a sense of past, present, and future of ourselves in relation to others' (p. 21). The term denotes how the material (and symbolic) conditions of memory and remembering the past are made possible and shaped by various technologies, forms of digital media, and by larger digital infrastructures.

The notion also highlights the entanglement of the personal, social, technological, and the cognitive. As van Dijck (2007, p. 28) claims:

> Mediated memories… can be located neither strictly in the brain nor wholly outside in (material) culture but exist in both concurrently, for they are manifestations of a complex interaction between brain, material objects, and the cultural matrix from which they arise.

Within this framework, making clear distinctions between brain, body, sociality, and material objects is, at best, problematic. These various biological, social, and technological factors interact and feed into each in complex ways, shaping the parameters and conditions of what memory is, through what objects memories are instantiated, as well as what it means to remember the past. For this reason, van Dijck (2009) calls mediated memories 'amalgamations' of technology, culture, and embodiment. In other words, they highlight the entanglement of technologies, users, people's sense of self, as well as the objects created through the technologies. Conceptualising mediated memories as amalgamations problematises the (often-neat) distinctions that emerge from different disciplinary approaches to the study of memory, such as psychology, neuroscience, and philosophy. Instead, van Dijck's notion of mediated memories suggest a dialectical co-constitution between cognition, embodiment, sociality, technology, and culture. What constitutes memory and what it means to remember the past are therefore not stable nor fixed categories. Rather, the questions of what memory is and what it means to meaningfully remember the past are in constant development, a constant state of

becoming (something else) as a result of the technological changes permeating contemporary society.

In this thesis, I want to transpose or take this notion of mediated memories further by bringing in the issues concerning the widespread proliferation of algorithmic systems. As Couldry and Hepp (2017, p. 34) remind us, contemporary society is marked by 'a much more intense embedding of media in social processes than ever before.' Given the fact that algorithms are becoming ever-more intensely embedded in social processes, it is getting increasingly difficult to understand memory practices apart from the social media platforms, apps, software features, and algorithmic systems in which they are embedded. Mediated memories must be understood as 'deeply mediatised' (Couldry and Hepp, 2017), as simultaneously and inextricably personal, social, cognitive, material, and algorithmic. These interact and shape each other in ways I want to examine. How we talk about memory, how we imagine and conceptualise it, how we meaningfully engage with the past, are shaped by the technologies and algorithmic systems we use. In short, the concept of mediated memories is used throughout this project as a way to investigate what it means to remember with, and as a result of, algorithms in everyday life. As such, this investigation will shed new light on both the pervasive role played by algorithms and the ever-changing nature of memory.

1.4 Chapter Overview

Chapter two provides an overview of the literature that is explored in relation to this project. It discusses the fields of algorithms, memory, and digital memory studies, and highlights the various conceptual contours that have emerged within these fields. In chapter three, I outline the project's methodological approach. In order to answer the research questions listed earlier I employ documentary analysis as well as qualitative interviews, conducting both in-depth online interviews as well as focus groups. Chapter four turns to an analysis of the algorithmic remembrance technologies themselves. When exploring the intersections between algorithms and memory, it is necessary to examine the sites and spaces through which everyday memory practices are instantiated. The data is drawn from an analysis of a range of case materials: documents such as Terms of Agreement, Terms of Service, Privacy and Cookie Policies as well as promotional material such as video presentations, instructional videos, blog entries, and advertisements. The chapter explores several features, software functionalities, platforms, and apps that currently exist to mediate people's mediated memories. Looking at features such as

Amazon Photos, Facebook Memories, and Snapchat Memories, this chapter seeks to examine their salient characteristics and the ways in which they have been constructed and with what aims. As such, the chapter seeks to outline and investigate the various contours that characterise the variegated landscape of algorithmic remembrance technologies. The chapter argues that, through their salient affordances, these technologies have the capacity and the potential to shape the conditions of possibility for users and their everyday memory practices. Tapping into the affordances of data-driven and data-led modes of engaging with the past, algorithmic remembrance technologies represent an attempt to make the conditions for human memory-making increasingly machine-readable and thus knowable to the algorithm. Yet, it is important that these features are also seen as integral to existing networks within what has been called 'surveillance capitalism' (Zuboff, 2015; 2019). As such, the chapter also explores the economic underpinnings of these technologies and how that might shape how users engage with both the technologies themselves and their own data past.

In chapter five, the focus shifts to the ways in which users appropriate and use these technologies in everyday life. The encounters between algorithms and users are never fully pre-determined, but instead always exist in relation to various modes of engagement and resistance. Focusing on the practices of users, this chapter argues that people use algorithmic remembrance technologies as a means of 'emplotment', drawing on past memories in order to weave coherent narratives of self in the present. The chapter starts by discussing Lawler's (2008) use of 'emplotment' in more detail, but also seeks to move towards a more socio-technical understanding of it. Drawing on qualitative and focus group data, the chapter investigates three ways in which emplotment can be understood in terms of socio-technical practices: management, sharing, and anticipatory positioning. These practices or themes came to the forefront when participants discussed the various dimensions of using algorithmic memory features as well as their experiences encountering their digital past. Through practices of management, sharing, and anticipatory positioning, this chapter also argues that both humans and algorithms actively participate in the shaping, constructing, and maintaining of identities, drawing on mediated memories that resurface via memory features.

Chapter six, titled 'The Importance of Timing', looks at a very particular way in which these algorithmic remembrance technologies can be seen to affect users in everyday life. It examines the algorithmic mediation of memories 'from the bottom up', so to speak (Couldry and Powell, 2014). Viewing algorithms as 'apparatuses of mattering' (Amoore, 2020), this

chapter examines particular instances *when* algorithms come to matter. It suggests that by analysing specific temporal instantiations, in this case 'timing' and the idea of the 'right moment' as well as the dynamics of algorithmic media, we may gain a better understanding of the social power of algorithms. Drawing on qualitative interview and focus group data, this chapter proposes the notion of 'anniversification' as a way to explore *when* algorithms come to matter and the impact their timing may have on memory. In short, the importance of timing for how users remember their data past. Algorithmic remembrance technologies resurface and remind users of their past data in the form of 'memories.' Anniversification sensitises us to the importance of examining how their timings are programmed and algorithmically instantiated, and how users are affected as a result. As the chapter details, *when* a person is reminded can be as significant as *what* they are reminded of. The notion of anniversification therefore functions as a way to investigate how algorithms temporally frame remembering in order to produce affective states, behaviours, habits, and routines. It is an avenue for exploring the politics of temporality on algorithmic media (Bucher, 2020b), that is, how temporality and timing are used and practiced by these media to shape how people remember the past and work on the present.

In the thesis conclusion, I return to the question: what does it mean to remember with algorithms? Here, I seek to develop a conceptual framework to better make sense of these increasingly intimate interconnections between algorithms and memory practices. Drawing on the findings from chapters four, five, and six, I argue that there is an overarching shift in our current media landscape from *remembering to resurfacing.* By this I mean that with algorithmic systems the focus shifts from merely affording users to store and draw data from the past to instead algorithmically pulling certain data points from the past and presenting these as 'memories' in the present. Throughout the research project, it became clear that algorithmic systems are inhabiting an increasingly active role in memory making in terms of mining, classifying, ranking, timing, and resurfacing mediated memories. Drawing on these research findings, I argue that there are two underlying processes that facilitate and propel this shift: the 'eventfulness of algorithms' and 'the positioning of users'. As the analysis chapters will show, algorithms come to matter as part of broader socio-technical situations, where infrastructures, technologies, memory practices, and everyday negotiations intersect and cross. This shift from remembering to resurfacing should therefore not be seen as passive or deterministic. Rather, it signals the production of a plethora of affects, behaviours, and realities. Secondly, the shift from remembering to resurfacing is facilitated and propelled by the positioning of users. As is

discussed in more detail in chapter five, the everyday ‘use’ of memory technologies was often characterised by a certain posture, a certain mode of positioning, a way in which interviewees placed themselves in the way of algorithmic systems resurfacing memories from the past. In the conclusion, I also seek to make sense of the underlying politics and economics of this shift, linking it back to the idea of surveillance capitalism as well as what Nick Seaver (2018) calls ‘captivating algorithms.’ But first, it is important to explore the fields of algorithms and memory in more detail. The following chapter will discuss some of the key concepts and ideas that have emerged within these fields.

2.0 Literature Review

In order to answer the research questions posed in the introduction, I have chosen to engage with three particular fields of research: algorithm studies, memory studies, and digital memory studies. This is because the idea of remembering with algorithms necessitates a closer investigation of these three areas and the particular concepts and ideas that have emerged within them. Firstly, the literature review explores in more depth the notion of algorithms as well as the role of algorithmic systems in society. Here I focus on three specific issues: visibility, order, and agency. Secondly, there is a need to investigate the field of memory studies and how past research has conceptualised remembering, memory, and memory practices. Here I explore issues such as self and identity, photograph and images, ideas of social memory, and archives. Lastly, the literature review engages with some of the main concepts and research strands that have emerged in what has been called digital memory studies. This section will explore the ideas of 'digital' and 'mediated' memories in more depth as well as the metaphor of dormancy, the interplay between social media platforms and social memory, and the nascent research on algorithms and memory. Reviewing literature from these three areas will provide both a deeper understanding of the issues at hand as well as a conceptual vocabulary when investigating the various intersections of algorithms and memory in chapters four, five, and six. Crucially, through an engagement with these fields of research, I identify relevant gaps in the literatures and how this project aims to explore these.

2.1 Algorithm Studies

This section will give a general overview of some key aspects or characteristics of algorithms. The field of 'critical algorithm studies', as it is sometimes called (Seaver and Gillespie, 2016), encapsulates a wide variety of aspects as well as scholarly directions. This section will touch on three key aspects of algorithms – visibility, order, and agency – as a way to better understand both the diverse implications of algorithmic systems enacted in the social world as well as the specific implications for mediated memories and everyday memory practices.

Before discussing each of these aspects in more detail it is important to reiterate the scope and widespread proliferation of algorithms in society. As a result of the emergence of large datasets, often referred to as the era of Big Data (Boyd and Crawford, 2012; Kitchin, 2014a) has led to a 'data revolution' (Kitchin, 2014b) in which data infrastructures and algorithmic systems have pervaded society. Algorithms have been implemented for various

purposes in contexts as diverse as schools (Andrejevic and Selwyn, 2019), border security systems (Amoore and Raley, 2017), academic work (Introna, 2016a), social media (Bucher, 2012b), and even gymnastics tournaments (Keh, 2019). In tandem with the widespread applications of algorithms there has been a call to adopt a more critical stance towards them, as they have the potential to be systems of oppression (Noble, 2017) that dehumanise (Cheney-Lippold, 2017) and perpetuate digital inequalities (Eubanks, 2018). But viewing algorithms solely in terms of oppression and discrimination fails to recognise that they are fundamentally productive processes, generating realities or, more specifically, the conditions for which certain realities are possible and desirable (Amoore, 2020). As such, algorithmic functions such as making-visible, classifying, and ordering need to be understood as a performative power to generate novel actual realities from virtual ones (Lash, 2007). In other words, they contain the potential to process data about the world and roll-out new modes of thoughts, behaviours, and habits, carving out new or modified spaces of human experience in a world they often claim to only represent.

Algorithms are therefore socially powerful, both in the sense that power is exercised through them (e.g. government agencies, corporate companies) and more broadly that they have the potential to generate new realities. Yet, the social power of algorithms should not be understood in essentialist terms. As Taina Bucher (2018) reminds us, algorithms are ontologically processual, coming to matter in specific situations, at specific times, and within particular human-nonhuman assemblages. For instance, algorithms lose all meaning and efficacy apart from written code, apart from data and large training sets, apart from software and computational frameworks, apart from larger digital infrastructures, or apart from their everyday interactions within the world (both in terms of their effects on people and institutions, but also their interactions with other algorithms, as seen in high-frequency trading). Algorithms are therefore processual, relational, and affective. In short, the main thrust of this section is that algorithms are generative. They not only represent the world, but participate in shaping it. More specifically, this section will show how algorithms may do so in terms of broader issues such as visibility, order, and agency. First, I discuss the issue of visibility in relation to algorithmic systems.

2.1.1 Visibility

Even though algorithms may constitute opaque procedures (Burrell, 2016), they are powerful agents in the shaping of the visible realm, both online and offline. As I will show here, algorithms can structure and modulate the realm of the visible, and this has social implications. Much scholarly work has already been conducted into the ontology and sociality of visibility (Brighenti 2007; 2010) as well as how algorithms can modify the visible (Pasquinelli, 2009; Introna and Nissenbaum, 2000).[6] In her article 'Want to be on top?' (2012b), Taina Bucher looks at new 'modalities of visibility' that algorithmic media, i.e. social media platforms, afford. She argues that through a particular architectural structuring, using the machine learning algorithm EdgeRank, Facebook constructs a regime of visibility that imbues in the user that participates on the platform a perceived 'threat of invisibility' (p. 1164). The algorithm behind the NewsFeed calculates people's posts, pictures, and shares and filters them in a way that creates a hierarchy of visibility with some posts being more likely to be visible and others more likely to disappear from view. Unlike studies that examine mediated visibilities in terms of the ways in which people make themselves appear online, Bucher shifts the focus toward the software architectures that make possible such mediated visibilities in the first place, seeing software as 'a sociotechnical actor capable of influencing users' practices and experiences on the Web' (p. 1167). Focusing on software and algorithms brings to the forefront how visibility is never just there; it is always made, arranged, and designed, never neutral.

For Bucher, visibility is a matter of architecture or, more specifically, Facebook's technical structuring of visibility on through the EdgeRank algorithm. What posts become visible and what posts disappear does not necessarily depend on what is written, even though the content is a factor that determines its relevance and impact to some extent. Rather, it fundamentally depends on 'the (im)material conditions of the software' that makes things 'visible, and thus knowable, in a specific way' (p. 1171). As such, the way in which visibility on Facebook is organised entails that the condition of being visible to others becomes, Bucher states, a 'highly contested game of power' (p. 1165). This architectural structuring of visibility, the digital space of contestation on the NewsFeed, has affective repercussions on how subjects perceive themselves and participate on the platform. As Bucher states:

[6] Pasquinelli (2009) and Introna and Nissenbaum (2000) specifically examined the PageRank algorithm that calculates and determines the relevancy Google searches.

> In Facebook there is not so much a 'threat of visibility' as there is a threat of invisibility' that seems to govern the actions of its subjects. The problem as it appears is not the possibility of constantly being observed, but the possibility of constantly disappearing, of not being considered important enough. In order to appear, to become visible, one needs to follow a certain platform logic embedded in the architecture of Facebook (p. 1171).

Through this struggle for contested visibility, the user is instilled with the logic of Facebook's regime of visibility that works to discipline its users into a framework of 'online participation = reward'. As Bucher writes, 'In the Facebook assemblage, a useful individual is the one who participates, communicates and interacts' (p. 1175). Thus, Bucher turns Foucault's model of panoptic power on its head: ubiquitous visibility is not surveillance to be dreaded but a form of currency and a sign of participation to be pursued. But by participating, by wanting to become visible, one surrenders to, legitimates, and further perpetuates this 'platform logic' that is embedded in the way Facebook operates. Moreover, this reward scheme means that if one does not participate on Facebook, or participates in the 'wrong' way, the 'punishment' so to speak is invisibility. That is, if one does not continually participate there is a potential that one's posts, pictures, and general uploads will not reach a wide audience of friends.[7] Drawing on Foucault's notion of discipline, Bucher states that this architectural structuring of visibility leads to a 'participatory subjectivity' (p. 1164), the reconfiguration and disciplining of users into participating subjects, subjects encouraged to be active or else they fall into obscurity.

Bucher's analysis helpfully reminds us that what is visible on social media platforms cannot simply be reduced to what is written or stated, whether it deserves to be visible or not, as it depends on the technical structuring of visibility underlying these platforms. As Andrea M. Brighenti (2010, p. 34) suggests, the visual has to 'visibilised', that is, it is has to be outlined, actively made, and programmed. Algorithmic procedures are not only there to make visibility easier but to better structure its conditions and facilitate its 'game rules,' however contested the game of power may be. But ultimately, Bucher (2012b, p. 1169) argues, the Facebook EdgeRank algorithm is 'not merely modelled on a set of pre-existing cultural assumptions, but also on anticipated or future-oriented assumptions about valuable and profitable interactions

[7] This is exactly the opposite issue in areas such as surveillance and border security control (Amoore, 2009; Cheney-Lippold, 2016). Louise Amoore (2009, p. 25), for instance, argues that in border security practices algorithmic systems are 'not primarily a way of seeing or surveilling the world, but rather a means of dividing, isolating, annexing subjects in order to visualize what is 'unknown'. As such, people can be 'pixelated' and then 'constructed' as potential threats or terrorists.

that are ultimately geared towards commercial and monetary purposes' (p. 1169). That is, social media platforms have a financial incentive to make sure that certain things remain visible to users, such as third-party ads. This financial incentive, which Astrid Mager (2012) argues is emblematic of an 'algorithmic ideology,' can not only be seen on certain social media sites but can also be seen as underpinning search engines such as Google and Bing as well as the continual development of search technology. Algorithmic mediations are attempts to ensure that the 'right kind of' visibility reaches the 'right kind' of audience (Mager, 2012). As such, visibility is algorithmically personalised, users are recommended or shown content that has been predicted will matter to them specifically. Visibility loses its potency if it is visible for the wrong reasons or, more importantly, to the wrong kind of crowd. Such instances could include getting ads that are vastly different to what users might normally connect with. This shows that the visibility created by algorithmic systems is not deterministic, but rather constitutes 'spaces of contestation' (Crawford, 2016), where users may engage with, negotiate and/or resist the outcomes of algorithms.

For Lucas Introna (2016b), this financial incentive of making things visible on social media undergirds a move toward increasingly 'choreographed' forms of algorithmically mediated visibility. By this he means that algorithmic processing of data allows for the coming together of subject, product, and producer in an efficient and dynamic way. That is, a choreography that positions the user as a particular type of consumer (i.e. one who likes sports, books, listens to certain types of music) and couples them up with ads deemed 'relevant' to them in that particular time. More specifically, Introna proposes the notion of 'impressionable subjects' in explicating the importance of the 'right kind of visibility' to the 'right kind of person' in advertising. 'Impressionable subjects' refer to, Introna (2016b, p. 26) states:

> Subjects that are so impressed – pressed into or imprinted on – that they are highly likely to *convert*. That is, do something of value for the company whose advertisement it is – such as click on the advertisement, register on the site, buy a product/service, and so forth (original emphasis).

Visibility on social media platforms such as Facebook is algorithmically manufactured around financial incentives to profit from users' online activity. For Introna, algorithms have the capacity to both aggregate and individuate users, coupling them with product ads they are likely to buy based on the attributes of others. These notions of 'choreographed visibility' and 'impressionable subjects' also bring attention to the way algorithmic systems not only *find*

already-existing users and compare them with other similar users; instead, as the next section will demonstrate, algorithmic systems classify, order and, ultimately create users and their points of comparisons.

2.1.2 Order

Another broad set of tasks performed by algorithms revolves around what I have here called the 'order' of algorithms: their affordances to cluster, classify, group, and categorise content and people. The ordering power of algorithms is seen to underpin the logic of social media platforms (Andersen, 2018; van Dijck and Poell, 2013) as well as various other real-world contexts.[8] In short, algorithms is a pattern-seeking operations. They are often implemented to spot patterns in data in order to find how data points connect and diverge.[9] Before we examine the social implications of such algorithmic ordering, it is worth mentioning that on an ontological level algorithmic outputs are predicated on boundaries and problems being clearly defined and demarcated. As Luciana Parisi (2016, p. 473) states, 'the tendency of computation is to determine its incomputable horizon. What this activity implies is a continuous compression of incomputables into countable data and systems of equations.' The algorithmic choreography of visibility, as we saw with Introna (2016b), relies on parameters (e.g. data or users) that have already been generated, made computable, countable, and thus been made actionable. In a sense, algorithms reduce, compress, and render the 'incomputable' into data that is intelligible. A crucial way this is done is through classification. As Adrian Mackenzie (2015, p. 433) states in 'The production of prediction':

> In all cases, prediction depends on classification, and classification itself presumes the existence of classes, and attributes that define membership of classes. This mode of apprehending differences through classification assumes that all relevant differences can be understood as deriving from combinations of attributes or 'features.'

[8] Jack Andersen (2018) argues that search engines, algorithms, and databases increasingly shape and order everyday communicative actions, that is, 'they make us think, internalize, and act along the lines of their particular modes of communication action' (p. 1).

[9] For more on issues such as classification, classifiers, bayes probabilities, clustering, etc., see Adrian Mackenzie's (2017) comprehensive *Machine Learners.*

In order for predictions to be efficacious, data must be classified and ordered, put into hierarchies.[10] Algorithms process data to spot ways in which data points may be similar or different, how they may connect or diverge, classifying attributes accordingly. The algorithm, then, is a pattern-seeking and pattern-recognising procedure, implemented in wider systems, often in relation to other functions. They participate in the ordering of the social by classifying or grouping it into observable patterns and categories. Although such categories may not always be helpful, and though they may be discriminatory, they are rarely transparent. The ordering power of algorithms therefore does not simply reflect the way in which world is already divided and classified, but often participates in the production of such divisions and classifications.

It is important to then ask what the social implications of the ordering power of algorithms are. One area the ordering power of algorithms becomes visible is in the field of identity and personalisation (e.g. de Vries, 2010; Lury and Day, 2019). John Cheney-Lippold's (2011, 2016, 2017) work, for instance, has repeatedly emphasised how notions of identity, gender, and citizenship are being re-conceptualised through algorithmic categorisations. In the article 'A New Algorithmic Identity' (2011), Cheney-Lippold argued that the implementation of machine learning algorithms in sectors such as marketing and data analytics gave companies the capacity to infer categories of identity based not on survey or census statistics but rather on people's online behavioural patterns. These algorithmic inferences or categorisations, according to Cheney-Lippold (2011, p. 172), constitute the emergence of a novel way of conceptualising and understanding identity as a 'new analytical axis of power: the digital construction of categories of identity.' This form of algorithmic categorisation calculates and determines people's gender, class, or race based on tracking users movements across different websites and servers - in short, it is based on 'statistical commonality models' (p. 165). This means that as people's online behavioural patterns change, even incrementally, notions of identity attributed to users are recalculated, remaining in a state of perpetual flux and recalibration. As such, the ordering power of algorithms do not simply construct online identities but, simultaneously, 'defines the actual meaning of gender, class, or race themselves' (p. 165). Attempts at algorithmically classifying individuals therefore helps to modify the very parameters of how identity is conceptualised and understood. As a result, Cheney-Lippold (2017,

[10] For more on the social implications of classification practices, see Bowker and Star (2000).

pp.4-5) has argued elsewhere that 'we are data,' that is, 'we are temporary members of different emergent categories… according to our data.'

Cheney-Lippold's work has also focused specifically on the implications of such algorithmic categorisations for emerging notions of gender. He argues that:

> Algorithms allow a shift to a more flexible and functional definition of the category, one that de-essentializes gender from its corporeal and societal forms and determinations while it also re-essentializes gender as a statistically-related, largely market research-driven category (Cheney-Lippold, 2011, p. 170).

Drawing on Deleuze's famous 'control societies', Cheney-Lippold (2011, p. 171) argues that such algorithmic categorisations constitute a novel form of biopower which he calls 'soft biopower'. Soft biopower, in his view, comprises endlessly updatable categories of identity based on algorithmic calculations. Gender, in this framework, similarly becomes an endlessly updatable category, where a user's gender is reduced to and equated with statistical correlations with other users. Gender is detached from its embodied and societal forms and instead becomes an ever-modified correlative pattern. In short, a 'man' is someone behaving similar to other 'men' online, leading to novel modes of generalisations and stereotyping. The danger of such algorithmic categorisations, Cheney-Lippold (2011, p. 177) concludes, resides in the way they provide 'an elastic relationship to power', that is, 'one that uses the capacity of suggestion to softly persuade users towards models of normalized behaviour and identity through the constant redefinition of categories of identity.' The danger, in other words, lies in the way that these algorithmic categorisations are not simply tools for marketing, but also have the capacity to modify people's perceptions and behaviours in the real world. Algorithmic calculations tend to ignore people's embodied, subjective, social, and psychological realities. Instead, as he states in his book, *We Are Data,* 'who we are in the face of algorithmic interpretation is how we are computationally calculated to be' (Cheney-Lippold, 2017, p. 5).

Another area where the ordering power of algorithms is salient is in relation to sociality and the ways in which it is variously configured on social media platforms. Critical media scholars have pointed out how social media platforms do not simply mediate or facilitate already-existing social groups; instead, they actively participate in shaping and constructing the formation of various audiences on social media platforms. Tarleton Gillespie (2014), in his influential article 'The Relevance of Algorithms', argued that algorithms can be seen to partici-

pate in the production of what he calls 'calculated publics.' The way publics can be seen as 'calculated' is, according to Gillespie (2014, p. 188):

> When Amazon recommends a book that 'customers like' bought, it is invoking and claiming to know a public with which we are invited to feel an affinity – though the population on which it bases these recommendations is not transparent, and is certainly not coterminous with its entire customer base.

He further suggests that these algorithmically generated groups may be 'inexact approximations' and that they have nothing to do with the users they have sought to represent (p. 189). As such, algorithmic systems can often seem to reflect and mediate pre-existing audiences, with commonalities and mutual interests and affinities, whereas in actual fact these publics have been 'calculated' and programmed based on the criteria and aims posed by the social media platform in question. Gillespie's (2016) exploration of Twitter trends is an apt example of how the algorithmic production of calculated publics can be seen at work in everyday life. On Twitter, things trend when multiple users concurrently tweet about the same event/news or engage with the same topic through hashtags. Yet, as Gillespie (2016, p. 3) points out, Twitter's trending algorithm identifies what is popular for 'us' by using 'a combination of metrics to identify particular content or topics generating the most activity, at a particular moment, and among a particular group of users.' According to Gillespie, trending algorithms on Twitter calculate whether something should trend based broadly on three different components: a very broad *who*, a very narrow *when*, and a little *what*. For something to trend, in other words, the algorithm calculates how many users (who) tweet about a certain topic (what) within short increments of time (when). Trending algorithms, as such, purport to help link content with users who are likely to find it newsworthy or interesting. For Gillespie, trends are algorithmic calculations that invite us 'to both attend to and join these trends' (p. 7). The trend, in a sense, is created by users being shown the 'trend.'

A third area where the ordering power of the algorithm can be seen is with regards to culture and cultural production. For instance, much critical work has already examined how algorithms shape music taste on various digital platforms (Prey, 2017; Karakayali et al., 2018). Culture is an elusive concept and has been conceptualised in various different ways. For Raymond Williams (1976), in his book *Keywords*, 'culture' refers to the values, views, and meanings embedded in certain practices and forms of life. Williams argues that culture is often implicit because it is ordinary, ubiquitous, and taken for granted. It seems evident that many of

the practices commonly understood as 'cultural' have been reshaped, or are in the process of being reshaped, by algorithms. In *Popular Culture and New Media*, David Beer (2013) argues that our everyday lives are increasingly being shaped and ordered by the merging of new media and popular culture. He points out that taste is often understood in relation to people's economic background and their level of social or cultural capital. With the emergence of new media, Beer argues, this view fails to capture the fact that algorithms are shaping people's cultural tastes to a larger extent than ever before (pp. 3-4). Central to this intersection of new media and popular culture are circulations of data that are produced on a granular level by people who engage with culture in various ways (be it through the movies they watch or the music they listen to) (p. 4). The data is generated when people engage with various new media architectures such as digital archives and social media platforms and this data then flows back into these architectures, reshaping them based on the new data that was produced. Culture, becoming mediatised, increasingly consists of a multiplicity of flows, of data circulations that recursively fold back into the very culture that facilitates these flows in the first place. Therefore, it is not unlikely that there exists, as Beer (2013, p. 165) states, 'an underlying recursivity in contemporary culture.' That is, a recursivity that is arguably key to understanding not only how popular culture works but modern rationality as well (Hui, 2019; Totaro and Ninno, 2014; 2016).

The social power of algorithms, embedded in software and new media architectures, can be said to 'flow' out from these circulations of data into everyday life. They classify and order what movies or music people watch or listen to depending on what they have previously watched or listened to. But the power of these automatic processes resides not only in their power to predict cultural behaviour by continually honing the accuracy of recommendation systems, but in their performativity: 'algorithms have the capacity and potential to *make taste* by shaping cultural encounters and crafting our cultural landscape' (Beer, 2013, p. 99; original emphasis). As algorithms order our cultural consumption and recommend what new music to listen to, what books to buy, and what films to watch the ordering power of algorithms is revealed and continually fine-tuned. As culture is reconfigured through increasingly intimate circulations of data, the role of algorithms to process and to make sense of these data sets becomes ever more important.

There are others, however, who have argued that the ubiquity of algorithmic processes in society has led to the emergence of 'algorithmic culture' (Galloway, 2006; Striphas, 2015).

What is meant by this notion? Defining algorithmic culture, Ted Striphas (2015, p. 396) states that:

> What one sees in Amazon, and in its kin Google, Facebook, Twitter, Netflix and many others, is the enfolding of human thought, conduct, organization and expression into the logic of big data and large-scale computation, a move that alters how the category *culture* has long been practiced, experienced and understood. This is the phenomenon I am calling… 'algorithmic culture.'

Hallinan and Striphas (2016) take this notion further in order to elucidate the extent to which algorithms feature prominently in the construction, curation, consumption, and circulation of (digital) cultural objects such as films and music. Culture, according to Hallinan and Striphas, is increasingly entangled with algorithmic practices, and these practices participate in the shaping and determining of what culture looks like. For example, they state that Netflix offered 1 million US dollars to the first person or team who could improve their recommendation system by 10% (2016, p. 117). The competition, which was known as The Netflix Prize (2006-2009), revealed that long-established marketing categories such as gender, ethnicity, and age were insufficient factors when determining the accuracy and appropriateness of a movie or series recommendation. These classifications failed to capture the more nuanced reasons why people watched the movies they did and they were therefore not precise enough when trying to draw connections between users, that is, when trying to determine what 'kind' of viewer would view 'what' kind of movie (p. 123). Instead, the outcome of the competition led to a shift in how movies and series were being recommended on the platform, 'from more traditionally collaborative filtering to a blend of latent predictive elements' (p. 127). The Netflix algorithms started recommending based on individual user ratings, that is, what movies the user likes, and would modify its recommendations based on the user's continual engagements with the services on Netflix and the movies or series their algorithms recommended, echoing Cheney-Lippold's (2011) notion of 'soft biopower.'

Hallinan and Striphas (2016, pp. 129-130) also point out how Netflix used a factor-based algorithmic approach to the production of their popular political drama series, *House of Cards*. Based on the analytical tracking and classification of their users, Netflix found strong correlations between factors such as 'David Fincher', 'Kevin Spacey', and 'Political Drama' and thereafter sought to assess whether there would be a potential audience for the combination. In other words, both the production and recommendation of movies and television series are

informed by ‘data-driven hunches’ (Hallinan and Striphas, 2016, p. 129). It signals the importance of data in determining cultural production and consumption rather than using more traditionally fixed marketing categories such as age, gender, and race. The example suggests a way in which algorithmic processing of user data operates in an everyday context, shaping and reinforcing the taste of their subscribers.

It is important to note, however, even though algorithms may be said to constitute a powerful ordering force in the world, this ordering force must not be equated with a wholistic, overarching logic or grand narrative. As has been already suggested, algorithms produce multiple outputs from multiple inputs (Roberge and Seyfert, 2016, p. 3), resulting in a multi-directionality that problematises the orderliness of algorithmic order. As such, given this multiplicity and contingency, Roberge and Seyfert (2016) prefer the plural notion ‘algorithmic cultures.’ Multiple outcomes engender and cascade into multiple readings, interpretations, conceptions, and lived practices. This is, for instance, well demonstrated by Taina Bucher’s (2017) notion of ‘algorithmic imaginary’, where users and algorithms are seen as intertwined on social media platforms, iteratively shaping each other. Bucher shows how people’s perceptions of the algorithm shapes the way they interact with it, which in turn shapes how the algorithm interacts with them as well as the kind of content it reveals. Still, the algorithm participates in the reconfiguration of culture and its underlying principles of automation, calculation, classification, and hierarchisation can be seen in how culture is being produced, mediated, and consumed. That is why it is crucial to also examine the idea of agency in this context, both in terms of human and algorithmic agencies.

2.1.3 Agency

As the previous sections have shown, algorithms are now widely diffused in society, performing real-world tasks but also affecting and shaping people’s perceptions, behaviours, and grids of intelligibility. Does this mean that algorithms have agency in the sense that human beings have agency? In order to answer this question, it is important ask what counts as an agential ‘act’. This section will look at this notion of agency in more depth, both in terms of algorithms and humans. This project draws on notions of agency from STS scholarships, especially Bruno Latour’s (1988, 1992) conceptualisation of ‘actor.’ Latour’s actors constitute a broad category, where nonhuman objects are considered agents similar to human beings. Latour abandons the dichotomy between agency-possessing humans (subject) and the agency-

lacking nonhuman (object), proposing the notion of 'actors' instead, which envisages a complex intermingling between humans and non-humans alike. He similarly abandons the subject-object dichotomy in favour of action, defined as 'a property of associated entities' (Latour, 1994, p. 35). For Latour, 'essence is existence and existence is action' (p. 35). Actions are therefore fundamentally distributed across a wide range of actors. In other words, actions are that which does, enables, facilitates, authorises, enhances, accelerates, modifies.

From such a viewpoint, algorithms must be thought of as performative, exercising affective power in the social world. Yet, it is also important to account for the interdependence and interconnections of various actors. Following Deleuze and Guattari, Donald Mackenzie (2009) has called the assemblage of humans, non-human objects, and technical systems 'agencement' in order to capture the associative and entangled nature of agency. It is a reminder that agency does not strictly nor exclusively reside in the human subject. It also encapsulates nonhuman objects such as algorithmic systems that make 'subjects' possible. Moreover, the notion of agencement or assemblages indicates what Lucas Introna (2011) calls the 'enframing' of agencies within systems and wider structures. In his essay 'The Encoding of Human Agency', Introna (2011) argues that all forms of human agency are always predicated on pre-existing conditions, norms, and rules. That is, human agency does not exist in a vacuum but is made possible by 'material enactments' such as language, writing, or software code that are often taken for granted (p. 116). Introna, echoing Marshall McLuhan's (2001) media theory, states that all cultures and all epochs have their own modes of encoding, enactments without which reality remains unintelligible, where people remain 'trapped in the immediacy of the present and the encoded materiality of the body' (p. 122). Material enactments, according to Introna, frame or translate our social existence so that it becomes possible for us to act meaning-fully, extending our agency in the world.

However, Introna argues, that is impossible to separate human agency from these encoding systems. Echoing posthumanist scholars such as Ihde, Haraway, and Hayles, Introna argues that 'there is no agency – and therefore no actor – which is prior to encoding/extension' (p. 119) and that 'all agency is always borrowed (or 'plagiarized') – i.e. it is never originally human' (pp. 133-134). In other words, one should not start with human essence and view technologies and encoding material enactments as merely emanating from it. Rather, the tools we have used to create the world have always been embedded in who we are and how we act. Human agency is encoded by them, framed, enabled, shaped, and borrowed from them. In this view, agency can therefore be understood as a 'nested' concept. That is, 'as our sociomaterial

world becomes more complex, agency becomes increasingly encapsulated – nested as codes within codes within codes' (Introna, 2011, p. 134). They help us make sense of ourselves as well as extend our agencies to act meaningfully in our environments. Most importantly, however, encoding enactments 'performatively produce' our agency. Enactments such as algorithms never merely represent the world to ourselves and to others; they help produce the reality they purport to represent.

This notion of agency as nested and as distributed also echoes N. Katherine Hayles's (1999, 2006, 2012, 2017) extensive work on agency and cognition. In *How We Think* (2012), for instance, Hayles investigates how humans and machines perform different cognitive functions such as making inferences. Attempting to capture the entanglement of human and machine, she proposes the notion of 'technogenesis', which refers to the 'reciprocal causality between human bodies and technics' (Hayles, 2012, p. 123). Agency, in this framework, consists of both human and nonhuman actors that are mutually constitutive. Humans are dependent on these technical systems as much as they are on humans. Hayles's work also challenges the assumption that agency must be equated with ideas of intentionality, rationality, and consciousness. Hayles's notion of 'cognisphere' (2006), as well as her work on non-conscious forms of cognition in *Unthought* (2017), problematises such claims by suggesting that cognitive processes do not reside merely in human subjects, but are rather distributed across biological and nonbiological lifeforms such as media and technical systems. Human agency is always-already part of broader assemblages of interwoven and interconnected modes of cognition.

Moreover, in her book *Unthought* (2017), Hayles proposes the distinction replaces the dichotomy between human and nonhuman in favour of 'cognizers' and 'noncognizers'. Emphasising ideas of cognition enables Hayles to conceptually capture the vast extent to which human agency comprises the enactment of nonconscious cognition. For humans, for instance, agency is most often not conscious. Most of human or bodily behaviour is performed unconsciously, which in turn means that agency should not be reduced to simply conscious choice or intentionality. Hayes argues that algorithmic systems similarly perform non-conscious forms of cognition, and should therefore be considered as acting in and upon the world as much as humans.

It would be easy to fall into the trap of thinking that such arguments propose a deterministic view of human agency as totally engulfed in and nullified by algorithmic systems. However, this is not the case. As Louise Amoore (2019a, p. 6) reminds us:

> A Haylesian reading would urge caution with the idea that forms of machine reading are subsuming the human forms of deep reading of these authors. The human and the algorithm are co-evolving, yielding new modes of reading and cognition that do not readily map onto conventional notions of the human and the machine.

Notions such as actors, agencement, cognisphere, and cognizers emphasise a 'co-evolution', a 'technogenesis', of human and nonhuman agencies, that is, a process by multiple kinds of agency are mutually produced.[11] Elsewhere, Introna and Hayes (2011, p. 108) have called this co-evolution a 'constitutive entanglement', suggesting the dialectical production of human subjects and the technical (or algorithmic) systems which they come into contact with. But this dialectical process is not smooth or straightforward, which means that the relations or interconnectedness of human and algorithmic agencies cannot be conceptualised as simply a form of 'being alongside' (Latimer, 2013). As Lucas Introna (2011, p. 118) points out, 'in the multiplicity of encoded events there are always multiple points or possibilities for the otherness of the events to assert itself.' The conditions underlying human agency are not fixed but may at any time, for any given reason, modulate and fluctuate. Algorithmic systems do not simply actualise certain realities in the social world unproblematically, because they exist in complex wider assemblages as well as in relation to various human practices, resistances, and surprising intentions.

Therefore, with every algorithmic implementation, there always exists a vast array of potential outcomes, possibilities that the algorithm may change, and that accidents, break-downs, misuses, subversions, and re-appropriations may occur. As Bucher (2017) shows, algorithmic systems can be shaped by human responding to them, gaming them, or resisting them. As such, algorithmic outcomes or implementations are not entirely determined but rather

[11] Other ways to conceptualise the relationship between humans and algorithmic systems is in terms of a 'dance of agency' (Pickering, 2005) or 'flows of agency' (Introna, 2016b). Lucas Introna (2016b) develops this notion of flow of agency in relation to algorithmic choreography and impressionable subjects, stating that:

> In the algorithmic choreography of the impressionable subject there are many different agencies circulating – which overlap, coincide, correspond, etc. In these circulations intentions, identities, positions become translated and displaced in ways that do not allow any definite choreographer to emerge (not the algorithms, nor the subjects, nor the advertisers, nor the advertising agencies, and so forth) (p. 47).

carry traces of contingency.[12] Moreover, Kate Crawford (2016) argues that algorithmic encounters should be perceived as 'spaces of contestation.' Although algorithms contain the power and potential to transform reality and may enact what their designers intended them to do, they do not necessarily always reflect the intentionality of their designers.[13] They do not determine, and are sometimes unable to even predict, how people will act and react to those algorithmic processes. Reality is messier and more unpredictable than often assumed.

Roberge and Seyfert (2016, p. 3), in order to capture this uncertainty in algorithmic operations, propose the idea that algorithms possess a sort of 'fractal agency', suggesting that they may or may not result in (un)wanted and (un)expected outcomes. They argue that, even if algorithms can be said to 'do' things or to possess agency, their actions cannot be said to always be intentional or straightforward. Rather, they state, 'the type of agency involved here can be best described as 'fractal,' that is, producing numerous outputs from multiple inputs' (Roberge and Seyfert, 2016, p. 3). As the mathematical term suggests, the fractal agency of algorithms is multidirectional, pushing in multiple directions simultaneously. They seldomly operate in a linear fashion (that is, translating one input to one output) but rather work with finding patterns, sorting, and categorising units from large datasets to which data is constantly added, retracted, and evolving. As Roberge and Seyfert suggest, the outcome of multiple inputs is, correspondingly, multiple results.

In addition to the complexity of algorithmic multi-directionality, the idea of fractal algorithmic agency invokes fragility and the potential for brokenness, as the words 'fractal' and 'fracture' both etymologically derive from the Latin word *frangere*, which means to break. Roberge and Seyfer (2016, p. 3) state that 'one algorithm is intertwined with many others in extremely intricate networks. Nonhuman as much as human contributions are thus key here, and could rather easily result in mismatches, unpredictable results, or even dramatic failures.' This potential for unpredictable failures and mismatches, creates an algorithmic indeterminacy by which the outputs produced by algorithms may be numerous but do not always necessarily achieve what they were initially designed to achieve. Shintaro Miyazaki (2016), for example, has outlined how the AT&T Crash of 1990 was a result of a malfunction in the algorithmic

[12] M. Beatrice Fazi (2018) even argues that contingency is at the heart of all forms of computations.
[13] Green and Viljoen (2020) have proposed the notion of 'algorithmic realism' as a new mode of algorithmic thinking for computer scientists. Algorithmic realism sensitises computer scientists and programmers to the gaps that exist between the intended (good) uses of algorithms and the actual socio-economic realities they often help create or perpetuate in the real world.

feedback loops.[14] Of course, looking for the initial purpose of an algorithm procedure is not always straightforward. It assumes that a particular human intentionality can always be located as underlying originator of the algorithm in question. On the contrary, the reality is most often that the production of algorithms involves large teams of developers simultaneously working on different parts of it. But the idea of a fractal agency is a helpful reminder of how an algorithm operates: through a multi-directional production of several outputs that carries the potential for failure and mismatch.

Given their proneness to failure and the unexpected consequences that can emerge from algorithmic outputs, Louise Amoore (2019b) has proposed a 'posthuman mode of doubt.' Amoore points out that the allure of (machine learning) algorithms for the financial and political sectors resides in their promise of 'securing against all possible future events (terrorism, irregular migration, financial crisis, climate change), via the analysis of data' (p. 148). With machine learning algorithms, future possibilities and unknowabilities are reduced to 'a malleable arrangement of weighted probabilities' (pp. 148-149) whereby any doubt is thus eradicated and instead rendered as a singular decision that is made actionable by the algorithm. This is also echoed by Luciana Parisi (2016, p. 473), who suggests that for computation to actually be efficacious it must be predicated on 'a continuous compression of incomputables into countable data and systems of equations.' Yet, according to Amoore (2019b), the fundamental issue is not that algorithms produce 'partial accounts' of the world or the future; rather, they reveal 'the already present problem of locating a clear-sighted account in a knowable human subject' (p. 150). The issue, in other words, is not that the algorithm provides partial accounts and humans are somehow able to provide full accounts. Instead, doubt inheres in both human and algorithmic agency. Certainty is never fully achievable. The presence of doubt in algorithmic systems, according to Amoore, opens onto a future 'that is never fully reduced to the single output signal, to the optimised target' (p. 147). In other words, algorithms can be considered agents, performing tasks in the real world, shaping, and affecting how life is lived and perceived. Yet, just like humans, they are unable to fully capture the complexity of reality in single actionable outputs. At the same time, this does not stun human agency, but their interactions with algorithms are characterised by a variety of outcomes, possibilities, and reactions – by doubt. Algorithms and humans, therefore, are intertwined in assemblages of

[14] For more on the momentary break-down of algorithmic systems and its repercussions, see chapter five 'Temporality and Cognitive Assemblages' (pp. 142-178) in Katherine N. Hayles's *Unthought* (2017).

interconnected agencies, but this does not pre-determine what the outcomes will be, but rather opens onto a future that is never fully reduced to a single output signal.

The algorithm, in short, is affective and performative. It structures and modulates the realm of the visible, enframes and reframes human agency, and constitutes an ordering force that reconfigures culture in relation to its rationality of automation, calculation, classification, and hierarchisation. But to ascribe power to the algorithm is not to pose a deterministic view of computational agency, limiting all human practices and perceptions, nor is it to essentialise a particular software property. Rather, it is acknowledging that algorithms form part of a much larger and complex 'assemblage of strategies' (Bucher, 2018, p. 3) from which power flows. It is an acknowledgment of the scope to which algorithms have been implemented in society, and some of the important functions we have delegated to these automated processes. It is acknowledging that algorithms make matter and only come to matter in particular situations and at particular times. As this thesis also explores, it is crucial to understand the way in which algorithms interact with and shape people's everyday memory practices. I will now outline some important aspects and themes that have emerged in the memory studies literature.

2.2 Memory Studies

What is memory? How can we understand and conceptualise memories and remembering? Research into the nature, qualities, functions, and implications of memory have been conducted across diverse fields: neuroscience, cognitive psychology, cultural studies, social studies and sociology, literary studies, history, and philosophy. Ideas of memory can vary greatly as well. At best, memory is 'travelling concept' (Bal, 2002), one which traverses disciplinary, linguistic, historical, and cultural boundaries, picking up a heterogeneity of meanings whilst simultaneously shedding others. The study of memory is a diversified and interdisciplinary endeavour, comprising various epistemological, ontological methodological assumptions and approaches. The meaning of memory also varies from culture to culture, whilst there exists a multiplicity of memory practices, which converge and diverge across various societal contexts.

It is important, then, that memory be understood 'within a kind of multidimensional space' (Sutton et al., 2010, p. 221), where both personal, cultural, and social forms of remembering are considered, as well as tools, objects, databases, archives, algorithms, and infra-

structures. In this part of the literature review, I have narrowed the multiple approaches to memory studies down to four key areas: self and identity, photography, the social forms of memory, and archives. The reason for choosing these areas is because they can provide a deeper understand the various ideas and concepts that underlie my examination into the intersections of algorithms and people's memory practices. These focal points also provide a language and framework in which to make sense of the ways memories are facilitated, ordered, and resurfaced on algorithmic remembrance technologies as well as how these technologies figure in people's everyday memory practices. Although the literature review differentiates between four key areas of memory studies, it is important to acknowledge that these are not holistic nor independent categories. Rather, they coexist, blend, and often overlap. The following section will discuss how memory has been conceptualised in relation to notions of self and identity.

2.2.1 Self and Identity

In many areas of memory studies, memory remains intimately interconnected with ideas of self and identity. Memory has been suggested to be key to how a sense of self is maintained over time. English philosopher John Locke, for instance, emphasised this link between memory and a sense of self, arguing that memory was not just a means of storage, a storehouse and extraction point for lived experiences, but rather constituted an essential part of a person's selfhood, a sense of their diachronicity, as well as their identity-making process (Ferguson, 1996). Locke suggested that it is because of memory that individuals have the ability to act in accordance (or in opposition) with their past sense of self. They are able to reflect back and evaluate present behaviours in view of the past and to reinterpret past behaviours in view of the present. This frame of reference for action anchors people in 'the now' and gives them a sense of continuity over time. As such, this anchoring aspect of memory is considered vital for a sense of selfhood that is relatively consistent through time.

Since Locke, the study of the connection between memory and self has been developed in diverse directions but, as Frances Ferguson (1996) has noted, the emphasis on the inter-dependence of memory and a continual sense of self has remained a focal point of memory studies. Its continual importance is also evident when looking at how this link has been explored in popular culture, with movies such as *Blade Runner* and *Eternal Sunshine of the Spotless Mind* as well as more recently with the HBO series *Westworld*. However, Ferguson (1996) adds that this interconnection between memory and self was to a large extent born out

of the Romantic period, a period in which the idea of the self was foregrounded and where memory predominantly revolved around and was anchored in 'the individual.' As Ferguson observes, memory following the Romantic period has come to stand for not only the ability to recall certain parts of the past, but also 'the possibility of reflexiveness itself' (p. 514).

This idea of memory as condition for self and reflexiveness has permeated Western societies, even becoming inextricably embedded at the level of language itself. For example, Paul Ricoeur (2004, p. 96) has pointed out that French uses the reflexive pronoun 'soi' (self) as prefix to the verbs 'souvenir' and 'rappeler', meaning to remember. At the level of everyday speech, Ricoeur (2004, p. 96) suggests, remembering figures as an act of the self: 'in remembering something, one remembers oneself.' Moreover, the idea of reflexiveness also highlights how memories are not static representations of the past. Rather, as the process of producing and maintaining a sense of self through time is not stable, so memories are constantly being revised and modified in the present. This is also echoed by the psychoanalytic literature where memory traces are constantly revised and rearranged to fit new experiences and new circumstances, incorporated into and perpetuating a sense of continuous self (e.g. Kennedy, 2010). This view is further echoed in psychology and neuroscience where remembering denotes an imaginative reconstruction of the past in the present (e.g. Bartlett, 1932; Rose, 2003). As Fredric Bartlett (1932, p. 213) put it:

> Remembering is not the re-excitation of innumerable fixed, lifeless and fragmentary traces. It is an imaginative reconstruction, or construction, built out of the relation of our attitude towards a whole active mass of organised past reactions or experience.

Remembering, in this view, entails an interactive process of interpretation and reinterpretation, of 'imaginative reconstruction' of the past and our relationship to the past. As Annette Kuhn (1995) argues, memory can therefore be considered as an always-already 'secondary-revision', that is, an ongoing and dynamic process of negotiating the past, present and future. In *Family Secrets* (1995), Kuhn proposes the notion of 'memory work' in order to better capture these dynamics of remembering. 'This in effect is my understanding of memory work,' Kuhn (1995, p. 157) states, 'an active practice of remembering which takes an inquiring attitude towards the past and the activity of its (re)construction through memory.' Kuhn's notion of memory work highlights the affinity between remembering as an act of interpretation as well as an active 'investigation' into past experiences and the objects which mediate them, such as photographs.

Memory work conceptualises remembering as a set of active, intentional, performative, and yet contested acts, turning a critical eye to the ways in which the past is construed. The reason remembering may be seen as performative is because personal memories are constantly being interpreted and re-interpreted, be it to fit the current situation of the person remembering or to give a sense of personal and historical continuity.[15] In other words, memories are less like storehouse objects waiting to be accessed and more like the by-products of ongoing investigative memory work.

Given this intimate link between memory and self, there has been much emphasis on the role of narrative in relation to both memory and identity (e.g. Bruner, 1991; Cavarero, 2000). In her book *Relating Narrative,* Adriana Cavarero (2000, p. 33) argues that 'every human being, without even wanting to know it, is aware of being a *narratable self* – immersed in the spontaneous auto-narration of memory' (original emphasis). Drawing attention to both the link between memory and identity and the notion of memories as constantly in a state of flux, Steph Lawler (2014) explores the role of memories particularly in relation to how identities are formed in everyday life. In her book *Identity* (2014), Lawler seeks to examine how people engage in 'processes of *producing* an identity through assembling various memories, experiences, episodes, etc., within narratives' (p. 24; emphasis original). Drawing on Paul Ricoeur's notion of 'emplotment', Lawler explores how the narratives people employ in the production of their identities and how stories and memories from the past figure in this narrative production. Emplotment delineates the minimally necessary elements that a narrative needs to have in order to be a narrative, these being characters, action, and plot. Every narrative, in other words, needs to have someone in it, something that happens, and a plot which, as Lawler points out, is what actually 'makes' the narrative: 'it brings together events and episodes into a meaningful whole: events or episodes are not thrown together at random but are linked together' (p. 24). Emplotment is the making of a plot and the linking or 'synthesising' together of events.[16]

This process of bringing events and episodes together in a meaningful fashion, is essential to a narrative. More importantly, emplotment is essential to how a sense of continuous self is produced and maintained through time. In making sense of themselves, people draw on memories of various incidents and episodes that happened at various points in their lives. These

[15] This notion that memories are in a constant state of flux, since they are products of iterative processes of interpretation and reinterpretation, also brings attention to the way memories can be forgotten, repressed, or plainly false. For more on this notion of 'false memories', see Loftus (1997).
[16] Ricoeur defines emplotment as 'a synthesis of heterogeneous elements' (Ricoeur quoted in Lawler, 2014, p. 27)

incidents are not necessarily connected (and some not at all) but are linked together through a process of emplotment – a linking of events in a narrative structure – and these memories therefore form part of a (logically) continuous narrative of interconnected episodes that give the impression that these incidents have 'inevitably' led individuals to where they are now (p. 29). 'Emplotment,' Lawler suggests, 'configures a self which appears as the inevitable outcome and actualization of the episodes which constitute a life' (pp. 29-30). A sense of continuous self is therefore produced in the process of recursively engaging with, interpreting, reinterpreting, and organising one's memories in relation to the narrative of one's life. Moreover, Lawler suggests that memories, being themselves interpretations, are highly selective and are ultimately dependent on the impact they have on whomever remembers. They feature heavily in the narratives we produce, and it is '*through* the narratives themselves that we produce our identities in this way' (p. 26; emphasis original). As such, memories are part and parcel of the recursive production of people's identities, and this in turn highlights the extent to which memories are performative. In short, memories are performed, enacted and re-enacted through the continual telling of stories.

Lawler's work on the utility of memories for the production of identity narratives highlights how these narratives can be created both intentionally and unconsciously by individuals. Emplotment highlights how identities are actively produced by stories and people drawing on their past experiences and memories. As such, the notion highlights the purposeful processes by which people draw on memories to make sense of themselves. This sense of purposefulness and conscious retrieval of memories for present interpretations is also echoed in Annette Kuhn's (1995) notion of memory work as investigative attitude to the ways in which the past is perceived, construed, and constructed in the present.

Yet, the dynamic and multi-faceted nature of remembering encompasses not only conscious processes but nonconscious as well. These unconscious dynamics of memory become visible when turning to the idea of forgetting. Even though forgetting harbours notions of ambiguity and suspicion in Western history of thought (Weinrich, 1997), its centrality to remembering, reflexivity, and action cannot be denied. For instance, Siegfried Kracauer ([1927]1993, p. 425) stated that memory encompasses 'neither the entire spatial appearance nor the entire temporal course of an event,' but was rather full of gaps and voids that have been forgotten. 'Autobiographical memory,' Jens Brockmeier (2002, p. 20) observes, 'is essentially

about forgetting: forgetting about most of what happened in one's life-time.'[17] Autobiographical memory is not only what we forget but what we thought we had forgotten and are then reminded of later on. The centrality of forgetting to our memory suggests that even if people (deliberately) draw on memories in order to produce and re-produce a sense of identity, most of people's past experiences are inaccessible or at least not accessible to intentional recollection even if they may be important part of someone's personal history. As such, memories are not only an active set of practices, something we use to form our identities; memory is also something that happens *to* us – unpredictably, spontaneously, organically, and uncontrollably.

This idea of memory as unpredictable and spontaneous is well captured in the work of novelist Marcel Proust, especially in relation to his idea of 'involuntary memory.' For Proust, voluntary memory, or actively remembering certain events or experiences that happened to oneself, was not considered 'true' memory since it only provided an imprecise copy of the past (Wood, 2010, p. 111). Proust claims that true memory, on the other hand, is a spontaneous recovery of the past through an unexpected provocation of the senses: the scent of a particular brand of tea, the sound of a piano, the sensation of holding a particular book in your hands. There is a famous example in Proust's *Way by Swann*'s where the narrator dips a madeleine biscuit in tea and feels a warm sensation rushing over him and is immediately transported back to his childhood days in Combray where his aunt would give him biscuits on Sunday mornings. Even though Proust's memory distinction is questionable, the examples of involuntary memory in Proust's fiction sensitises us to the elusive, nonconscious elements of memory, and also highlights the role of the body in remembering (Whitehead, 2009).

These unexpected sensations also highlight the role of reminding. As Edward S. Casey (1987) states, reminding is a fundamental modulation of remembering. It is a way of revisiting or being revisited by past memories, or being prompted to revisit, through objects such as old photographs and videos. Just as with Proust's notion of involuntary memory, people can be prompted to remember certain past experiences in unexpected ways and at unexpected times. Sensations may remind us of the past, remind us of memories we had forgotten we had. In a

[17] The critical role of forgetting for identity is also echoed in Pierre Bourdieu's (1990) work, especially with regards to his notion of 'habitus'. Habitus, being the inculcated dispositions, can be understood as 'embodied history, internalised as second nature and so forgotten as history' (Bourdieu, 1990, p. 56). Inculcated habits and embodied dispositions are historically conditioned and internalised to such an extent that people forget where they originated (e.g. class relations). Instead, these qualities and habits come to seem as innate and intrinsic to someone is. This kind of forgetting, history 'forgotten as history', is constitutive of people's identities.

sense, these external factors afford remembering to take place. Michael Wood (2010, p. 113), in his analysis of Marcel Proust, states that the role of reminding is a crucial one:

> It's not that we don't remember, it's that we can't recall. Significant memories don't come when they are called, and we couldn't call them anyway, because we don't know of their existence until they suddenly arrive. We happen on them; they happen to us.

Involuntary memory, as understood by Marcel Proust, can produce both sensations of joy, as we are reminded of happy childhood days, or sadness, as we are reminded of someone's death. These memories happen externally, they are cued and provoked by things around us. They are involuntary, and as such problematize our notions of agency and intentionality in relation to memory. This form of memory is equally powerful to the more active, performative understanding of memory that is outlined in Lawler, but is much more elusive since it is spontaneous, organic, external, and indisputably affective.

As such, memory is both a re-presenting of the past and a negotiation of its meaning. It comprises traces of lived experiences and performative engagements with those memory traces. However, drawing on Proust, it is also important to consider the unexpected and involuntary qualities of memory, conceptualising it as something internal and external to us simultaneously. As Sally Alexander (2010, p. 237) put it, 'memory works on the cusp of inner and outer reality.' Remembering can therefore be conceived as an intentional, conscious, and performative act as well as an involuntary one, where memories cued externally. People draw on memories to construct narratives of self, but memories can also be, in a sense, 'pulled out' of people: it can engender affective states, creating reactions and involuntary moments of recall in the present. Both these dimensions of memory – as intentional and non-intentional - emphasise an intimate connection between remembering our past experiences and our sense of identity progressing through time.

2.2.2 Photography

Given the idea that memory is intimately linked to notions of selfhood and identity and the fact that things are easily forgotten, people have long been dependent on various material objects and structures to store and facilitate their remembering of the past. As Annette Kuhn (1995, p. 13) noted, memory relies on 'the materiality of the trace, the immediacy of the recording, the

visibility of the image.' Given their integrated part of our everyday life, objects can become fused with affect and meaning. They can become what Sherry Turkle (2007) calls 'evocative objects', capturing and triggering affective states, stories, and memories. Given the increasing emphasis on the visual for algorithmic remembrance technologies, this section will look closer at the idea of photography, the image or visual object, and how these variously relate to memory and remembering.

Photography has become a central and ubiquitous device for retaining people's personal memories in contemporary society. This dominance of photography as medium for personal memories is an understandable development: photographs seem to give us access to a reality that once was; they act as evidence that some event in history really did happen; they help us remember lives once lived. Yet, they are also snapshots of stories we will never know in their entirety. Although photographs have become a dominant way to store personal memories, the extent to which one can or should distinguish between memories themselves and memory objects has been subject to debate. For instance, Siegfried Kracauer ([1927]1993) states that a distinction must be established between the two, given that they comprise and provide different visual representations of time. He argues that 'memory-images' – the mental, visual impressions that are personal memories – 'retain what is given only insofar as it has significance' (p. 425). For Kracauer, what constitutes personal memories, or memory-images, is primarily a question of the meaning or significance they have for the person doing the remembering.

Photographic images, on the other hand, are able to capture the appearance of the time and place of an event and freeze or fix them. As John Berger (2009, p. 54) notes, 'the camera, unlike the human eye, is able to *fix* the appearance of the event. It removes its appearance from the flow of appearances and preserves it' (original emphasis). Kracauer argues that since the camera is able to isolate or fix events that are necessarily interlinked with other events in a temporally continuous flow, photographic images do not encompass 'the meaning to which they refer', and as such, 'a person's history is buried as if under a layer of snow' (p. 426). Thus, whilst memories are highly selective, retained because of what they mean to the person remembering, photographs manage to isolate moments and events from their continuous flow, but are unable to retain the meanings that these moments might have had for the people living them or witnessing them.

In *Camera Lucida*, Roland Barthes (1980) similarly argues that a more rigorous distinction must be made between photographs and personal memories. In fact, he argues that

a photograph is 'never, in essence, a memory' (p. 91) and these must therefore not be conflated. For Barthes, photographs are even so-called 'counter-memories', objects that may block the remembering of things. Yet, as I will discuss in more detail in the next section ('digital memory studies'), the capacity of technologies and media such as digital images to mediate memories from the past problematises any clear-cut distinctions made between memories and memory objects.

Given this tension between the different 'organising principles' (Kracauer, 1993) of memories and photographs, it is not surprising that those researching memory are critical of the ways photographs make the world appear.[18] Annette Kuhn (1995, 2000, 2007, 2010) has explored extensively the relationship between photographs and memories in a critical manner. In *Family Secrets,* for instance, Kuhn (1995) looks at photos from her past to investigate the gender politics of her family, seeking to reconcile her childhood with her adult life. In the book, Kuhn argues that the memories available to women through photographs may limit the construction of possible narratives for women in the present. As such, she investigates what bell hooks (1995) called 'the visual politics' of photographs and memories. Kuhn (2010) conceptualises these photographs as 'memory objects', objects that set the stage for various acts of remembering, material traces that might evoke or act as vehicles for remembering.

Echoing her notion of 'memory work', Kuhn's (1995) methodological approach constitutes casting a critical, reflexive eye on photographs and their evocative ability. Memory work sees memory not as something given or something inevitably arising from photographs, but rather as a dynamic act of coming to terms with one's past through scrutiny, negotiation, and reconstruction. Memories are always in flux and must therefore always be questioned, and negotiated. And when these memories are mediated through photographs, through 'memory objects', they take on added layers of complexity. Photographs, in this view, do not evoke a 'pure' memory of the event as much as they produce a variety of meanings in the present. Being interested in how photographs help make such meanings, Kuhn (2000, p. 183) suggests that:

> Every photograph contains a range of possible meanings, from those relating to cultural conventions of image production to those that have to do with the social

[18] Some scholarship has examined the role of photographs in the transmission of knowledge concerning traumatic events (Hirsch, 2008; Pickering and Keightley, 2012). Others have explored, for instance, how photographs may act as memorials or as modes to further political agendas (Sturken, 1999).

> and cultural contexts in which the image has been produced and is being used. I find that these meanings seldom yield themselves fully to a surface reading.

Critical memory work entails being aware of the multiplicity of meanings a photograph may produce. As such, photographs can be understood as 'restless images' that are always 'changing meaning and moving forward (Sturken, 1999, p. 194). Images help produce realities and are not just neutral conveyors of a person's memory of past events. Photographic images may give the impression that they are able to fix certain events, but they do not provide a 'pure' access to these events, and are instead able to shape memories of a certain person or event. Photographic images may be used as a means to repress the memory of someone (as in the Soviet censorship of political and military figures) and it can also be used to perpetuate and reify societal structures.

Echoing Turkle's (2007) point about the interconnection between objects and affect, it is important to note that photographs may not only produce a multiplicity of meanings, but can also be highly affective as vehicles for remembering. In his book *Camera Lucida*, Roland Barthes (1980) seeks to arrive at a definition of photography as a particular type of knowledge and perception. When discussing the more phenomenological approach to photographs, Barthes distinguishes between two ways photographs may affect people: 'studium' and 'punctum'. A person's general interest in photography, or their interest in the subject matter of a certain photograph, Barthes calls studium (p. 26). Studium is a somewhat disinterested, distanced, and familiar interest in the subject matter of the photographs. It is the 'very wide field of unconcerned desire, of various interest, of inconsequential taste' (Barthes, 1980, p. 27). According to Pickering and Keightley (2007, p. 277), Barthes' idea of studium operates on the level of 'regulated desire, anticipated pleasures, and relatively superficial modes of relating to an image.'

On the other hand, Barthes argues, photographs can pierce through the studium, people's general interest, and induce a highly subjective and affective response in the viewer. This affective response to certain photographs he calls the punctum: 'this element which rises from the scene, shoots out of if like an arrow, and pierces me' (p. 26). According to Hirsch (1997, p. 4), the punctum is an affective response which 'disturbs the flat and immobile surface of the image' and 'arrests and interrupts the contextual and therefore narrative reading of the photograph.' As such, pictures may involuntarily connect people to their past in affective ways,

engendering various emotional responses and attachments.[19] It is also worth adding that Barthes' (1980) notion of punctum accentuates the involuntary aspects of memory and the affective responses memory objects can have. According to David Bate (2010), Barthes' notion carries a certain resemblance to Proust's idea of 'involuntary memory.' That is, photographic images can involuntarily remind us or jog our memory of certain things in the past. As Bate argues, the affective potential of certain photographic images, as memory objects or as vehicles for remembering, can reside in their unpredictability, their involuntariness, their seeming randomness. Both Barthes' notion of punctum and Proust's idea of involuntary memory suggest that memory can be something profoundly external to us yet affectively powerful.

As Pickering and Keightley (2007, 2012) have explored in detail, photographs do not simply engender affective states, but also form part of people's practices in everyday life. In their article 'Technologies of memory', Keightley and Pickering (2014) examine the shift from analogue to digital photography, focusing on four key categories of photographic practices: photo-taking, photo-storing, photo-viewing, and photo-sharing. They argue that the shift from analogue to digital photography has implications for how photographs figure as 'mnemonic resource' (p. 576), as vehicles for remembering. However, the shift from analogue to digital, they argue, does not constitute a clear rupture, nor did it engender the emergence of entirely novel forms of photographic and memory practices. Instead, their data shows that photographic and memory practices 'manifest a fluid and ambivalent mix of change and continuity with various adaptations from analogue practice being made alongside accommodations to digital technology' (p. 581). As they also state earlier in the article:

> When we turn aside from thinking exclusively in terms of the technology, and look instead at how digital cameras and digital imagery are being adapted to existing patterns of remembering in everyday life, we see that, alongside changes that are being made to these patterns, there are clear signs of continuity in the ways people are adapting them to older modes of storage and retrieval, and older idioms of drawing on and relating to photographs in thinking and talking about the pasts that they share (p. 579).

[19] For how the dual notions of studium and punctum have been used as conceptual framework in qualitative research, see Pickering and Keightley (2007). In their work, Pickering and Keightley have also called for a reassessment of the relationship between studium and punctum, arguing instead for greater emphasis on the interdependence of both concepts (2007, p. 276-279) As they state, 'these twinned concepts should be reformulated in a constitutive relation of mutuality, for they can only exist alongside each other' (p. 277).

In the digital age, photography has taken on new meanings as well as providing new affordances. Yet, the role of digital images, especially in relation to algorithmic remembrance technologies such as Timehop, Facebook Memories, or Snapchat Memories, should not be considered to constitute entirely novel forms of memory practices. Rather, they draw on and have been adapted from already existing 'patterns of remembering in everyday life.' They form part of larger trajectories of usage. Developments within photography – for instance, images as 'memories' on Facebook Memories or Snapchat's Snap images (see Jurgenson, 2019) – should be seen as constituting 'an ambivalent mix of change and continuity', as both old and new, as both continuity and rupture.

That being said, photographs are also highly transferrable. They cannot be viewed as merely being the 'memory objects' of remembering individuals. Their meanings are produced intersubjectively and they are therefore necessarily replete with social meanings, comprising, reflecting, and reproducing social relations. As memory objects, photographic (or digital) images should be seen as having the potential to produce and reproduce what Pickering and Keightley (2012) called 'communities of memory'. Mediated through memory objects such as photographs, memories can become socio-cultural artifacts and its meanings transmitted across generations and social formations. It is these social dimensions of memory that will be discussed in the next section.

2.2.3 The Social Forms of Memory

In the previous sections, memory has been considered in relation to material objects such as photographic images but it has also been considered in relation to notions of identity and selfhood. Although memory can be conceptualised as intimate and personal, it is crucial to acknowledge the social and intersubjective aspects of memory. Within social studies and cultural studies, much has been written on memory as a fundamentally social or socio-cultural phenomena. Prefixes such as 'collective', 'public', 'cultural', and 'social' have been variously used to conceptualise the social dynamics of memory in society.[20] In *On Collective Memory*

[20] Marianne Hirsch (2008), for instance, has proposed the term 'postmemory' to examine a generation's relationship to a particular incident they have not directly lived through it (e.g. the descendants of Holocaust survivors). Aleida Assmann (2006) differentiated between four types of memory: 1) individual memory, 2) social memory, 3) political memory, and 4) cultural memory. Even though memory is differentiated (and has been further atomised) for the sake of analysis, in reality memory is the product of variously intersecting and overlapping factors.

([1952]1992) and the unfinished *The Collective Memory* ([1950]1980), Maurice Halbwachs sought to move the study of memory away from the philosophical, cognitive, and psychological approaches existing in the nineteenth and early twentieth century. These approaches saw the individual, both in terms of their embodiment and cognition, as the locus of memory. For Halbwachs, memory was rather a fundamentally relational and intersubjective phenomena. About the nature of memories, Halbwachs (1992, p. 38) states:

> There is no point in seeking where they are preserved in my brain or in some nook of my mind to which I alone have access: for they are recalled to me externally, and the groups of which I am a part at any time give me the means to reconstruct them, upon condition, to be sure, that I turn toward them and adopt, at least for the moment, their way of thinking.

Proposing a socially distributed notion of memory, what he called 'collective memory', Halbwachs emphasised the role of the 'group' for the production and maintenance of memories. These groups – family, friendships, interest groups, corporations, religious organisations – function as 'the instruments used by the collective memory to reconstruct an image of the past which is in accord, in each epoch, with the predominant thoughts of the society' (1992, p. 40). These groups, in other words, function as social frameworks in which memory can be instantiated and reproduced over time. In fact, Halbwachs (1992, p. 43) even argued that outside these frameworks no memory was possible. In this view, there is no memory without the social.

However, the notion of collective memory produced a tension for Halbwachs: *who* is then doing the actual remembering? In the book *The Collective Memory*, Halbwachs (1980, p. 48) suggested that 'while the collective memory endures and draws strength from its base in a coherent body of people, it is individuals as group members who remember.' For Halbwachs, then, one could argue that although the actual remembering is located in the individual, neither the individual nor the collective are ontologically preeminent. Instead, both form part of a remembering assemblage, where memory is spread out amongst individuals who are always already inhabiting social frameworks, groups, and interconnected networks. Halbwachs also stated that the concept of 'collective memory' should not be read as a denial or negation of 'individual' memory (if that distinction can be made), but rather it constituted an attempt to extend existing conceptions of memory beyond the limits of the individual human brain. In short, to emphasise the social conditions of memory and to think remembering as an always-

already, socially 'enframed' set of practices. This also highlights the importance of repetition for the production and maintenance of the social forms of memory, an idea which I will revisit in chapter five. For such memories to persist over time, they have to be continually enacted or engaged with (Brightenti, 2015). As other scholars have also pointed out, the repeated re-enactment of memories also helps to internalise them to such an extent that they become habitually encoded actions (Bourdieu, 1990; Connerton, 1989). Through such habitual actions, people remind themselves, consciously or unconsciously, of the shared histories of the communities in which they are embedded, which are in turn perpetuated in the present.

Although Halbwachs' notion of 'collective memory' sought to conceptualise memory as made possible and instantiated within social frameworks, renewed and perpetuated 'during the dull routines of everyday life' (Halbwachs, 1992, p. 25), his framework has been critiqued on a number of areas. For instance, Some scholars have noted that Halbwachs does not account for how memories can persist across multiple generations (e.g. Connerton, 1989; Assmann, 1995), whereas others have questioned whether or not Halbwachs' social 'frameworks' are to stable and well-delineated, proposing a more messy and dynamic understanding of social frameworks (e.g. Huyssen, 2003). With the rise of digital technologies, the very notion of '*collective* memory' has also been critiqued: Hoskins (2016b) prefers the term 'memory ecologies' whilst Garde-Hansen and Schwartz (2018) propose the notion 'iconomies of memory'.

Drawing on the work of Halbwachs, Jan Assmann (1995) seeks to examine the role of culture in relation to memory as well as how memory comes to be maintained and transmitted over long periods of time. Assmann (1995) makes the overarching distinction between 'communicative memory' and 'cultural memory'. 'Communicative memory' refers primarily to everyday actions, interactions, and communications between members of a group (1995, p. 126). The memories that form on the basis of these everyday (inter)actions are characterized predominantly by 'formlessness, wilfulness, and disorganization' (p. 127). 'Cultural memory', on the other hand, is more formalized and organised. It is the moment when 'a collective experience crystallizes, whose meaning, when touched upon, may suddenly become accessible again across millennia' (p. 126). Rather than being rooted in everyday lived experiences, such as collective memory would, cultural memory relates more to memories of events and persons from a past that exceeds living memory, but instead is 'characterized by its distance from the everyday, or its transcendence' (Whitehead, 2009, p. 132). In the age of digital technologies and algorithmic media, as chapters five and six explore in more depth, this well-defined

contrast between memories based on lived experience and material representations is problematised, as is the understanding of memory being necessarily instantiated within social frameworks, collectives, and groups. One reason for this is the increasing deep mediatisation of smart technologies in the fabric of everyday life, and another is that phenomena such as social media platforms problematise the whole notion of the 'social'.

Moreover, the mediation of memory through socio-cultural objects such as monuments or institutions such as museums plays a crucial role in Assmann's (2008) framework of 'cultural memory'. Assmann (2008, p. 110) argues that cultural memory is 'a kind of institution', meaning that it is 'exteriorized, objectified, and stored away in symbolic forms' and thus attains a sort of fixity which allows the memories to persist through time. As he suggests, 'in cultural formation, a collective experience crystallizes, whose meaning, when touched upon, may suddenly become accessible again across millennia' (Assmann, 1995, p. 126). As such, cultural memory can be crystallised and maintained through objects such as images and texts, institutions such as monuments and libraries, and practices such as rites and rituals. This is not to say that the meanings embedded in objects such as monuments remained fixed. Rather, Assmann (2008) suggests that cultural memory is a conduit for a multiplicity of readings and interpretations. Cultural memory, even though objects such as monuments may imply a semblance of fixity, is always in a state of flux; its meaning remains in a state of transition, a state of tension. It is always being interpreted and reinterpreted, appropriated and transformed according to the context in which it exists.

The importance of institutions and societal structures in mediating cultural memory further suggests that acts of remembering should not be viewed as neutral processes but rather as being politically underpinned. Memory can be instrumentalised in order to legitimate and perpetuate a certain socio-cultural or national identity over time. In *How Societies Remember*, Paul Connerton (1989) argues that 'it is surely the case that control of a society's memory largely conditions the hierarchy of power,' adding that the issues surrounding the storage of data in contemporary society, for example, has a direct bearing on 'legitimation, the question of control and ownership of information' (p. 1). This link between memory and power can also be seen in the ways forgetting has been variously employed in the forging of nation states and as well as shaping socio-cultural communities (Anderson, 1983; Brockmeier, 2002; Connerton, 2008, 2009; Kundera, 1996).[21] Collective memory (and collective forgetting), therefore, has

[21] See also Ian Hacking's (1995) work on the ways in which the psychological study of memory in the 19th century was used as a means to justify certain discriminatory beliefs, such as racism.

crucial implications for the legitimation and perpetuation of socio-cultural identities over time. This means that although we have the impression of remembering the past as individuals, we are simultaneously 'recalling the memories of a social community' (Brockmeier, 2002, p. 24). As such, the social forms of memory can be seen to be political in the sense that they may frame social interactions, create, and shape societal cohesion, and legitimate certain expressions of identity.

2.2.4 Archives

A particularly important institution for the preservation and transmission of both personal and cultural memory was the archive. The emergence of digital databases, social media platforms, smartphone galleries, and cloud-based services corroborate this need to think memory in relation to the archive (Beer and Burrows, 2013). Before the written language, memories were mostly transmitted orally but as people started retaining their stories in writing, the archive became an important socio-cultural institution. It allowed for the retention of the history and collective memory of different groups of people. The intimate link between archives and memory has led some to proclaim that 'without archives, memory falters' (Schwartz and Cook, 2002, p. 18).

The importance of archives for memory is also emphasised in Jacques Derrida's (1995) work. In *Archive Fever*, Derrida (1995) discusses the conceptual history of the archive, reflecting on its structures and implications for society. Drawing on the etymology of archive ('arkhe'), Derrida argues that the archive traditionally was grounded in two primary functions or principles: namely, the archive was the place of 'commencement' (the ontological principle) and the place of 'commandment' (the nomological principle) (p. 1). As a place of 'commencement', the archive is a place of origin, a place in which the history and knowledge of a society begins. The archiving of a people's history gave a sense of their continuity, laid the ground for a collective identity, and allowed for the public commemoration of events of individuals. It afforded the possibility of 'memorialization, of repetition, of reproduction, or of reimpression' (p. 14) and therefore the continual remembering and inculcation of certain memories along with the (systematic) exclusion of others. At the same time, the archive was a place of 'commandment', the place from which the law, authority, and social order were upheld and exercised. As such, the archive is that which both conserves and initiates.

Derrida states that the effectiveness and efficiency of archives depended upon the role of the *archons*, that is, the custodians that resided in the archives and were the so-called 'documents' guardians' (p. 10). They were responsible for not only the physical safety of the archive but also of acquiring, interpreting, classifying, and ordering that which was archived. The archons, Derrida suggests, were accorded 'hermeneutic right' to both 'state the law' as well as 'recall the law and call on or impose the law' (p. 10). These responsibilities were not only founded on certain intellectual or technical expertise, but also constituted political power. As Derrida argues:

> There is no political power without control of the archive, if not of memory. Effective democratization can always be measured by this essential criterion: the participation in and the access to the archive, its constitution, and its interpretation (p. 11n).

Political power, according to Derrida, was inextricably linked to who controlled the archive. Control of the archive meant control over the means by which things were captured, ordered, and regulated. With the archive, then, memory became more than a personal or socio-cultural quality; it was entangled with the archive's nomological principle, becoming a tool for political authority, power, and order. Of course, it is questionable whether one has ever been able to sever memory from politics, but with the archive this link became more increasingly overt. Still, the issue of archives and archons reminds us of the political dimensions that are expressed in how things are archived, interpreted, classified, unified, and ultimately executed as law. As such, memory is not only enframed within certain social frameworks, embedded within certain material objects. It is also mediated through the archive and the power of the 'archons'.

Unlike Derrida, Michel Foucault (1972) understands the archive in less spatialised and more abstract, linguistic terms. Foucault defines the archive as 'the general system of the formation and transformation of statements' (p. 130). Defining the archive in terms of the statement, Foucault emphasises the power of the archive to determine what can and cannot be said, describing the archive as 'the law of what can be said' (p. 129). According to Foucault, the meaning of what is archived or uttered is determined by the structural framework in which they exist. In other words, it follows that some sentences do not lend themselves to the underlying logic and form of some archival structures and therefore are rendered unsayable, meaningless (p. 129). Foucault argues that a particular system of archive defines the 'enunciability' (p. 129) of an archived object, which suggests that the archive is not only that

which archives, but also which determines what can or cannot be archive in the first place. The power of the archive, according to Foucault, resides in their ability to define and shape the parameters of the archivable or utterable.

This idea of archives defining the archivable is also echoed in Derrida (1995). As he states, 'the technical structure of the *archiving* archive also determines the structure of the *archivable* content in its very coming into existence' (p. 17; emphasis original). The archive therefore has a performative effect on the events being recorded. Derrida even argues that 'the archivization produces as much as it records the events' (p. 17). As such, both Foucault and Derrida emphasise the idea that archivable content is malleable and is modulated according to the particular logic or structure of the archiving archive.[22]

As archives moved into a digital context, their form and function have fundamentally shifted. The archive was decentralised and instead multiplied. The central role of the archive as centralised, institutional guardian of collective memory and history was rapidly replaced with widely disseminated digital devices such as mobile phones and computers that became personal, everyday archives of memory (Featherstone, 2006). As such, the archive in the digital age has 'extended its wall' (Featherstone, 2000), capturing everyday life in ways previously impossible. This has led scholars to conceptualise the archive as 'banal' (Parikka, 2012), 'affective' (Long et al., 2017), and 'everyday' (Osborne, 1999).[23] Even though the implications of archiving and memory in a digital context will be discussed further in the next section, it is worth reiterating, echoing both Derrida and Foucault, that the archive is not neutral but is wrapped up in questions of power. Moreover, both Derrida and Foucault argued that a shift in the archival structure necessitated a shift in the archivable content, since the archive defines and shapes the way the past is recorded, made retrievable, and thus legitimated.

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[22] This idea is also echoed in Arlette Farge's (2013) work on the connection between the archive and truth. Drawing on Foucault's notion of the archive, Farge states:

> The archive is a vantage point from which the symbolic and intellectual constructions of the past can be rearranged. It is a matrix that does not articulate 'the' truth, but rather produces, through recognition as much as through disorientation, the elements necessary to ground a discourse of truth telling that refuses to lie (pp. 96-97).

The archive becomes that which produces as much it facilitates the truth. The archive therefore should not be reduced to a political institution, but should be considered what Mike Featherstone (2006, p. 596) called 'a paradigmatic entity', a logic which constructs, arranges, rearranges, and legitimates conceptions of truth and representations of the past.

[23] Osborne (1999, p. 59) suggested that the archive in the digital age became a 'memory of everyday detail', capturing the mundane and insignificant as well as big milestones. This has had profound impact on how we understand the figure of 'the archon' and archontic power, especially in the context of social media platforms that curate people's personal data.

The question, then, becomes: What does this mean for memory and the remembering of the past? As David Beer (2020) points out, Derrida leaves it ambiguous whether he thinks memory changes in accordance with the restructuring of archival systems. Instead, he rather hints at the idea that this is likely to be the case. Derrida (1995, p. 16) suggest that although changes in archival systems do not necessarily denote a shift in the 'representative value' of memory, it does suggest the shift of 'an entirely different logic' of memory. It is therefore possible, according to Derrida, that a shift in how the past is documented, stored, and ordered, could mean a shift in how the past is remembered and understood. Mike Featherstone (2006, p. 594) argued that with the proliferation and decentralisation of the archive in the digital age, the archive constituted an 'active aspiration', that is, a place and 'a tool for reworking desires and memories.' Although he does not specifically examine whether or not memory is reconfigured by new archival systems, Derrida's ambiguity at least demonstrates his interest in how archival technologies may or may not shape individual and social memory (Beer, 2020).

One could therefore ask: with the proliferation of algorithmic systems on social media platforms, are we seeing a new logic of memory? A new way memory is represented, mediated, conceptualised, and even produced? The question of the changing nature of memory in the age of the algorithm will be further detailed and explored in the next section where I provide an overview of the digital memory studies literature, showcasing different ways in which the relationship between digital media and memory have been developed.

These focal points – self and identity, photography, the social forms of memory, and archives - have functioned as a reminder that memory is not merely an abstract concept but is always variously framed. Whether it be spatially, biographically, cognitively, or socio-culturally, memory is always embedded in various institutions and groups, upheld by archives or evoked through a performative engagement with 'memory objects' such as photographs. As these sections have also shown, remembering can be a conscious act and a result of involuntary reminders, it is an investigative approach, an ongoing, dynamic, and performative process – which produces the past as much as it recalls it. In the last section of this literature review, the attention turns to the ways memory and memory practices have been conceptualised within the so-called digital memory studies.

2.3 Digital Memory Studies

The previous section looked at different ways in which memory has been and continues to be conceptualised, mediated, and facilitated. It discussed media such as archives and photographic images that capture, order, and facilitate people's re-engagement with their mediated pasts. Similarly, the field often termed 'digital memory studies' (e.g. Hoskins, 2018) examines the ways in which memory and new media intersect in our contemporary media landscapes. This field of study, Andrew Hoskins (2018, p. i) states in the preface to the edited collection *Digital Memory Studies*, seeks to 'interrogate concepts, theories and histories of media and memory studies, to map a holistic vision for the study of the digital remaking of memory.' As such, the intersectional study of media and memory seeks to examine how memory practices are shaped in a digital context, how conceptions of the past may be changing, and that 'the act of recall, of recollection and of remembering is changing in itself' (Garde-Hansen et al., 2009, p. 1). In short, how memory and remembering are being shaped by emerging technological and digital systems.

As this section of the literature review will demonstrate, there has been much scholarship examining the relationship between memory and digital media in the past couple of decades. Yet, the intersections between memory and algorithms have remained a largely unexplored topic of research.[24] Given the proliferation of algorithmic systems in everyday life, this project seeks to examine the various ways in which algorithms can be seen to affect people's remembrance of the past as well as their memory practices in everyday life. This section of the literature review seeks to give a general overview of the studies that have been conducted in the area of media and memory. It also discusses some notable concepts that have emerged from it (e.g. mediated memories, dormant memories, dynamic archives, algorithmic memory) in order to better highlight how an in-depth study of the intersections of algorithms and memory can prove a fruitful addition. The following section looks closer at different conceptualisations of memories in a digital context.

2.3.1 From Digital Memories to Mediated Memories

Throughout the years, the field of digital memory studies has focused on various aspects of media and memory. Some of the early work in the field focused specifically on the emergence

[24] As I mentioned in the thesis introduction, notable exceptions are Prey and Smit (2019) and Pereira (2019). This will be discussed in greater detail in the last section of this chapter.

of Web 2.0 and how it enabled novel ways of documenting, engaging with, and sharing the past with others (Garde-Hansen et al., 2009). Other scholarship has also examined the ways in which digital media could shape people's relationship to forgetting (Blanchette and Johnson, 2002; Dodge and Kitchen, 2007; Mayer-Schönberger, 2009;), as well as how social memory can be seen, in a digital age, as fundamentally connective (van Dijck, 2010), globally distributed (Garde-Hansen, 2011)[25], and existing within the 'architectures of temporality' of network culture and social media platforms (Parikka, 2018).

One crucial issue, however, has been how to conceptualise the nature of people's memories in a digital context. In the early edited collection *Save as… Digital Memories,* Garde-Hansen et al. (2009, p. 4) proposed the notion of 'digital memories' as a way to conceptualise digital memory objects. Such digital memories could include:

> Online mementos, photographs taken with digital cameras or camera phones, memorial web pages, digital shrines, text messages, digital archives (institutional and personal), online museums, online condolence message boards, virtual candles, souvenirs and memorabilia traded on eBay, social networking an alumni websites of archival material, blogs, digital storytelling, passwords, computer games based on past wars, fan sites and digital scrapbooks.

This list was not meant to be exhaustive, the authors suggested, but was rather meant as a sort of umbrella term, emphasising the potential for heterogeneous digital objects to function as vehicles for people's remembrance of the past. Digital memories, in other words, 'deal with the past's relationship to the present through digital media technology' (p. 4). Digital memories, as we shall see with mediated memories as well below, not only referred to digital objects, but to embodied practices in everyday life as well. As Garde-Hansen et al. (2009, p. 7) state:

> Digital memory is, then, an enactment and engagement with difference and the use of digital media to remember is not about taking a passive approach to the passage of time, however fast it appears to be. Rather, it is the active, subjective, organic, emotional, virtual and uncertain production of the past and present at the same time.

[25] Garde-Hansen (2011, p. 46) argues that 'memories are now distributed globally and networked digitally even though they are personally and locally produced.'

The digitalisation of memory, then, denotes an active engagement with both the past (i.e. how the present is captured and the past remembered) as well as digital technologies (i.e. the tools used to document and engage with the digital past). Digital memory suggests active practices in everyday life, rather than 'a passive approach' to the digital past. Digital memory as a practice, or 'digital memory work' (echoing Kuhn's notion), is also well captured in more recent work dealing with how people actively engage with the past through smartphones (Hand, 2017; Özkul and Humphreys, 2015) and social media platforms such as Facebook (Humphreys, 2018).

The notion of digital memory is helpful in order to understand both the active memory practices it suggests as well as the sheer heterogeneity of digital objects that can act as vehicles for remembering. However, Garde-Hansen et al.'s (2009) view of mediation establishes a too clear-cut distinction between the analogue and the digital, the embodied and the technological.[26] Given the proliferation of algorithms in society, there is a need for a notion that better captures the ways in which algorithms, platforms, data, memories, and memory practices are inextricably interwoven in contemporary society. As a result, I will now turn to José van Dijck's (2007) notion of 'mediated memories'.

One of the important earlier nodes in the field of digital memory studies was José van Dijck's (2007) book *Mediated Memories in the Digital Age*. Similar to Garde-Hansen et al.'s (2009) understanding of 'digital memories', van Dijck (2009, p. 21) defined 'mediated memories' as 'the activities and objects we produce and appropriate by means of media technologies, for creating and re-creating a sense of past, present, and future of ourselves in relation to others'.[27] As such, the notion is understood in terms of, firstly, the affordances of media technologies to store, facilitate and ultimately shape people's memory objects; secondly, people's active practices and engagements with those memory objects; and thirdly, how mediated memories also mediate socio-cultural relationships. In other words, mediated memories

[26] Garde-Hansen et al. (2009, p. 11) argue that media function as 'an externalisation of inner processes, sensations, thoughts and memories', focusing in particular on the ways in which these memories can be digitally shared. However, viewing media simply in terms of the externalisation of inner processes creates a too pronounced dichotomy between what they call 'the organic and the inorganic' (p. 13), the inner and the outer, the embodied and the technological. As they argue, 'making memories remotely accessible, producing empathy at a distance… means that they are not only shared but are prosthetic. They become memories that are not built on first-hand experiences but still have powerful emotional effects' (p. 11). In my view, this notion of media technologies as producing 'prosthetic memories', not built from first-hand experiences, does not capture the extent to which current algorithmic systems, platforms, and smartphone features are intensely embedded in people's everyday lives.

[27] Andrew Hoskins (2009: 27) suggests that 'memory (individual and collective and their varying intersections) is 'mediated' in that how the past is and is not recorded, achieved, accessed, retrieved and represented is entangled with the nature, forms and control of the technologies, media and institutions of the day'.

suggests how the socio-material conditions of memory practices and how the past is conceived is facilitated and shaped by technologies and larger digital infrastructures. Van Dijck also uses the notion as a conceptual tool through which 'we can understand larger transformation currently at work in our culture' (p. xiii). Indeed, van Dijck (2007, p. 21) argues that 'mediated memory objects and acts are crucial sites for negotiating the relationship between self and culture at large, between what counts as private and what as public, and how individuality relates to collectivity.' This research project also seeks to use 'mediated memories' as conceptual tool in order to examine in more detail the larger algorithmic transformation of society.

As was mentioned in the thesis introduction, van Dijck's notion problematises the dichotomy between organic and inorganic, analogue and digital, embodied and technological, in favour of a more entangled conceptualisation. Given the importance of this sentiment, it is worth quoting again at length:

> Mediated memories… can be located neither strictly in the brain nor wholly outside in (material) culture but exist in both concurrently, for they are manifestations of a complex interaction between brain, material objects, and the cultural matrix from which they arise (van Dijck, 2007, p. 28).

Mediated memories, then, are not simply prothesis of the mind, technological copies of a more original embodied thing. As van Dijck (2009, p. 158) argues in the paper 'Mediated Memories as Amalgamations': 'It is at the nexus of mind, technology, and perceptual and semiotic habits that mediated memories are shaped.'[28] These factors are in a constant state of interaction and constitutive mutuality. In my view, this conceptualisation of mediated memories as amalgamations better captures the ways in which current algorithmic systems are 'intensely embedded' (Couldry and Hepp, 2017) in people's everyday lives. The notion highlights the entanglement of technologies, users, people's sense of self, as well as the objects created through the technologies. Moreover, it problematises any clear distinctions between technology, data, embodiment, cognition, and sociality since these are inextricably interdependent and in constant interaction. The notion of mediated memories, within this framework of entanglement and amalgamations, also signals that the parameters and conditions of what

[28] This same idea is echoed in van Dijck's (2010) paper 'Flickr and the culture of connectivity', where she discusses the idea of connectivity in particular,

> The dynamic of connection constitutes memory's very condition. Therefore, any memorizing activity takes place in the current flow of contacts between people and machines and cannot be the result of *either* an individual *or* collective reminiscence (2010, p. 404).

constitutes ‘memory,’ ‘memory practices,’ and ‘remembering’ do not remain fixed. Rather, these can be shaped and re-ontologised by algorithmic technologies.[29]

2.3.2 The Metaphor of Dormancy

Another conceptual node which that emerged in the field digital memory studies, especially in its early days, was the metaphor of dormancy in relation to mediated memories and data. Writing at the time when social networking sites started to emerge, Kathleen Richardson and Sue Hessey (2009, p. 25) argued that platforms such as Facebook functioned as ‘a dormant archive of relationships that would have dissipated without these technologies.’ In their view, Facebook affords users to accumulate ‘friends’ over time, giving them the option to connect or reconnect with them at any future point. However, Richardson and Hessey observe, their participants did not interact with most of these ‘friends’ most of the time. Most friendships remain simply a numerical addition to the accumulated friendships list, and although they were called ‘friendships’ they were not actualised as such. These friendships, Richardson and Hessey argue, can therefore be seen to be ‘dormant’, that is, inactive and passive nodes of social connectivity. As such, in their view, Facebook figured as a ‘dormant archive’. It makes possible social connections that would not have been possible otherwise through the material conditions of the platform itself, which is comprised mostly of ‘friendships’ and potential social relations that are not actualised as such.

This idea of dormancy is also echoed in Joanne Garde-Hansen’s (2011) book *Media and Memory* in relation to the idea of ‘dormant memories’. In it, Garde-Hansen points out that:

> My Facebook page is awash with unremarkable images of conventionality: new babies, weddings, beloved pets, children on the beach, families skiing, gatherings, nights out, concerts, gardens, home improvements and hobbies. The vast majority I am not in... They are 'dormant memories' (p. 136).

Social media platforms afford the continuous accumulation of so-called ‘unremarkable images of conventionality,’ data traces that lie dormant in the storehouse of the platform. These digital

[29] Further on this idea, Andrew Hoskins (2016b, p. 18) states that one of the advantages of seeing mediated memories as fundamentally entangled is that this view resists ‘the traditional way of seeing memory as discrete entities or phenomena’, especially with regards to discrete and contained entities such as ‘the body’, ‘the brain’, ‘the social’, and so on. The understanding of mediated memories as entangled is premised on memory as constituted through ‘emergence, enfoldings, and interactions’ (p. 18), as well as through ‘an ongoing dynamic trajectory of hyperconnections rather than being merely residual (in brains, bodies, media)’ (p. 18).

artifacts represent not much more than a bundle of disjointed and unrelated memories, mediated memories that lie dormant. That is, they lie inactive until they are revived by the user re-engaging with their digital traces. Social media platforms, in other words, afford what Geoffrey Bowker (2008) called 'potential memory,' the potential status of some data as memories 'should the need ever arise' for them to become such (p. 30). As such, dormant memories do not only suggest the social relations underpinning these but also the digital objects themselves and their dormant mnemonic potential that lie hidden, dormant.

A third understanding of this notion of 'dormant memories' can be seen in Andrew Hoskins's (2010) blog entry titled 'The Diffusion of Media/Memory.' Discussing the nature of social media platforms, which were in their infancy, Hoskins argued that 'Social networking sites facilitate a continuous, accumulating, dormant memory, with ongoing potential to transform past relations through the re-activation of latent and semi-latent connections.' Hoskins similarly comments on the accumulative effect of social media platforms, continuously mining and storing people's data. He writes about the continuous accumulation of digital traces as well as the social relations underpinning these. Yet, Hoskins also acknowledges the 'ongoing potential' of these past relations being 're-activated' in the present. Social networking sites, accumulating people's data, afford users the potential to reactivate latent and semi-latent connections in the present and not just the mediated memory objects themselves. This means that although dormant memories suggests a passive approach to memory, their persistence through time, their continuous accumulation, and their always-being-there on the platform, gives users the potential to revive and reactive both past (and not so past) social relations as well as the digital memory objects themselves.

As such, dormancy highlighted the archival potentialities of social media platforms, especially around the time of their inception and proliferation. It highlighted the ways in which users were able to upload, post, and share on these platforms, which stored and accumulated these data traces for an indefinite amount of time. Yet, as social media platforms have developed and their data tracking techniques and algorithmic underpinnings have become increasingly sophisticated, the conception of them as storehouses for people's dormant memories has also shifted. Naturally, the idea of 'dormant memories' may seem a little outdated now.[30] In fact, as I will discuss in the next section, the nature and function of the

[30] Another issue with this notion of 'dormant memories' is that it is not an adequate metaphor for understanding potential differences between storing mediated memories digitally or on analogue devices such as photo albums. If dormant memories are understood as essentially stored and accumulated memories that lie dormant until users re-engage with them, then this would also apply to devices such as diaries, shoeboxes, and photo albums as well.

digital archive has shifted in the last few years, after becoming increasingly algorithmic. Yet, the reason this concept figures in this literature review is because, I argue, the exact opposite trend can be seen emerging on newer algorithmic remembrance technologies such as Facebook Memories, Google Photos, or Apple Memories. Applying various algorithmic processes such as machine learning and pattern recognition, these features do not only store people's digital memory traces on their database, but they actively pull out these digital memory traces, resurfacing and reminding users of them in the present. Instead of simply lying dormant within the database of the social media platform, mediated memories have become *lively*, being variously resurfaced and vitalised by algorithmic processes. The digital archive, in other words, has become more dynamic.

2.3.3 Dynamic Archives

As the last section pointed out, the notion of social media platforms as dormant archives may have been an apt description when they were in their infancy, but it does not account for the ways social media platforms have developed and how contemporary digital archives have become increasingly dynamic. Throughout the years, there have been several studies into the effects of digital archiving on memory, and how the changing nature of the digital archive shapes how memory is perceived and instantiated (Blom et al., 2015; Ernst, 2013; Garde-Hansen, 2009). David Beer (2018, p. 20), for instance, states that we need to focus on the ways in which different archival structures such as social media platforms fashion and shape our memory-making practices as well as how they shape 'our memories and the information we have available and retrievable to us.' Considerations of how the digital archive is shaping memory, according to Beer, must emphasise issues such as classification, categorisation, retrievability and the powers of inference and prediction. Akin to Derrida's 'archive fever', Andrew Hoskins (2016a), for instance, states that the ubiquity of memory devices in contemporary society has engendered an 'archive me!', where everything in the present can be digitally archived, where archiving is seen as desirable. It refers to a sort of envisioned total memory, and the self's curatorial control is promised. Such issues and such notions indicate a move away from considering platforms as dormant digital archives, merely hosting or storing people's digital memory traces, which await re-engagement and re-activation.

As such, the concept does not effectively describe the ways in which the digital archiving of memories is different from other means of storing and accumulation.

In an article discussing the inherent time properties within technological media and how these might affect human perception and memory making, Wolfgang Ernst (2018) argues that the nature of the archive fundamentally changed when it went digital. In one sense, 'digital communication is a system that is permanently *archiving presence*' (p. 144; emphasis original), that is, there is no longer any delay between memory and the present, as digital archives afford the immediate archiving of the present. More importantly, however, Ernst stated that the digital archive is increasingly characterised by what he calls 'algorithmic dynamics':

> While the traditional function of the archive is to document an event that took place at one time and one place, the emphasis in the digital archive shifts to re-generation, (co-)produced by the online users for their own needs. There is still an archive, in Immanuel Kant's and Michel Foucault's sense: the condition for the possibility of the memory performance to take place at all. The real multi-media archive is the *arche* of its source codes, but in a different form of existence: *algorithmic dynamics instead of documentary stills* (p. 148; emphasis added).

What does Ernst mean by this notion of 'algorithmic dynamics'? what are its implications for our understanding of the archive and its functionality? He continues:

> The contemporary digital archive is indeed marked by algorithmic dynamics, but not in the sense of online user co-production: Instead of a creative process of 'pulling' memories out of the archive, the digital archive is 'pushing' digital memories, afforded by algorithmic dynamics (p. 148).

As Ernst points out, the digital archive is being reconfigured, characterised by an algorithmic dynamics, which affects how people interact with the archive and the content that has been archived. On one level, the digital archive has made it possible for users to creatively engage with archived data, providing the condition of possibilities for engaging with one's mediated memories. Users are able to easily pull data from the digital archive, to enjoy them, to reflect on them, to engage with their personal and symbolic texture, and to share these with others. Yet, with the emergence of algorithmically dynamic archives, digital archives are able to 'push' mediated memories (p. 148). In other words, it therefore becomes important to examine remembering as an act of non-human actors as well as human.

Ernst's suggestion regarding contemporary digital or computational archives can be seen to, again, problematise the notion that social networking sites simply facilitate 'dormant'

memories. Ernst proposes a notion that sees archives as inherently dynamic, its affordances going beyond the capacity to just store and make data retrievable for human consumption. As a result of their underlying algorithmic dynamics, social media platforms have started increasingly pushing the data that previously was predominantly 'pulled' by users. Although Ernst's notion of algorithmically dynamic archives implies a connection between mediated memories and algorithms, it focused mainly on shifts in the ways in which things are digitally stored. He proposes the notion not so much to demonstrate how algorithms may mediate and affect people's personal memories as to highlight the nuanced developments in contemporary storage technologies. This project draws on and transposes Ernst's observation that archives are capable of 'pushing' data instead of merely allowing data to be 'pulled'. It seeks to examine empirically how the algorithmic dynamics of contemporary memory features are enacted and instantiated in people's everyday lives. As David Beer (2020) stated, conceptualising social media platforms as a form of archival media:

> The form that these archival social media take, produces and shapes the events that they capture and the way that people understand, respond and memorialise those events. Knowledge and memory are changed as the archival structures within which we live change.

Digital archives are not simply a matter of storing, ordering, and managing digital data. They do not merely afford the pull out of data and information. They have become dynamic in their interaction with their outside world, with those that use them. And as the digital archive and their underlying algorithmic makeup change, they constitute changes in the way memory is stored and perceived as well as how remembering is instantiated in everyday life. The dynamic archives described by Wolfgang Ernst, indicate a turn towards pushing information outwards as well as the affordance of information to be extracted.

2.3.4 Social (Media) Memory

Another salient issue has been how to conceptualise social or collective memory in a changing media landscape. Some have focused on the way digital media are dynamic rather than static sites of social remembering in contemporary society, paying specific attention to the 'media frameworks' through which memory becomes collective (Erll and Rigney, 2009). Others have focused on issues such as the effects of the increasing convergence of museum and online spaces for social memory (Worcman and Garde-Hansen, 2016), whereas others have focused

on the ways social memory figures in the contemporary network economy (Terranova, 2017) and how in the digital age it is increasingly reduced to the production and mining of data.[31] The majority of these studies contend with Maurice Halbwachs' notion that memory exists inescapably within social frameworks, yet we also need to attend to the digital conditions in which contemporary social memory exists. Some have argued that we need to re-conceptualise our notions of 'social' and 'collective' memory, given the prevalence of digital media and social media platforms. José van Dijck (2010, p. 403), for instance, critiqued Halbwachs' idea of 'collective memory', stating that the notion of the collective was conceptualised solely in anthropomorphic terms. Moreover, Andrew Hoskins argues that Halbwachs' notion of 'collective memory' does not account for, unsurprisingly, the digital environments in which memory takes place. As such, he argues that we need to examine 'memory ecologies' instead, i.e. external factors that facilitate individual and collective memory (Hoskins, 2016). Elsewhere, Hoskins (2018) applies Paulo Virno's notion of 'the multitude' in order to argue for the end of collective memory and move beyond Halbwachs. These studies also indicate that we need to approach mediated memories in terms of both the changing conceptions of the social and the platform logics and algorithmic processes on which they are predicated.

In *If…Then: Algorithmic Power and Politics*, Taina Bucher (2018) touches on some of the ways social media platforms and algorithms may affect people's personal and collective memories. Bucher states that Facebook provides several tools and techniques dedicated to supporting memory in order to simulate and augment the notion of a shared history, (p. 5). Some of these techniques include being encouraged to celebrate when one became friends with someone else, more 'intimate' friendversaries, celebrating x number of likes or pictures shared with someone else, and celebrating or remembering some historical event. As seen here, social memory emerges not simply as the shared communicative practices of groups of people. In other words, it does not merely indicate a coming-together, routinised acts of commemoration and collective celebration. Rather, social (media) memory emerges as constructed, as fundamentally programmed. As José van Dijck (2010, p. 401) argued, collective memory on social media platforms is 'largely the result of data linked up by means of computer code and institutional protocols.'

Although Bucher touches on the idea of social memory being facilitated and shaped by various social media tools and techniques, she does not go further in her analysis of how social

[31] See also Neiger et al.'s (2011) edited collection *On Media Memory: Collective Memory in a New Media Age* for a more comprehensive, if somewhat dated, overview how digital media facilitate and shape collective memory.

memory is being shaped. She does, however, argue for a reconceptualisation of the 'social' given the increasing use of algorithms of social media platforms. Bucher proposes the notion of 'programmed sociality' as a way to highlight the ways in which users and relations are highly networked and connected, overlapped, and circulated. Whereas Halbwachs' understanding of memory as collective was based on purely anthropomorphic terms, Bucher's notion brings to the forefront the architectural structure on which any notion of digital sociality and social memory is based. As she states:

> To be concerned with programmed sociality is to be interested in how actors are articulated in and through computational means of assembling and organizing, which always already embody certain norms and values about the social world (2018, p. 4).

When defining the notion of 'programmed', Bucher draws on the language of computer science, in which programming refers to that which 'organises' and 'assembles' (p. 4). To program is to organise and assemble data into a manageable and functional structure, to impose a structure onto the data which makes it intelligible and useful. Programming is, in short, that which 'frames software and algorithms as dynamic and performative rather than as fixed and static entities' (p. 4). Bucher's notion sensitises us to the processes through which sociality and online participation are algorithmically conditioned, showcasing how social formations are shaped to fit the specific logics of social media platforms (p. 7). For example, she shows how friendships are embedded and shaped by the structural makeup of Facebook: 'friendships' on Facebook are algorithmically measured according to criteria such as affinity and activity which in turn determines how visible someone's post will be in relation to someone else. This means that what can be seen and who one comes into contact with is not a matter of fate or random selection. These relationships are no longer dormant or passive (as we saw in the previous section). Rather, Facebook 'friendships' constitute a highly calculated and algorithmically-measured social space. As such, programmed sociality is also a politically infused term: 'political in the sense that it is ordered, governed, and shaped in and through software and algorithms' (p. 8).

In other words, social relations on social media platforms emerge as algorithmically conditioned and programmed. It is not unfeasible, then, to apply the same logic to the ways people engage with their own mediated memories and those of others. The tools and techniques that each social media platform uses to facilitate people's remembrance of things operate

according to the logic of that particular platform. Each social media platform, in turn, operates according to its own logic of what participation should look like, and possesses therefore criteria to enforce or, more accurately, nudge this vision onto its users. We therefore need a thorough investigation of how the logics of platforms, and contemporary memory technologies in general, affect memory and memory-making practices in everyday life. In the next section, I will give an overview of the narrow yet emerging field of studies, examining how algorithms may affect memory.

2.3.5 Towards Intersections of Algorithms and Memory

Having outlined some of the conceptual nodes that examine the digitisation of memory, we now move towards the under-researched field of algorithms and memory. As of yet, there have been but a few studies in this area and these have varied greatly in both scope and aims. This fact also speaks to ways in which the relationship between algorithms and memory have been variously conceptualised and understood. A study into the intersections of algorithms and memory, therefore, is also simultaneously a window into different sculpting exercises. That is, given the fact the area is under-researched, it is marked by a need to conceptualise and justify what indeed *counts* as an intersection of algorithms and memory. As I will show in this section, the few studies that have already been conducted in this area construe and operationalise these intersections in heterogeneous ways.

Lambert et al. (2016), for instance, investigated the effects of algorithmically curated memorial videos within the context of grief, mourning and commemoration. Specifically, they pay attention to controversial moments where the algorithmic curations of depictions of the deceased can be seen to have a negative impact on audiences. The paper concludes by asking, amongst others, 'how can death-sensitive algorithms be designed and offered on large scales?' (p. 13). On one level, this question beckons a deeper question: *can* algorithms ever be death-sensitive? On another level, the question posed by Lambert et al. (2016) is a helpful reminder that algorithmic mediations of people's memories are permeated by affect and meaning. Applied to other intersections of algorithms and memory, the question invites other questions such as: how do algorithms 'know' what mediated memories people want to encounter? How do they 'know' what counts as a mediated memory? These questions are indeed in need of further exploring.

Other studies have gone further and proposed notions such as 'algorithmic memory' and 'algorithmic memory making'. Elana Esposito's (2017) work is exemplary of this. Esposito explores the different ways humans and algorithms process information, stating that algorithms cannot 'remember' or 'forget' in the same way humans can, because they simply work with and work on data, and in turn utilise and exploit the meanings bestowed on memory and forgetting by human actors. As Esposito (2017, p. 6) suggests, 'Abstracting is actually remembering *and* forgetting. Algorithms do not abstract, they merely calculate. They do not properly remember and do not properly forget' (original emphasis). The idea of algorithmic memory, as such, is not mainly a reference to the specific encounters between human memory practices and algorithms. Rather, it signals both the distinction between different forms of information/data processing (human and nonhuman), but also the distinctiveness of algorithms in storing and processing people's data or mediated memories. Algorithmic memory is therefore a reference to the sort of 'memory work' specifically performed by algorithms: calculated, classifying, and productive.

However, Esposito argues that algorithms, because they work (semi)autonomously, provide the possibility of large-scale forgetting in humans. Drawing on Harald Weinrich's work on forgetting, Esposito moves from the technical and conceptual specificities of algorithms to their potential impact on people's remembering in everyday life. She suggests that 'hindering remembering is not enough to produce forgetting', but 'in order to reinforce forgetting you should rather multiply the range of available memories' (Esposito, 2017, p. 6). The implication is that 'if you increase memories, every piece of information is lost in the mass and becomes difficult to find,' concluding that 'in fact it is lost as if it were forgotten' (p. 6). The argument put forward by Esposito centres around this notion of forgetting as induced by the deluge of data continually processed by algorithms, and the ways this development can be seen to have political implications. Esposito's work seeks to develop a notion of 'algorithmic memory' through the lens of forgetting or digitally induced forgetting. This relationship between algorithms and forgetting can also be understood in terms of selectivity. For instance, elsewhere I have argued that Facebook's throwback feature 'Year in Review' has incorporated algorithms which seek to identify and filter 'unwanted memories' from reappearing on people's timeline, arguing that through these digitally 'sculpted voids' Facebook's politics of forgetting becomes salient (see Jacobsen, 2020b). However, there is still a need to develop an understanding of what it means to actually *remember* with algorithms, how algorithms can be seen to affect people's remembrance of the past in their everyday lives.

Recently, there have been some studies into the sort of 'memory work' done by algorithmic features such as Facebook Memories and Apple Memories. In their work on Facebook's throwback feature 'Memories', Prey and Smit (2019) argue that the focus needs to shift from mediated memories as personal digital objects to mediated memories as algorithmmically personalised by the feature. Drawing on Bernard Stiegler's work, Prey and Smit conceptualise Facebook Memories as a 'mnemotechnology', that is, a system built 'around and through the organizing of our memories' (p. 210) or 'a technology that systematically orders memories' (p. 212). Very much like Derrida's archons, Prey and Smit emphasise the ordering power of memory features such as Facebook Memories. They argue that through the organisation of people's memories, new information is generated about them (p. 212), echoing Derrida's contention that the archiving archive shapes that which is being archived. The archivable content, for Derrida, is ordered and shaped according to the internal logics of the archive. As Prey and Smit (2019) state, 'Memories on Facebook are exteriorized within a particular technological system which organizes memory according to its own logic' (p. 213). A crucial aspect of the logics of Facebook Memories, according to Prey and Smit, is the way the feature seeks to personalise memories 'through the interlinked processes of user experience research, machine learning, and user input' (p. 213).[32] Prey and Smit's work is useful for seeing how mediated memories are shaped according to the logics of the feature ordering and processing them. Similarly, this project will seek to investigate the specific logics of other memory features, that is, examining what are their functionalities, aims, and affordances.

This project will not, however, utilise the conceptual framework of 'mnemotechnologies' as have Prey and Smit. Referring back to Stiegler's definition, the concept is somewhat deterministic and its undertones are too oppressive. As Stiegler states, mnemotechnologies refer to 'service industries which can network them [memories], control them, formalize, model them, and perhaps destroy them' (Stiegler cited in Prey and Smit, 2019, p. 212). Instead, this project will seek to explore how algorithmic memory features cannot be considered solely through a lens of control, formalisation, and destruction. Instead, drawing on the algorithm studies literature, we need to acknowledge the affective and productive effects of algorithmic systems and of these memory features. This project will explore how memory features may produce a multiplicity of affective encounters with users, affects such as meaningful, nostalgic, odd, creepy, funny, and so on. There is therefore a need for a conceptual framework that is

[32] They also argue that the personalisation of memories is also an attempt by the platform to improve their 'stickiness', to seem more 'intimate' to users and to become more desirable (p. 214).

more nuanced than ‘mnemotechnologies’, one which accounts for both the programmed logics of the memory feature and how these are utilised and experienced by people in everyday life.

Finally, there has also been work examining Apple’s in-built photos application ‘Memories’ (Jacobsen, 2020a; Pereira, 2019). In a conference paper titled ‘Apple Memories and Automated Memory-Making’, Gabriel Pereira (2019) explores the role of Apple Memories in the way memories are algorithmically generated and circulated. Attending to both Apple’s marketing speak as well as their chip-engineering, Pereira argues that memory-making is increasingly mediatised and automated in the age of the algorithm, embedded within a logic of prediction. As he concludes:

> Our memory is not a computer, and memory-making is more than information processing. As applications promise to cut through the clutter of our big data, the politics of these systems need to be carefully analyzed in the imaginary they present and how they physically materialize them.

Posing a fundamental distinction between how humans and algorithms remember, Pereira calls for an investigation into the politics of how memory applications are being made, how they are being rhetorically and commercially presented, and they are physically materialised. This project will seek to respond to this call, examining the politics and imaginaries of memory features and how algorithms can be seen to affect and shape people’s memory making practices in everyday life. Yet, there is still scope to examine how applications such as Apple Memories are actually utilised and experienced by people in everyday life. Such examinations into the everyday use of memory features will also highlight how people can be seen to remember *with* algorithms, potentially disrupting or problematising the fundamental distinction between human and algorithmic remembering.

2.4 Conclusion: Research Questions and Identifying the Gaps in the Literature

The intersections of digital media and memory attest to the dual fact that people have always used ‘media’ of various kinds to facilitate and make possible their remembrance of the past and that the presence of media has been greatly proliferated in contemporary society. As we have also seen in this chapter, remembering must be understood as an active and performative engagement with one’s digital memory traces, one’s mediated memories. Memory and remembering are not contained in the individual nor the ‘social’; neither is it contained in the

technologies themselves. Examining the intersections of algorithms and memory should not be restricted to people's performative enactments and engagements with their data past nor should it be understood solely through the prism of the technologies themselves. In other words, it means that neither humans nor algorithms can be ontologically prioritised, but rather these must be conceptualised and studied in relation to each other, as coming to matter in particular situations at particular times.

As this chapter has also shown, there is not much research dedicated to the ways algorithms mediate memory. This project is guided by two overarching research questions: firstly, to what extent and in what ways do algorithms affect people's remembering of the past? And secondly, what are the various (social) implications of algorithms mediating people's memories? The project also identifies two main gaps in the literature or two main areas which are in need of more research: 1) an investigation into and a scoping of the algorithmic technologies themselves, and 2) a study into how people use, experience, and negotiate these technologies and their resurfacing memories. As I highlight below, each of these questions contain a plethora of sub questions that need attending to and investigating. I will outline a few here.

In the context of the algorithmic technologies which mediate people's mediated memories, there is a need for:

- A comprehensive overview or scoping, which outlines the emergence and presence of algorithmic systems mediating memory in our current mediascape[33]
- An examination of the functionalities and affordances of these systems, i.e. the role of techniques such as classification, computer vision, pattern recognition, neural networks, feedback loops, and so on.
- An examination of how these algorithmic systems are rhetorically and programmatically 'imagined' by tech companies, i.e. how they are described, what they promise users, what are some their underlying assumptions about the world, users, memory, and so on.[34]

[33] As the following chapters will show, these technologies comprise a heterogeneity in the form of social media platform features, smartphone features, standalone apps, cloud-based photo storage and sharing services, and so on.

[34] For instance, Van House and Churchill (2008, p. 297) observe that 'explicit and tacit models of social and personal memory are 'baked into' the design of these technologies', arguing that 'these design decisions then play a part in how memory is constructed and enacted'. These explicit and tacit models of conceptions of memory need interrogating.

The project will seek to answer these questions in the first analysis chapter titled 'The Landscape of Algorithmic Remembrance Technologies'. The chapter both conceptualises what is meant by the notion of 'algorithmic remembrance technologies' as well as outlining some of their key characteristics. Seeking to answering these questions will also help to answer a more fundamental and abstract set of questions, that is: how, when, and why is past data repackaged as mediated memories and what are its effects? This will be further elucidated in the thesis conclusion.

Secondly, it is crucial that they examine people's affective encounters with their data past and algorithmic remembrance technologies. In this context, there is a need for:

- A study into people's lived experiences with algorithms in relation to these technologies, i.e. we need to ask:
    - How do people experience these technologies?
    - How do people use these features in their everyday life?
    - How do people negotiate and make sense of the mediated memories they are encountered with through their resurfacing?
    - What sort of impact do these technologies have on users and their remembrance of the past?
    - What sort of impact do these technologies have on people's 'working on the present' (Bowker, 2008)? In other words, how are these technologies affecting people's memory practices in the present and their present behavioural patterns?

Pursuing these questions will help move the analysis towards a more nuanced and detailed understanding of people's lived experiences of algorithms and also how algorithms affect people's remembrance of the past. These questions will be approached in further detail in chapters 5 and 6. Chapter 5 will discuss how people variously use algorithmic remembrance technologies in everyday life, whilst chapter 6 will discuss how these technologies can be seen to affect and shape people's perception and approach to the past.

These various questions warrant a mix of methods, a mixed-methods approach (archival research and interviews – both qualitative and focus groups). In the next chapter, titled 'Methodology', I will first argue for the reasons for using a mix-methods approach, and then outline the specific methods used in collecting data for this project.

3.0 Methodology

3.1 Introduction: A Mixed-Methods Approach

This research project examines the ways in which algorithms can be seen to affect and shape people's remembrance of the past and their everyday memory practices. Through engaging with the research questions proposed in the introduction, the aim is to better understand what it means to remember with algorithms in everyday life. In order to do this, I utilise a mixed-methods approach. The methods comprise:

- The scoping and analysis of 15 algorithmic remembrance technologies (listed below) and the discourses surrounding them
- The analysis of 26 in-depth, semi-structured interviews
- The analysis of four focus groups
- The analysis of one in-depth, semi-structured interview with a tech expert

The chapter discusses these methods in two sections, titled 'Scoping Algorithmic Remembrance Technologies' and 'Doing Interviews'.

In order to better understand how algorithms and memory can be seen to intersect in everyday life, it was crucial to gain a deeper understanding of, firstly, the systems, apps, and platforms that mediate memory practices. The scoping of what I will call 'algorithmic remembrance technologies' sought to establish what technologies exist in the contemporary media landscape as well as outlining their key characteristics. Interviews with tech experts similarly sought to add nuance to the understanding of these technologies as well as providing insights into the ways these technologies are imagined and programmed, how users are figured, and how memory is conceptualised. As interviews with tech experts were dependent on access, I therefore did not expect many of these interviews. Nonetheless, I managed to get an interview with the head developer and co-founder of the popular memory app, Timehop. The interview with the Timehop cofounder provided an additional and fruitful entry point into investigating the power and politics of algorithms and algorithmic systems on the way memory is mediated in everyday life.

Furthermore, the thesis seeks to investigate varying levels of engagement with platforms and apps. This provides a more comprehensive and more holistic understanding of how algorithmic remembrance technologies are experienced, used, and negotiated. As a result, two

different qualitative methods – in-depth interviews and focus groups – were used for the project (Bryman, 2012; Seidman, 1991; Rubin and Rubin, 2005).[35] This was decided in order to procure data that explored people's lived encounters, affects, and experiences with using these memory technologies. As this chapter will show, algorithmic remembrance technologies comprise both standalone apps and features that have been integrated into platforms. This necessarily affects how people use and experience the algorithmic mediation of memory online. For instance, apps such as Timehop are specifically designed with the sole purpose to resurface past data as 'memories' in the present, which means that people must opt in and continually engage with it. In this case, the assumption was that the use of Timehop, for instance, would be more routine, more voluntary, more active. Facebook Memories, on the other hand, is an integral features of the social media platform and cannot be fully disabled by users. It was therefore assumed that encountering resurfaced data as memories on Facebook would constitute a more incidental yet crucial part of the platform experience. Given the disparate nature of algorithmic remembrance technologies, this project showcases how people experience the algorithmic mediation of their past data differently based on what features or apps they use or are exposed to.

Therefore, the methods I have employed sought to capture the different ways algorithmic remembrance technologies are used and experienced in everyday life. That is, to provide insights into how people both intentionally use memory features as well as how they are exposed to resurfacing memories as a 'by product' of their social media usage. The rationale for using mixed methods was in order to try and capture the diverse ways in which people experience, negotiate, and engage with algorithmic remembrance technologies and the 'memories' they routinely resurface.

In-depth, semi-structured interviews have been widely used to examine people's memory practices and remembering of the past (e.g. Lawler, 2008; Keightley and Pickering, 2012, 2014). It is also worth mentioning that I used semi-structured interviews as a way gain a better understanding of why algorithmic remembrance technologies are used and how they are perceived by users. Moreover, interviews were used to examine how the use of algorithmic

[35] There have been various studies conducted into the ways algorithms can be seen to affect and shape various aspects of people's everyday lives (see chapter two). These studies have utilised different qualitative research methods to examine the social power of algorithms. Taina Bucher (2017), for instance, conducted email interviews with participants in order to examine people's everyday perceptions of algorithms. Moreover, Rob Kitchin (2017) has proposed ethnography as a valid way of researching algorithms and the ways people both engage with and are conditioned by algorithmic systems.

remembrance technologies can be seen to affect and/or shape people's remembrance of the past, whilst simultaneously acknowledging my involvement as researcher in the production of what Donna Haraway (1988) called 'situated knowledges'. Focus groups, on the other hand, were employed to broaden the understanding of how algorithmic remembrance technologies are used and how they are understood. Focus groups were considered, and indeed proved to be, an apt approach to better capture the views of people who may not be routine users of memory apps. Given the way some technologies are embedded into already well-established social media platforms or smartphones, focus groups constituted a useful mechanism to facilitate participants' ways of co-exploring and co-constructing their experiences of encountering algorithmically resurfaced memories on features such as Facebook Memories or Apple Memories. As such, focus groups were a useful space in which people's meanings and perceptions could be negotiated and co-constructed in relation to the other participants present.

This mixed-methods approach highlights the dynamic nature of memory – as embodied, embedded, and constantly in flux. This approach is also based on a relational view of algorithms (Bucher, 2018). Seen in relational terms, algorithms exist as part and parcel of larger assemblages, comprising both human and nonhuman agencies. Algorithms are therefore understood as enacted in the world, at particular times, in particular settings.[36] Examining algorithmic remembrance technologies and how people experience them is one such setting that will help further our understanding of the social power and politics of algorithms. In the next section, I will outline the scoping method in more detail, discussing how these technologies were conceptualised and operationalised as well as sampled and analysed.

3.2 Scoping Algorithmic Remembrance Technologies

3.2.1 Conceptualising

As the next chapter will argue in more detail, algorithmic remembrance technologies facilitate and shape how memory practices are instantiated in everyday life and, more broadly, how memory is being configured and conceptualised. More specifically, they are mechanisms for mining, analysing, and resurfacing previous content (such as social media posts and images) to

[36] For a deeper discussion of the relational/variable ontology of algorithms, see Taina Bucher (2018, p. 50-54). The notion that algorithms have a variable ontology also means, as Introna and Wood (2004, p. 180) state, that 'we cannot with any degree of certainty separate the purely social from the purely technical, cause from effect, designer from user, winners from losers, and so on'. Moreover, Tarleton Gillespie (2014, p. 183) argued that when studying algorithms we need to bear in mind 'a multidimensional 'entanglement' between algorithms put into practice and the social tactics of users who take them up'.

a user as ‘memories’ at particular times in the present. I also identify different kinds of features currently mediating people’s memories, delineating their scope and structural configurations as well as analysing their main characteristics. Through this method, I provide an overview of the technologies that algorithmically mediate memory in our current mediascape.

Having established this, I ask what is meant by ‘algorithmic remembrance technology’? In terms of the former, I propose the notion in order to emphasise the various applications of algorithmic techniques and models in the mediation of people’s memories: machine learning, convolutional neural networks, AI, computer vision, object and pattern recognition systems. In other words, the concept accentuates how these technologies mine, analyse, classify, order, rank, and routinely resurface people’s past data as ‘memories’ in the present (algorithmic remembrance technologies will be explored in chapter 4). As such, this project looks at contemporary technologies that algorithmically mediate people’s past data in the present.

Notable examples of these technologies include features such as Facebook Memories, Apple Memories, and Timehop. Facebook’s Memories feature, for instance, helps users revisit content from a given day in their Facebook history with notifications such as ‘you have a memory 5 years ago with so and so.’ It consists of past platform-specific content such as posts and images, which are resurfaced back to users according to what has been posted in the past and when. If one has an iPhone, one may also encounter notifications from the feature Apple Memories such as ‘you have a new memory’ or ‘fluffy friends 2015.’ This feature is embedded within the phone’s Photos app and resurfaces photos and videos one has taken in the past that are stored on the phone. There are also standalone apps, specifically dedicated to the purpose of resurfacing users’ data past in the present. For instance, the app Timehop gathers all of one’s social media content (such as posts and images) from across a variety of social media platforms, resurfacing these in the present. As a result, if one were to open up the app on, say, June 15th one would get the photos and posts from that exact day 1 year ago, two years ago, or even 8 years ago (that is, if one posted

anything on that day in the past). Generally speaking, what these algorithmic systems have in common is that they are mechanisms for presenting/resurfacing previous content (such as social media posts and images) to users as 'memories' at particular times in the present.

Moreover, I propose the notion to make sense of the various technologies in the everyday life that seek to explicitly intervene in and shape the definition of what a memory is and what it means to remember. Notifications such as 'you have a new memory' are not merely clever marketing, but also reveal a fundamental engagement with how memories are conceptualised in the contemporary media landscape. There is therefore also a need to explore how these technologies define 'memory' and 'remembering' (this is explored in chapter 4). For this reason I have also chosen not to examine 'quantified self' apps. The quantified self, occupied with self-tracking and lifelogging in order to promote a particular objectivised view of the body and of health, is not mainly concerned with conceptualising data as memories nor to explicitly intervene in the definition of what a memory is. Although a study of the relationship between quantified self apps and memory could be an interesting future study, I have chosen to leave it out here.

Given the emphasis on and use of algorithmic techniques in mediating people's memories, it is worth mentioning from the outset that I am not looking at one homogeneous group of technologies. Instead, the notion of algorithmic remembrance technologies is referring to a wide variety of systems comprising apps, platforms, platform features, cloud-based services, databases, smartphone features, and so on. Indeed, as the analysis in chapter four will demonstrate, these technologies reflect a heterogeneous grouping of features, functionalities, and platforms. It is therefore not meant as a totalising concept nor an exhaustive list. Rather, it is of a sensitising kind. I suggest that the technologies that have been sampled and analysed in this project are sufficiently emblematic of an emergent, highly variegated media landscape that seeks to algorithmically facilitate, frame, and shape people's memory practices in the present.

Given the plethora of features that currently exist, and given their varied configurations, I have employed a three-pronged sampling strategy for identifying these technologies. Broadly speaking, this means that the sampling of the scoping method was purposive as well as explorative (this will be discussed in more detail below). This strategy helped me identify and distinguish between three general categories of algorithmic remembrance technologies,[37]

[37] It is important to reiterate that these categories do not reflect nor describe the exact nature of these technologies. For instance, I have put Facebook Memories in the category of 'platform feature', yet Facebook is also down-

1) Apps
2) Platform features
3) Smartphone features

My justification for producing such a sampling typology is well articulated by John B. Thompson (2020). He states that:

> A typology of forms of interaction is not intended to be a description of the actual flow of social life. But one of the merits of a typology is that it enables you to separate out the different forms of interaction which are often woven together in the complex flow of day-to- day life, to analyse their characteristics and to make explicit certain similarities and differences that might otherwise be difficult to see (p. 8).

Thompson is not discussing algorithmic remembrance technologies but rather the creation and development of new forms of digital action and interaction. Still, I find his idea – the separation of technological forms of interaction as a means of providing clarity, depth of analysis and understanding – highly relevant to the context of this project. As such, the sampling strategy was aimed to better analyse the characteristics of algorithmic remembrance technologies and to 'make explicit certain similarities and difference' between different kinds of memory technologies.

The first category – apps – refers to 'mobile software applications', or applications designed and programmed to be used on smartphones and tablets. Apps are ubiquitous and mundane, designed to be downloaded and used voluntarily. This project sees apps in terms of both 'commodities' (Morris & Elkins, 2015) and 'sociocultural artefacts' (Lupton, 2014). This means that apps are understood as 'digital objects that are the products of human decision-making, underpinned by tacit assumptions, norms and discourses already circulating in the social and cultural contexts in which they are generated, marketed and used' (Lupton, 2014, p.

loadable as a smartphone app. Similarly, Apple Memories is an integrated feature of the iPhone's Photos feature, but also exists on the Photos feature on Apple Macs. Moreover, Google Photos and Gallery Go are both produced by Google, and they contain overlapping functionalities, but one I have categorised as a 'platform feature' and the other as an 'app'. How these are categorised is necessarily contingent since their boundaries are fluid. As such, the categorisation of algorithmic remembrance technologies is a sampling strategy and should not be seen as a generalisable classification or taxonomy of these technologies. Although these features are interconnected and sometimes even inseparable, I have chosen to distinguish between them for the sake of sampling, clarity, and analysis.

606).[38] Apps are also embedded within 'pre-established circuits of discourse and meaning' (Lupton, 2015, p. 441), which means that they have the potential to impact and shape people's everyday perceptions and practices. Algorithmic remembrance technologies also comprise mobile software applications. As a result, the scoping of these technologies is, in part, a critical analysis of particular apps which store people's past data from various platforms and resurface these as 'memories' in the present. The scoping and analysis of memory technologies therefore includes apps as one methodological point of departure.

Secondly, algorithmic remembrance technologies also refer to platform features. Platforms and their politics have received ample scholarly attention in recent years (Helmond, 2015; Gillespie, 2010, 2018; van Dijck et al., 2018). For instance, social media platforms have been conceptualised as 'algorithmic media' as a way to explore 'what it means to have algorithms interwoven in the social fabric of the contemporary media landscape' (Bucher, 2018, p. 38). Platforms, and especially social media platforms, have become ubiquitous aspects of work and everyday life, shaping the ways we shop, learn, and interact with others. As this project shows, they have also become central to how memory is conceptualised and how memory practices are instantiated in everyday life. Algorithmic remembrance technologies not only constitute standalone apps, but are also embedded or integral features of already-established social media platforms. As I pointed out earlier, this means that these technologies can seem less visible than standalone apps. For instance, Google is primarily a search and online advertising company, yet they also host cloud-based photo storage and sharing services such as Google Photos. Google Photos can be considered, at least in part, an algorithmic remembrance technology as it stores, analyses, curates and resurfaces past content as 'memories' in the present. Through features such as Google Photos we are able to identify and investigate more implicit iterations of algorithmic remembrance technologies.

Another similarly implicit kind of algorithmic remembrance technologies can be found on smartphone features. These features, it turned out, were often embedded in the default apps of smartphones and thus could not be entirely deleted (although it could be muted to some extent). For instance, features such as Apple's Memories, which is an integral part of the default Photos app, seeks to algorithmically curate and resurface a user's past content in the present. Other smartphones have similar embedded features: LG has a feature called 'Memories' whilst the newer versions of Samsung smartphone have similar memory-directed functionalities on

[38] Apps have been extensively researched in a variety of areas, for instance, in relation to self-tracking and sex (Lupton, 2015) education (Decuypere, 2019), and language learning (Godwin-Jones, 2015).

their inbuilt ‘Gallery’ app. Sampling categories such as ‘platform features’ and ‘smartphone features’ indicate that a certain preoccupation with people’s mediated memories could be seen to be deeply and inescapably embedded in the structural fabric of our current media landscape.

3.2.2 Sampling

Having conceptualised algorithmic remembrance technologies, I now turn to issues of sampling. The sampling took place between October and December 2018 and was both purposive and explorative. In the years leading up to the project, I had had several encounters with my past data resurfacing as memories in the present. As a Facebook user, I occasionally came across notifications such as ‘Here’s a Memory from Two Years Ago’ on my Newsfeed, and as iPhone user, I routinely saw the notification ‘You have a New Memory’. These personal experiences became a starting point for exploring what other memory features there might exist. By purposive, I mean that I intentionally searched for similar functionalities such as Apple Memories or Facebook Memories. By explorative, I mean that I did not know beforehand all the technologies that existed. Having established the different categories, I then explored each in more depth, finding relevant features as well as hitting dead ends along the way. Overall, the three-pronged sampling strategy provided a clear and manageable framework for identifying these algorithmic remembrance technologies. Still, how were each of these categories sampled more specifically?

The aim, in terms of apps, was to identify and establish what kind of memory apps existed, paying specific attention to their similarities and differences. The aim was not to establish a sense of volume (that is, how many apps existed in terms of quantification) but rather to establish what kinds of apps existed in relation to memory, and what were their affordances as well as technical makeup and interface. Following Dieter et al.’s (2019) discussion on app stores as a methodological entry point to the study of apps, memory apps were sampled from both Google Play and Apple’s App Store. App stores are crucial since apps are embedded and situated within these infrastructural settings.[39] In order to explore and identify algorithmic remembrance technologies as apps, I conducted a search on the two major app stores from

[39] As such, there is a political dimension to app stores. They function as gatekeepers, making some apps more visible than others. As Dieter et al. (2019, p. 2) argue, ‘App stores are the main site for accessing, downloading, and distributing apps’, continuing that ‘they allow researchers several opportunities to follow the perspectives of different stakeholder groups, including users and developers.’
In other words, they function as gatekeepers ‘by setting up the rules for app creation, sorting, and distribution, and they do so by drawing from the economic model of the multi-sided marketplace’ (Dieter et al., 2019, p. 2).

October to December 2018, using a wide variety of search terms such as: 'memory', 'memory app', 'remember', 'rediscover', 'review' and so on. I felt these to be the most appropriate and relevant search terms in the context of this project, and they were felt to highlight the types of apps most relevant to the algorithmic mediation of people's digital memories. Given that the scoping of apps was explorative, it felt appropriate to use a plethora of search terms for a comprehensive overview. In general, these search terms revealed a wide range of apps, with various aims and purposes, most of which were not considered relevant to the scope of this project. For instance, search terms like 'memory' and 'memory app' revealed mostly games and exercise applications meant for memory training, where one could improve cognitive recall through memorisation exercises.[40]

Apps were identified as being relevant to this study based on a variety of factors: firstly and mainly, I reviewed the app's functionalities and its features. For instance, apps such as Amazon Photos use facial and object recognition software to afford users the ability to search for certain people and objects in their digital photo albums. The use of facial and object recognition also figured in the way Amazon Photos afforded the specific resurfacing of 'memories of person x' or 'memories from place y.' As such, the feature was considered relevant to how memory is conceptualised and how memory practices are framed and instantiated. Moreover, I looked at users' reviews as well as examining the app's 'version history' to see how it has been updated and developed through time. Many apps also listed their developer website, license agreement, terms of service, and privacy policy on their App Store page. These were perused to examine how the app had been developed, their relationship to data and privacy, and to identify what other applications had been made by the same developer. These links provided rich data and documentation for the analysis.

It is also important to acknowledge the interrelatedness of apps and their interconnections on app stores. According to Dieter et al., (2019, p. 2), app stores can be used not only to identify certain apps, but also to address relations among multiple apps. In the project, these relations were addressed in two particular ways: 1) through the app's categorisation on the app stores, and 2) the 'You May Also Like' option. In terms of the former, both Apple's and Google's app stores categorise their apps under rubrics such as 'Productivity', 'Art & Design', 'Creativity', and 'Education'. These categories help navigate users through the app

[40] Search terms such as 'remember' revealed apps mostly related to to-do lists, schedules, checklists, notepads, plans, goals, reminders, and so on. Apps such as 'Google Keep' were branded as mainly practical tools, and were also categorised by Apple Store as 'Productivity' (categories are discussed above).

stores towards apps they deem relevant. Most apps relating to the algorithmic mediation of memories, it turned out, were categorised predominantly as 'Photo & Video', with some categorised as 'Social Networking' as well as 'Travel'. Taking advantage of the navigational affordance of app categories, I perused through categories such as 'Photo & Video', which elicited some interesting apps that have been included in the project's analysis (e.g. Amazon Photos and Microsoft Photos). Attending to their categorisation was also a good way to examine how apps were imagined and understood by app stores as well as by developers. In terms of the latter, the 'You May Also Like' function highlights correlated, or what is perceived by app stores to be related, apps. Again, the use of this function elicited relevant apps and data, as well as accentuating the interrelatedness of apps and app developers more generally.

Although platforms can be conceptualised in different ways (Gillespie, 2010), I chose to focus on the major social media platforms currently in circulation: Facebook, Instagram, Youtube, Twitter, Snapchat, TikTok, Tumblr, Reddit, LinkedIn, and Quora. The aim with scoping platform features was not to assess the exact number of algorithmic remembrance technologies in existence; rather, it was to examine the extent to which these technologies are already deeply embedded in and integrated into popular social media platforms. From October to December 2018, I perused these platforms for ways in which they may mediate people's past data as memories.

As the sampling strategy suggested, algorithmic remembrance technologies could also be found as features embedded in smartphones and their default applications. As I mentioned earlier, the experience of using an iPhone, and coming across notifications such as 'you have a new memory', sensitised me to the idea that these technologies could be found not just as standalone apps or as platform features, but as an integrated part of owning and using smartphones. The aim of this part of the sampling strategy was therefore to examine whether similar technologies existed in other kinds of smartphones as well, which would help to outline the scope of these technologies. The sampling frame for smartphone features was established by consulting both statistics outlining the global shipment of smartphones as well as sources listing the top-10 best-selling smartphone brands in the world at the moment.

As a result, I went through and examined smartphones such as: iPhone 6 (and onwards), Samsung Galaxy, Google Pixel, Sony Experia, LG G7, Lenovo, ZTE, Nokia, OnePlus, Huawei, Honor, and HTC. Again, it is important to reiterate that this was not meant as an exhaustive list, but was rather meant to provide an idea of the scope of these algorithmic remembrance

technologies, how their functionalities and affordances might differ or resemble others. The sampling and data collection was conducted through both convenience sampling, examining the kinds of smartphones I could get physical access to, and archival research, that is, examining the smartphone developers' online sites, their terms of agreement, their privacy policies, their lists of software update history, and promotional material regarding their phone products.

3.2.3 Scoping

This scoping method created a total sample of 15 algorithmic remembrance technologies in the form of apps, platform features, and smartphone features. The sample of algorithmic remembrance technologies, broken down into sampling categories, is listed on the table below.

Platform Features	**Smart Phone Features**	**Apps**
Facebook Memories	Google Pixel	Amazon Photos
Instagram Throwbacks	Apple Memories (in Photos)	Ever
Snapchat Flashback Memories	LG Memories (in Gallery)	Fotofami
	Samsung Stories (in Gallery)	Google Photos
		MemoryWeb
		Microsoft Photos
		Swarm (by Foursquare)
		Timehop

The data from the scoping was collected between early October and late December 2018. The scoping produced a varied dataset and different types of data. It produced a variety of documents such as Terms and Agreements, Terms and Conditions, Data Policies, Privacy Policies, Cookie Policies, User Manuals, update histories, and developer blogs. The scoping, particularly of the websites of the developers, also produced a range of marketing materials such as video presentations, promotional material, instructional videos, blog entries, user reviews, and online adverts.

These different types of data enabled me to focus on and examine how the algorithmic remembrance technologies are presented in the materials: that is, what is their commercial or marketing rhetoric, what are their functionalities, affordances, services, what algorithmic techniques do they utilise, and what do they promise users. When analysing the data, I initially

focused on key words and references such as 'machine learning', 'AI', 'pattern recognition', and 'memories.' In subsequent readings, I delved deeper into the specificities of their functionalities and how they algorithmically mediate people's memories more specifically. These materials also helped me examine the ways in which the technologies are imagined by developers and tech companies, their proposed aims and achievements, as well as how they relate to the wider ecosystem of connectivity (van Dijck, 2013) and surveillance capitalism (Zuboff, 2015; 2019).

It is worth mentioning that the scoping and analysis of algorithmic remembrance technologies, in terms of apps, also comprised what has been referred to as the 'walkthrough method' (Light et al., 2018; Decuypere, 2019). This refers to a methodological approach that examines apps in terms of their interfaces. It constitutes a direct and in-depth engagement with the app. As Decuypere (2019, p. 418) states, the walkthrough method enables the researcher to 'analyze an app's architecture and interface in a systematic way in order to disentangle the app's *environment of expected use* and foreground the characteristics of the interface' (original emphasis). Using this approach enabled me to become more intimately familiar with the algorithmic remembrance technologies in question. Moreover, I downloaded and visited the memory app Timehop every day for a year as well as checking Facebook Memories and Apple Memories 2-3 times a week for six months. The perspectives this engagement engendered also helped me connect with many of the interview participants, providing us a common frame of reference and often similar experiences. Overall, the walkthrough method provided further nuance to the dataset and a deeper understanding of the functionalities, architectures, and interfaces of several algorithmic remembrance technologies.

3.3 Doing Interviews

3.3.1 Sampling

This section will outline the interview approaches (i.e. 26 interviews, four focus groups, one interview with a tech expert). In terms of sampling for the qualitative interviews, it was decided that the most appropriate way to proceed was to do purposive sampling and thus narrow the focus down to one app, feature, or platform. As a result, Timehop was chosen as the sampling frame for the in-depth, semi-structured interviews. The reasons for selecting Timehop were manifold: firstly, it is an app specifically designed and dedicated to resurface users' past data as 'memories' in the present. As an app, it provides users with daily snippets or backward

glances of their digital past. It was therefore assumed that its user base constituted, on average, active and voluntary users who had intentionally opted in to use the app. Secondly, the app remains highly popular. As of 2018, the app had 21 million daily users (Lomas, 2018), which provided more than enough scope in terms of sampling. Thirdly, other algorithmic remembrance technologies have taken inspiration from Timehop. Created in 2011, the app has since provided the inspirational blueprints for features such as Facebook Memories in addition to remaining relevant to users as a standalone app through the years. Lastly, it was assumed that users engaging with Timehop were likely to also use or encounter other similar memory technologies. The interviews demonstrated that this was indeed the case. Many of the interview participants also discussed their use of other features such as Apple Memories, Facebook Memories, or Snapchat Memories, often drawing comparisons between their functionalities. As a result, the interviews not only provided data on how users use and negotiate features such as Timehop, but also provided insights into the variegated experiences of using other algorithmic remembrance technologies as well. That made this dataset particularly rich as well as providing points of comparison with the findings that emerged in the focus group interviews.

I took methodological inspiration from studies such as Bucher (2017) and Lee (2013), who used Twitter as a means to sample and recruit potential participants, conducting the interviews remotely via applications such as Skype.[41] I searched Twitter daily for key words relating to 'Timehop' or 'Timehop memories' over a three-month period, from mid-January to late March 2019. Based on these searches, I regularly contacted people on Twitter and 26 agreed to take part in an interview. These are listed below:

Pseudonym	**Age**	**Occupation**	**Country**
Anna	60	Teacher	Canada
Becky	36	Charity worker	United States
Charlotte	27	Unemployed	England
Diana	31	Software engineer	United States
Ethan	29	Tech worker	United States
Francis	20s	University student	United States
Grace	37	Digital marketing	United States

[41] Bucher (2017), for instance, searched for key words on Twitter in relation to what people wrote about algorithms over a nine-month period. Potential participants were then contacted on Twitter and asked whether they wanted to participate in an email interview about everyday perceptions of algorithms. Lee (2013) similarly used Twitter to establish their sampling frame when analysing the use of social media and smartphones amongst Korean youth.

Harvey	33	Teacher	United States
Imogen	37	Journalist	United States
Jack	26	Clergy	United States
Keith	26	Industry relations coordinator	United States
Lydia	50s	Management consultant	Northern Ireland
Miriam	26	Banker	United States
Nicole	34	Operations manager	United States
Oliver	32	Digital marketing	United States
Paul	35	Diamond industry worker	United States
Quentin	22	Journalist	United States
Raymond	40s	Customer support	Canada
Sarah	44	Chief marketing officer	United States
Taylor	23	Barista	Puerto Rico
Alice	30	Attorney	United States
Beth	34	Tech consultant	United States
Charlie	22	Digital marketing	Australia
Donna	22	Paralegal	United States
Emma	34	Medical education manager	United States
Demi	25	Health worker	Puerto Rico

The participants were consequently provided with an information sheet via email about the project as well as a consent form that they had to sign and send back before the start of the interview. Given the fact that 26 participants ultimately accepted to take part in the remote interviews, and given the total number of people contacted, the response rate was low. However, this was not seen as an issue for this project, as I was not attempting to determine a representative or generalisable sample of Timehop users, but rather to gain a multiplicity of insights and experiences of using memory features.

Given the variegated nature of algorithmic remembrance technologies, it was also decided to conduct focus group interviews. Focus groups were considered well suited to explore the experiences of people with various degrees of exposure to memory features, who may have encountered resurfacing memories as a ‘by product’ of their social media usage. The aim was therefore to procure a diverse sample, ranging from those unfamiliar with these

technologies to those using them or encountering them regularly, which in turn produced a rich and varied dataset. As a result, I recruited focus group participants with diverse degrees of familiarity and exposure to the technologies in question as well as to social media platforms. It was also decided that potential participants did not necessarily need to be acquainted with the technologies beforehand. This was in order to add to the focus group dynamic and to the dataset. It is worth noting here that diversity was not mainly related to gender, class, or race, but the participants' level of familiarity and exposure to or experiences using memory technologies. The aim was not to produce the necessary conditions for comparable or generalisable statements about issues of gender, class, or race. Rather, it was to produce a dataset from which to develop a conceptual framework for thinking about the intersections of algorithms and memory in everyday life.

I conducted four focus groups in total over two two-month periods in 2019: May to June and September to October. In order to procure a diverse and varied sample, I did purposive sampling and recruited participants from local community groups as well as students from the local university. It was decided that these two groups would provide sufficient range of familiarity and variety of encounters with the technologies in question. The focus group participants, who have been pseudonymised, are listed below:

Focus group 1 (community group)	**Focus Group 2** (community group)
Anna, 50s, housewife	Emma, 70s, retired
Brian, 50s, university lecturer	Freddie, 70s, retired
Catherine, 70s, retired	Grace, 60s, retired
Daniel, 70s, retired	Helen, 70s, retired

Focus Group 3 (student group)	**Focus Group 4** (student group)
James, 18, student	Esther, 18, student
Lucas, 18, student	Charlotte, 18, student
Mia, 29, healthcare assistant	Jane, 23, healthcare assistant
Elijah, 20, student	Theo, 30, civil servant
Ava, 18, student	Lily, 37, student
Olivia, 18, student	Eva, 20s, student

William, 19, student	Sonya, 18 student

One of the rationales for recruiting from these particular groups was the idea of sampling pre-existing groups, which is a much-discussed topic in the methods literature (e.g. King and Horrock, 2010; Kitzinger, 1994). It was assumed that sampling pre-existing groups would amplify participants' level of confidence and willingness to discuss the matter at hand, which in turn would engender a more dynamic group discussion.[42] In fact, sampling pre-existing groups was particularly conducive to the focus group discussions in relation to local community group participants.

The recruitment of local community group members was done by directly emailing local community and interest groups, the contact information for which I found online. Two groups agreed to take part in the focus groups and were provided with further information about the project. These focus group interviews were both conducted in Late June 2019. The recruitment of university students was done through departmental emailing lists. In late September, at the start of the Autumn term, I emailed different departments within the university and asked whether they would circulate my call for participants to the students in their department. Potential participants emailed me directly or were forwarded to me by their respective department, and two student focus groups were conducted in early November 2019.

During the project, I also sought to interview tech experts and engineers working with algorithmic remembrance technologies. This would add nuance to my understanding of these technologies as well as providing insights into the different ways these technologies are imagined and programmed. The idea was that these would provide an additional entry point into investigating the power and politics of algorithmic systems on the mediations of memory in everyday life. Based on the scoping materials, I found information about the team of developers and programmers through their websites, the info sections on Apple Store or Google Play, and their 'About' section on the feature's interface. It was also assumed that many of these developers, tech experts, UX researchers, and software engineers would have profiles on LinkedIn. I therefore decided to attempt to contact them through that platform. In March 2019,

[42] The challenge, on the other hand, is that it may limit the range of ideas and opinions being presented in the interview since participants are more likely to rely on taken-for-granted assumptions amongst the group members (Morgan, 1997). Another issue is that it may engender an implicit form of self-policing. That is, it may perpetuate the need for participants to appear consistent with former representations of self to avoid future awkwardness with other group members (Hollander, 2004).

I managed to get an interview with Benny Wong, software engineer and co-founder of the memory app, Timehop, who is now working at Instagram.

3.3.2 Interviewing

Overall, the interview samples were demographically and internationally varied and in terms of age. For the remote interviews, the sample range ranged from 22 to 60, and for the focus groups the sample ranged from 18 to participants in their 70s. As previously stated, the aim was not to produce a representative or generalisable sample, nor to provide a basis for comparative analyses between different ages, nationalities, classes, or gender specifications. Instead, the aim was to produce a varied and nuanced data set relating to people's experiences, affects, practices, habits, tensions, anxieties, and ultimately encounters with algorithmic remembrance technologies.

In preparation for the remote interviews, focus groups, and the interview with Benny Wong, I created an interview guide, commonly recommended for qualitative interviewing (e.g. King and Horrocks, 2010; Kvale and Brinkmann, 2009). The interview guide allowed me to conceptualise and outline the main topics that I wanted to cover in the interviews and focus groups, but afforded flexibility in terms of phrasing and the sequence by which questions were asked. It is also worth mentioning that the interview guides were constantly tweaked, modified, added to, re-phrased, and re-ordered throughout the data collection process as a result of findings in the interviews and focus groups (see Appendix for interview guides). For instance, chapter six examines the importance of timing for the algorithmic mediation of memory. I did not think of this topic prior to the interviews, and any questions related to this topic were therefore initially not in the interview guide. However, this topic emerged through the interview process, and as I considered it a potentially fruitful avenue of research, questions related to it were therefore included in later interview guides.

Drawing inspiration from Patton's (1990) six types of interview questions, the research guide contained a mix between what Patton called background questions[43], experience-/behaviour questions[44], opinion/value questions[45], and feeling questions[46] in order to elicit

[43] E.g. 'how long have you been using Timehop' or 'How did you find out about Timehop'?
[44] E.g. 'How do you normally use the app' and sub-questions such as 'does the Streak have any effect on how you use the app'?
[45] E.g. 'What do you particularly like about using Timehop?' or 'Is there anything you particularly dislike?'
[46] E.g. 'How does it make you feel seeing or being reminded of memories on Timehop?'

different kinds of data. Echoing Kvale and Brinkmann's (2009) types of questions, the main questions in the interview guide contained potential follow-up questions (probes), prompting questions, specifying questions, and sub-questions, depending on which way the participant decided to go in the interview. Moreover, Merton et al.'s ([1956]1990) four criteria for effective interviews – range, specificity, depth, and personal context – also provided a helpful guide in thinking about and devising the interview guide.

The remote interviews lasted, on average, between 30 minutes and one hour. Generally, we discussed the participants' use of Timehop as well other features such as Facebook Memories, Apple Memories, and Snapchat Memories. Moreover, we discussed the particular format of these technologies, in which users can visit these apps and encounter various increments of their data past. Participants explained how they found these technologies different and/or similar to more analogue modes of engaging with the past such as photo albums and diaries. The decision to use Timehop myself for a year before interviewing participants, as well as actively engaging with Facebook Memories and Apple Memories for an extensive period of time, proved fruitful for the discussions with the participants. It not only provided familiarity with the applications, but it also engendered a familiarity between me and the participants and common points of reference. It engendered a kind of user-to-user relation, as in many cases we were able to discuss how we both used the features and how we experienced it. I also decided not to take notes during the interviews, as I felt this would stifle the conversation and make it more artificial. One of the aims from the outset was to facilitate as organic a conversation as possible (Rapley, 2012). I decided to conduct interviews until the point of theoretical saturation. Although I thought this point was reached after interview number 24, I decided to conduct two more interviews to bolster and confirm this sense of saturation.

The focus group interviews, on the other hand, lasted on average one hour. Before the focus groups started, I provided participants with an information sheet and a consent form to sign. At the start of the group discussion, I spent a few minutes explaining how the features we would be discussing worked, namely Facebook Memories and Apple Memories. I also used visual aids on my computer, showing the participants screenshots from these two features. In reality, the discussion started here, because I encouraged participants to ask about the features if there was something they did not understand, and other participants often contributed to these explanations as well. This collective activity, or these particular moments at the start of the focus groups, in my view, demonstrated the ways in which data is a 'collaborative reconstruction' (Atkinson and Silverman, 1997, p. 314) by both interviewer and interviewee.

The discussions in the focus groups centred around the two features in question, Facebook Memories and Apple Memories; but many participants also drew interesting comparisons with Snapchat Memories, a feature they had often encountered or been exposed to. I had prepared a few general questions beforehand to help instigate and direct the topics of discussion, questions such as: what do you think of these features? Anything you particularly like or dislike about these features? Do you think you would remember something differently using these features as opposed to other ways of remembering the past? Given the flexibility and dynamics of a focus group setting, the discussion often went in many interesting directions, some emphasising the ways in which these features can change someone's memory of the past, other's discussing the ethics and privacy implications of these features, and others talking about issues such as temporality and sharing. As theoretical saturation had already been reached with the qualitative interviews, these focus groups were conducted to add nuance and depth to the already rich dataset. I therefore only conducted four focus groups in total.

Following recommendations from the methodology literature (Bryman, 2012; Morgan, 1997; King and Horrocks, 2010), size of the focus groups varied from to four to seven with an over-recruitment of 20% for each focus group. In terms of the focus group interview itself, I decided to utilise a semi-structured format. The 'collective activity' (Barbour & Kitzinger, 1999) comprised a discussion of the theme of algorithms, social media platform, and memory as well as short visual introduction to the memory features we would discuss. Given the fact that focus groups constitute a socially constructed environment, the aim was to select conditions most conducive to conversation. As a result, I ordered refreshments for the student focus groups (in the other two focus groups, refreshments were provided by the participants). The focus groups conducted with members from local community groups were also held in one of the participant's home and in a meeting room in a local community centre. The focus groups conducted with students were conducted in easily accessible classrooms on campus.

The interview with Benny Wong posed different challenges. As I have already suggested in this chapter, there is usually a certain unequal power balance in the interview setting. The interview dynamic was different in this case. Given Wong's status as software engineer at Instagram and co-founder of a popular memory app, I asked Wong permission to mention him by name in the project. He accepted, but in return asked whether he could have a copy of the audio recording after the interview, which I forwarded to him afterwards.

Although the interview was semi-structured, it was exploring different ideas than the other interviews. It focused on issues surrounding memory and algorithms from a more back-end perspective. The interview lasted approximately one hour, and questions included: How did Timehop come about? What is the story? What is the importance of calling the resurfacing memories 'anniversaries'? What did you find challenging about producing and running Timehop? We discussed issues around data mining, privacy, digital archives, temporality, the meanings imposed on data by users, as well as different ways Wong wished Timehop had developed. In turn, he asked me about the other interviews I had conducted with Timehop users and I mentioned some of the findings I had been thinking about and working on. More than the previous interviews, this interview was marked by reciprocity, a sharing of findings and information. Overall, the interview gave some additional insights into the ways in which Timehop had been programmed but also imagined from the start. It also provided insights into the ways the developers at Timehop conceptualised the relationship between data, memories, and the role of algorithms in mediating memories – which provided an interesting comparison to the construction of other features such as Facebook Memories.

At the end of the interviews and focus groups, I concluded by asking the interviewees if they had anything to add before finishing. In some of the interviews, for instance, this small window often engendered rich data, as users added thoughts, comments, or indeed questions they had had during the interview. Questions were often related to my experiences using the app or the project I was writing. I promised that all participants would be pseudonymised in the thesis and in future research outputs.

3.4 Recording, Transcribing, Coding, Analysing

The interviews and the focus groups were all audio recorded. After interviews, the audio files were transferred to my university office computer, which is equipped with the drive encryption program Bitlocker. Participants' signed consent forms were kept in a locked cabinet. In chapters five and six, interviewees have been pseudonymised. I also created a list of all the pseudonyms and the actual names they replaced, in order to ensure data accuracy, which has also been safely stored.

Afterwards, the interviews and focus groups were transcribed using Microsoft Word. Usually, the interviews were transcribed a day or two after the interview. It is worth mentioning that the transcription phase constituted more than simply translating oral data into written text.

As Kvale and Brinkmann (2009, p. 177) remind us, transcribing constituted an 'interpretative process,' both in terms of how to translate data such as expressions, tone, and emphasis, but also in terms of thinking about overarching themes, analytical observations, and recurrences in the data. Echoing Rubin and Rubin's (2005, p. 201) comment that the process of transcribing is 'the first phase of analysis,' I found that many of the thoughts and themes that ultimately emerged in this project emerged during the transcription phase. I also used many of the transcription conventions outlined in academic texts (e.g. Kvale and Brinkmann, 2009),[47] however I decided that it was unnecessary to transcribe cues such as 'mm's, pauses, and body language, since such linguistical and embodied features would be beyond the scope of the project aims. The transcriptions were therefore much more conversational in format.

In terms of coding, I found Johnny Saldaña's (2009) book *The Coding Manual for Qualitative Researchers* especially useful. Many of the coding techniques listed by Saldaña - such as Descriptive Codes, Simultaneous Codes, In Vivo Codes - I used when coding and analysing the transcribed data. The codes I wrote down in the first cycle of coding would sometimes be modified in the second cycle of coding. As with all research, this process was highly iterative, codes often changing based on similar codes or further interviews and focus groups. Echoing Saldaña (2009), my approach was a mix of 'deductive coding – driven by the existing literature and theories – and 'inductive coding' – coding driven by the data itself. As my overall research aimed to examine and develop a conceptual framework around the intersections of algorithms and memory in everyday life, inductive coding became particularly important, and I was looking to establish overarching patterns and themes in the coded data. One method I utilised in order to do this was to group similarly coded data into bigger categories, into increasingly higher levels of abstraction. For instance, this was especially useful in identifying the individual characteristics that became the overall memory practices discussed in chapter five. The process of increasing abstraction highlights the iterative process that is coding and the intimate connection between coding and analysis. Another method I utilised was thematic analysis (Braun and Clarke (2006). Through this, I could identify, analyse, and discuss overarching patterns in the data, using quotes and codes from the interview data as a means of illustration and corroboration. I also choose to use manual coding for both the inter-

[47] For instance – (at the end or beginning of utterance) interrupted speech,
. . . material omitted by authors
[ ] material inserted by authors
_ material inaudible on tape
? unidentifiable speaker

view and focus group data as I found it more manageable and convenient than, for instance, Nvivo coding.

3.5 Conclusion: Towards Analysis

Overall, these different methodological approaches – scoping, interviews, focus groups – facilitated an investigation into the algorithmic mediations of memory from various perspectives. The analysis chapters echo this. Chapter four examines the algorithmic remembrance technologies themselves, their use of algorithmic techniques, their programmed and imagined nature and their economic underpinning. Chapters five and six draw on interview as well as focus group data to investigate users' practices and the impact of timing (what I call 'anniversification') respectively. In short, the project analyses the technologies themselves, users' experiences and practices, and the impact of the technologies on users.

4.0 The Emergence of Algorithmic Remembrance Technologies: When the Conditions of Memory-Making Become Algorithmic

4.1 Introduction: Media Landscapes of Remembering

Memory is always enframed. Memory-making practices always take place within a context, within a particular framework. In other words, they happen *somewhere*. In his book *Non-Representational Theory*, Nigel Thrift (2008) examines what he calls the 'spatialities of feeling', the intricate entanglements of affect and spatiality in contemporary urban life. Thrift argues that although affect has been part and parcel of the urban experience, 'now affect is more and more likely to be actively engineered' with the aim of providing 'the basic mechanics and root textures of urban life' (p. 172). In Thrift's view, the increasing engineered reality of contemporary social life suggests that:

> Affective response can be designed into spaces, often out of what seems like very little at all. Though affective response can clearly never be guaranteed, the fact is that this is no longer a random process either. It is a form of landscape engineering that is gradually pulling itself into existence, producing new forms of power as it goes (Thrift, 2008, p. 187).

This chapter similarly argues that the conditions of memory practices in contemporary society are increasingly predicated on and shaped by what Thrift calls 'a form of landscape engineering', that is, a landscape densely populated with platforms, apps, algorithmic systems, and their infrastructural logics (Helmond, 2015; van Dijck and Poell, 2013). Drawing on the documentary analysis of 15 algorithmic remembrance technologies and the discourses surrounding them, this chapter contends that these technologies shape the conditions of possibility of encountering, negotiating, and remembering the past in contemporary life. In one sense, people's memory-making practices are always in a state of flux; they always rely on and are framed by the technologies that are readily at hand. The ways people capture, store, curate, share, and engage with the past have always hinged on various technologies, like a knob on a door. They have always been socio-technical practices and processes. But recently, the ways in which memory is conceptualised and memory practices enacted is increasingly mediated, dependent on, and shaped by algorithmic media. The pressing question, then, becomes: what happens when the conditions for memory making become, at least in part, algorithmic?

In this chapter, I outline and investigate the various contours that characterise the contemporary media landscape of remembering. That is, I provide a documentary analysis of corporate materials and documents such as Terms and Agreements as well as Privacy and Cookie Policies. I also analyse the discourses surrounding technologies such as Facebook Memories and Amazon Photos, investigating their marketing materials, user manuals, and technical descriptions. I also interviewed Benny Wong, software developer and co-designer of the memory app Timehop, to gain a better understanding of the technical aspects of the memory tools people use in everyday life. The chapter focuses on what I call 'algorithmic remembrance technologies' as well as their role, their imagined nature, their functional characteristics and affordances. Algorithmic remembrance technologies afford and constrain memory-making. They generate and modulate the conditions by which memory-making practices are made possible and desirable. They are mechanisms for mining, analysing, and resurfacing previous data (such as social media posts and images) to users as 'memories' at particular times in the present. As this chapter demonstrates, these memory technologies are widely diffused and constitute a heterogeneous assemblage of features, platforms, apps, and functionalities. This landscape comprises both standalone apps, specifically dedicated to the mediation of people's memories, as well as features that have melded into already-established platforms.

Moreover, the chapter explores how these algorithmic remembrance technologies, these designed spaces of memory, are programmed or 'engineered' in particular ways and how they configure users, memory, and the role of algorithms. Ultimately, this chapter argues that memory technologies envision data-led and algorithmic processes as co-producers of human memory making. As such, it is argued that memory making is conceptualised mainly as being amenable to the algorithm, as being algorithmically shaped and instantiated. A particular conception of what a memory is, as well as what constitutes remembering, is being articulated by these platforms and app- and smart phone developers. The 'data imaginary' (Beer, 2018) of algorithmic remembrance technologies sees the melding of datafication, smart organisation, machine-learning predictions and remembering.

More specifically, I argue that algorithmic remembrance technologies are reconfiguring memory-making practices in particular ways whilst undercutting prior understandings of what it means to remember and engage with the past. Below I outline six different themes that encapsulate how these technologies are designed and represented/marketed, what they do or how they are 'meant' to be used by consumers. These themes are unlimited, smart, organised, searchable, connective, and reminding. Through these themes, it becomes clear that the con-

ditions of memory making are being shaped by algorithmic media, ultimately generating new modalities of remembering in a digital context. This chapter's overarching framework highlights ways in which the conditions for mediated remembering is being variously reconfigured. In other words, mediated memories are conceptualised as increasingly datafied, ordered, evaluated, predicted, resurfaced, and ultimately experienced. These platforms and tech companies not only solidify a certain view of remembering they may only purport to represent; instead, they actively seek shape our understanding of what memories are and what it means to remember the past in a digital context. They represent an attempt to make human memory-making increasingly machine-readable. Through this endeavour, they are increasingly able to know, engineer and modulate the conditions for human memory-making practices.

Before examining how algorithmic systems shape people's remembrance of the past in everyday life, it is important to discuss the underlying conditions through which such remembering is made possible. Understanding what is meant by the notion of 'remembering with algorithms' starts with a critical analysis of those algorithmic systems, an analysis of their characteristics as well as their promises. For instance, similar to van Dijck and Poell (2013, p. 9), there is a need to ask what 'discursive regimes' (Kitchin and Dodge, 2011) these technologies are symptomatic of, what they promise, how they are imagined, and how they are likely to be enacted in everyday life. As such, the notion of 'algorithmic remembrance technologies' acts as a conceptual framework and analytical prism through which to investigate the intersections of memory, memory practices, and algorithmic systems. As I mentioned in chapter three, the notion of algorithmic remembrance technologies is not meant as an exhaustive typology; rather, it is meant to sensitise us to the emerging landscape of technologies that seek to algorithmically facilitate, mediate, shape, and reconfigure the way the past is captured and relived in everyday life.

4.2 The Underlying Logic: Surveillance Capitalism

Before examining the various technologies and their functional characteristics, affordances, and promises, it is crucial to first examine their underlying logic. I suggest that algorithmic remembrance technologies are best seen as integral parts of what has been called 'surveillance capitalism' (Zuboff, 2015; 2019). For Zuboff (2015, p. 77), surveillance capitalism is a form of capitalism both facilitated by and predicated on the extraction, analysis, management, and circulation of big data: ''big data' is both a condition and an expression.' It is a new form of

information capitalism, Zuboff (2015, p. 75) argues, that aims to render the social world and everyday life amenable to data extraction in order 'predict and modify human behaviour as a means to produce revenue and market control.' As such, the notion of surveillance capitalism does not only relate to big corporations such as Google and Amazon or social media platforms such as Facebook, but 'appears to have become the default model for most online startups and applications' (p. 77). It is argued in this chapter that algorithmic remembrance technologies share this underlying logic of surveillance capitalism, emphasising the centrality of data as resource and monetary value. In short, they constitute the ways in which data about people and their mediated memories are mined, analysed, and circulated.

It is important to note, however, that the political economy of these technologies, although they share an underlying logic of surveillance capitalism, is not uniformly expressed. Indeed, their specific business models shapes how the apps function, and in turn their use and experience by users. For example, apps such as Timehop deploy a rule-based algorithmic framework, run ads as part of their 'memory experience'. However, these ads are not personalised but are rather directed at the general user audience. For other memory technologies, data is a crucial factor in they operate and are experienced by users. For instance, on social media features such as Facebook Memories data is extracted from users in order to 'personalise' the memories, seeking to predict what memories users want to engage with as well as modulating the frequency by which users see memories based on their interactions with the feature (Paluri and Aziz, 2016). Facebook Memories therefore seeks to produce a dual attachment in their users: an attachment to the platform itself, its products and other services; and, secondly, continuous participation with social networks, such as friends and groups, which further conjoins users to the platform, or at least makes it less desirable to leave.

Cloud storage services such as Amazon Photos and Google Photos are produced by larger multinational tech companies that rely on the extraction of data in order to produce revenue. The data uploaded by users unto these services in form of videos and photos therefore have multiple uses and functions for these companies. For example, Google Photos stated in their 2018 Privacy Policy that their machine learning algorithm learned to do automatic image categorisations based on the training data from Google's earlier storage iteration, Picasa (Google, 2018). This meant as 'users sorted and categorised their photos on Picasa, these correlations and patterns became the training data for how Google's current algorithm learned to curate their current users' photos' (Jacobsen, 2020a, p. 7). Data about users, and how they

interact with their mediated memories, provides another means through which memory features can 'know' users more intimately (Thrift, 2005) (see Table for more comparative information).

	Primary functionality and design	**Business model**	**Memory delivery frequency (daily, monthly, annual)**	**Form of Memory (visual, feed based, notification, text)**
Apple Memories	Smartphone feature	Enhance product stickiness	Daily	Visual (photos and videos)
Amazon Photos	Cloud storage service	Subscription based	Monthly	Visual (photos and videos)
Ever	Photo storage app	Enhance product stickiness + subscription option	Daily	Visual (photos and videos)
Facebook Memories	Platform feature	Enhance platform stickiness + trading data	Daily	Visual and textual
Fotofami	Photo storage app	Enhance platform stickiness	Annually	Visual (photos and videos)
Google Photos	Cloud storage service	Data mining and trading data	Monthly	Visual (photos and videos)
Google Pixel	Smartphone feature	Enhance product stickiness	Weekly	Visual (photos and videos)

Instagram Throwbacks	Platform feature	Enhance platform stickiness + trading data	Annually	Visual (photos and videos)
LG Memories	Smartphone feature	Enhance product stickiness	Weekly	Visual (photos and videos)
MemoryWeb	Genealogy app	Subscription based	Annually	Visual and textual
Microsoft Photos	Cloud storage service	Enhance product stickiness + in-app purchases	Annually	Visual (photos and videos)
Samsung Stories	Smartphone feature	Enhance product stickiness	Weekly	Visual (photos and videos)
Snapchat Flashback	Platform feature	Enhance platform stickiness	Daily	Visual (photos and videos)
Swarm	Mobile app	Enhance platform stickiness + data mining	Annually	Visual, textual, and location based
Timehop	Mobile app	Run ads	Daily	Visual and textual

This logic of 'knowing' (Thrift, 2005) users through data mining and diffusing a logic of participation can also be seen in the wider analysis below. For instance, in some algorithmic remembrance technologies mediated memories are made searchable in order to become more amenable to sharing with others. In other cases, mediated memories such as photos are

automatically categorised, using computer vision, and curated into collections to incentivise participation and interaction with the technology. As such, current technologies that mediate people's data about the past not only have the potential to shape mediated memories themselves, but also the conditions through which people engage with their past data in the present. As such, algorithmic remembrance technologies embedded in people's everyday lives, are part and parcel of a larger business model that seeks to mine, analyse, and circulate data in order to know users more intimately. Although these technologies vary in levels of automation, curation, and affordances, they embody a desire to better capture, cluster and resurface people's pasta data as 'memories' in the present. Through an analysis of algorithmic remembrance technologies, there is an emergence of data-driven and data-led modes of engaging with one's data past, with one's mediated memories.

4.3 Reconfiguring the Conditions of Memory Making

Having discussed the underlying logics of algorithmic remembrance technologies, it is time to examine the technologies themselves along with their functions, affordances, promises, and commercial rhetoric. Drawing on a documentary analysis from 15 algorithmic remembrance technologies, this chapter outlines and discusses six themes or ways in which the conditions of memory making are being reconfigured. These themes illustrate both how algorithmic remembrance technologies conceptualise users, the nature of memory, and users' memory making practices. These themes are:

1. Unlimited
2. Smart
3. Organised
4. Searchable
5. Connective
6. Reminding

These themes highlight salient features and affordances of algorithmic remembrance technologies. They showcase the particular 'discursive regimes' (Kitchin and Dodge, 2011) of these technologies, that is the ways in which memory and users are imagined and discussed. They accentuate the ways in which memory technologies position themselves in relation to users and their memory making practices, along with the various roles played by algorithms. I argue that these themes, echoing David Beer (2019, p. 21), emphasise the ways in which these techno-

logies seek to 'instigate, facilitate and afford the expansion of data-led processes' into the realm of how people store, engage with, and relive their past.[48] As a result, algorithmic remembrance technologies can be seen to promote a view of memory and memory practices that is inextricably linked to algorithmic agency and dynamics, as intimately enmeshed with data-led decision making. Thus, I argue that the conditions of people's everyday memory practices being reconfigured in terms of the algorithm.

Before examining the first theme, 'Unlimited', which relates to issues and promises of storage, it is important to acknowledge the role and significance of commercial rhetoric. Although the chapter analyses technologies, products, that tech companies try to promote and sell, a danger would be to reduce these themes to solely being a marketing ploy, merely a way tech companies talk in order to sell. Instead, these should be seen as generative discourses and promises, as ways in which these companies and technologies 'configure the user' (Woolgar, 1990) and conceptualise memory and the social world in specific ways. As David Beer (2019, p. 21) suggests, discussing emergent themes in his analysis of the data analytics industry:

> We are looking here at marketing materials. We would expect them to attempt to sell the features and benefits of data analytics to an imagined customer. To reiterate my earlier point though, this requires us to see this not simply as an exercise in promotion but as a series of attempts to instigate, facilitate and afford the expansion of data-led processes of evaluation, judgement and decision making. This is the rhetoric aimed at oiling the spread of data and the type of calculative judgments, ordering and evaluation that it brings.

As Beer suggests, it is crucial to not only see 'exercises in promotions' when analysing the various features and affordances of algorithmic remembrance technologies; the appeal and attraction of these memory technologies lie in the features and opportunities they promise to their users. As Karen Barad (2007, p. 152) put it, 'the relationship between the material and the discursive is one of mutual entailment', adding that 'matter and meaning are mutually articulated.' For Barad, it is crucial to acknowledge the deeply intertwined and symbiotic relationship between discursive formations, material, and socio-technical practices. These algorithmic remembrance technologies promote particular discourses and conceptions about the relationship between algorithms and data-led processing, on the one hand, and storage

[48] It is also worth noting that these themes are often interconnected and sometimes overlapping.

opportunities and memory-making practices, on the other. These discourses and conceptions are generative, acting upon the world, becoming part of its reality. The themes discussed in this chapter explore the various ways in which algorithmic remembrance technologies shape the conditions of how memory-making practices are conceptualised, enacted, habituated and ultimately legitimated. This is explored in further detail below, in the first theme I call ‘Unlimited’.

4.3.1 Unlimited

One salient theme that emerged throughout an analysis of the corporate materials and documents was the notion of limitless storage. Given that many of these algorithmic remembrance technologies are cloud-based photo and video storage services, this may not be surprising. Yet, the language of limitlessness permeates the material, which has interesting implications for the ways people capture, store and curate their experiences. Many online storage services, such as Amazon Photos, state that in the App Store that they ’offer unlimited full-resolution online photo storage, and 5 GB free video storage, to Prime members, who can save and share their photos on desktop, mobile, and tablet’ and ‘Unlimited photo storage’ for Prime members. Similarly, the online storage service Google Photos promise in their Google Play entry, ‘Free storage and automatic organization for all your memories’, and that people need ‘never run out of storage again.’ Likewise, the photo backup and storage app Ever state in their promotional material that their users may ‘Get free, unlimited private backup of all your life's memories, from anywhere they exist’ as well as proclaiming that ‘We have the distinct honour of hosting your photos and videos, so that you are free to make memories.’

Before touching on this idea of being ‘free to make memories’ in more detail, as it is inextricably woven with the promises of limitless storage and therefore endless capture, it is worth pointing out that this language of near-limitless storage opportunities is also complimented by promises of security and safe keeping. Emphasising protection and securing people’s data is not surprising given the cascade of cases where people’s data has been variously compromised in recent times, most notably the case of Cambridge Analytica (e.g. Chan, 2019). That being said, the protection of people’s stored data is central to most, if not all, algorithmic remembrance technologies. This means that tag lines such as ‘Save, Organize & Secure Photos’ (Fotofami), ‘Protect and organize photos!’ (Ever), and ‘Finally move those family photos from your old laptop, your phone, and your desktop so they're all together in one safe place’ (Amazon Photos) are commonly seen throughout the data. Algorithmic remem-

brance technologies position themselves as the archons of people's digital memory objects, the gatekeepers, and protectors of people's mediated memory-making practices. Interestingly, the tagline from Amazon Photos pins 'old' digital means of storage against newer, 'safer' and more centralised cloud-based ones. This suggests that storage services such as 'old' laptops, phones, and desktops, are pictured as inadequate in this new age of cloud-based services; indeed, they are considered outdated both in terms of scope and security to facilitate people's current memory-making practices. In other words, algorithmic remembrance technologies frame issues of storage around notions of limitlessness and increased security.

It can be argued that these promises of infinite storage in the cloud are attempts to remedy the age-long angst that things decay, can be forgotten and forever lost, a sort of 'archive fever' (Derrida, 1995). Andrew Hoskins (2013), for instance, argues that whereas analogue objects inevitably decayed over time, digital objects and the digital archive ushered in what he calls 'the end of decay time'. Permanence became a reality with digital objects. Hoskins (2013) also suggests that following the rise of Big Data and data mining techniques, the mining and infinite retention of people's data became a desirable for data companies.

Crucially, data storage is depicted as a desirable to users as well. The threat of data loss is well depicted by the providers of Amazon Photos. Metalab, the company who helped to build the interface of Amazon's photo storage and management feature state on their website:

> After a series of discussions with Cloud Drive users, our design and product learned that people want more photo storage. Lots more. They constantly run out of space on their smartphones - and they worry about losing important visual memories… Precious memories are left, neglected in a disorganized mass, vulnerable to technical meltdowns. Not an ideal scenario.

Data loss, or the loss of 'important visual memories', is evoked here as a constant potential threat in the data age. The promises of unlimited storage are predicated on this threat. Algorithmic remembrance technologies such as Amazon Photos promise the security of unlimited and safe storage for users, who do not have to worry about their precious visual memories. Although the risk of data loss exists, and the anxieties attached to this risk are justified, it is also important to point out that the notion of data loss is, to some extent, produced by the technologies themselves, 'the enemy is created'. As seen in the case of Amazon Photos, data loss is figured as a threat to users, which in turn provides the rational basis for the platform itself. While data loss is figured as a threat, algorithmic remembrance technologies position

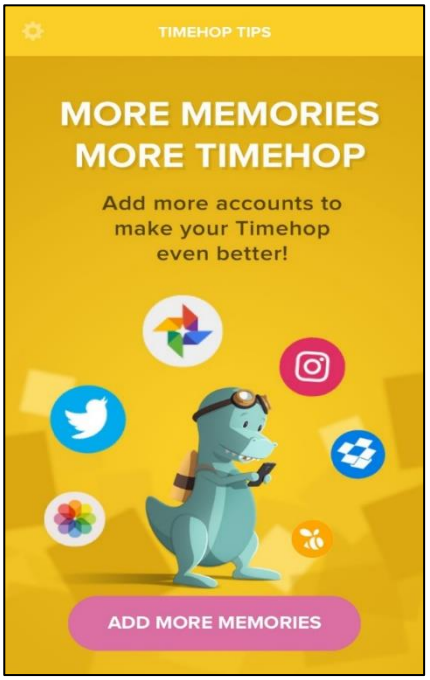
themselves as the solution. In a sense, the notion of people's loss of data is instrumentalised, evoked as a way to make platforms and features more desirable and necessary. Fear of losing one's data is used as a way for people to buy in, to use the platform, to become dependent on it. The simultaneous evocation of data loss and the promise of unlimited and safe storage is therefore a way to configure algorithmic remembrance technologies as indispensable in people's lives, as a way to promote and legitimate their data storing services.

The reason these technologies promise unlimited storage to users is hardly a surprising one. It highlights the 'logic of accumulation' (Zuboff, 2015) as well as the imperative of what Mark Andrejevic (2020, p. 34) calls 'total information capture', a drive central to surveillance capitalism. The desire towards capturing all facets of social life as data, Andrejevic argues, demonstrates surveillance capitalism's so-called 'fear of missing out': 'if everything is known, then all opportunities can be exploited – nothing is missed' (p. 7). In other words, everything needs to be made into data, everything must be captured, and everything must be utilised for commercial gains. This datafied 'fear of missing of out' is also well demonstrated by the claim made by Gus Hunt, the former Chief Technical Officer of the CIA, who stated 'we fundamentally try to collect everything and hang on to it forever' (cited in Sledge, 2013). Hunt was discussing storage and analysis capabilities and their relevance to surveillance. Total information capture, Hunt indicates, is crucial for extracting correlational knowledge from the data and being able to predict who may constitute a potential threat to national security. Within this perspective of total information capture, one cannot always know what data is important in the present until at some future point in time, when relevant correlations have been produced. The drive is therefore to capture everything because everything *might* be important. This coupling of promises of unlimited and safe storage is enveloped within this logic: let us store it for you, because it might be important for us in the future.

It is also crucial to point out that the promise of unlimited storage has implications for how people capture their experiences, how people produce mediated memories in the present. As the photos and videos storage app, Ever, state in a Medium article introducing the company: 'we have the distinct honour of hosting your photos and videos, so that you are free to make memories.' The key part here is the notion of 'making memories'. The suggestion is that storing and curating photos is framed as a kind of burden that limits how people make memories in the present by capturing experiences photographically. A similar link between better storage and therefore better means of capturing the present can be observed by one of the marketing taglines of the smart phone, Google Pixel, which states 'Google Pixel: Memories by You, Phone by

Google' and, again, 'Capture more details. Keep more memories.' At one level, this echoes Geoffrey C. Bowker's (2008) suggestion that memory-making practices for any given epoch will both reflect the material tools that facilitate them, but also point to a particular way of working on the present. As he observes, memory practices 'skew our available ontological space' (p. 71). They frame the present in a particular way, and often they 'indicate a drive to render the world memorable' (p. 16). As such, it can be argued that when the means and scope of archiving practices are extended and developed, it has a qualitative effect on the way the present is captured and remembered.

A certain drive to render increasingly larger parts of the world memorable are made possible by tools that promise unlimited and secure storage. In this case, the potentially infinite capacity for algorithmic remembrance technologies, many of which run cloud-based storage options, to store people's mediated memories drives a logic of 'free to make memories' (Ever) or 'capture more. Keep more' (Google Pixel). This is also echoed in of the slides when setting up the memory feature Timehop: 'More memories more Timehop.'



They make possible and propound a logic of incessantly working on the present. It is a logic that accentuates the *more*: capturing *more of* the present, keep *more* of it for the future, have *more* to look back on, and so forth. Echoing the notion of total information capture and the claim made by Gus Hunt, algorithmic remembrance technologies display a drive towards rendering the world memorable, regardless of whether or not experiences seem significant – they may *become* significant in the future. Memory practices, as both reflections on the past and a working on the present, therefore become caught in the interstices of what Bowker (2008) calls 'the potential memory' – namely, the extension of the '*might* be memorable' or the '*could* be important to remember.'

This idea of the potentiality of a memory would also help to explain the emerging attitude towards discard or deletion. In their Google Store entry, the producers of the smart phone Google Pixel pose the question 'Why Google Pixel?' and the answer is, 'Never delete a photo again. Take as many pictures as you want and save them with Google Photos' and 'You'll

never have to delete a memory to make room for a new one.' When storage is no longer considered an issue, then the idea of deleting photos takes on another meaning. Derrida's influential notion of 'archive fever' not only suggests a certain relationship between the archive and remembering or between remembering and forgetting; it also emphasises how techniques of archivisation produce a certain relationship to the present and, indeed, the future. The attitude of 'Capture more. Keep more' therefore seems to emphasise as much a relationship to the present as it does to the past. Yet, more significantly, there is a certain ideology hidden behind statements such as 'never delete' or 'you never have to delete'. If the aim for algorithmic remembrance technologies is total information capture, then acts of deletion seem to problematise this, seem to run counter to this logic. However, Alex Hern (2019) writes that although Facebook launched a 'clear history' feature on its platform, following the Cambridge Analytica incident, the feature will not actually delete anything from the platform. As Hern points out, when a user clicks 'clear history', they are instead simply 'disconnecting' their user data, which is still stored on the platforms' servers. Whether or not fully deleting one's data off a platform is even possible, it is reasonable to suggest that ideas of deletion still remain an undesirable user disposition from a platform perspective. Whilst unlimited storage benefits the user, who never has to delete a memory, it also obfuscates the underlying logic of data storing, the value and knowledge about users extracted from this data. In other words, the logic of 'never delete' is disproportionately beneficial to the algorithmic remembrance technology that may still 'try to collect everything and hang to it forever' (Sledge, 2013).

The slogan 'Capture more. Keep more' also reveals something telling in terms of how memory and remembering are conceptualised by algorithmic remembrance technologies. Memories, in this case, do not seem to be predicated on age and lived experience, or even social interactions, but rather on the production of digital traces. It is evident in one sense that these mediated memories, even though they carry traces of memories, meanings, and narratives, cannot be conflated with 'memories' per se. On Facebook, for example, 'memories' are carefully engineered and resurfaced objects consisting of past data such as posts, videos, photos, likes, shares, and friendversaries. These are programmed constructs. They are resurfaced at particular times based on a specific set of programmable criteria (Paluri and Aziz, 2016). In principle, therefore, any past data point can become 'a memory' on Facebook given the right combination of likes, shares, networks, and temporal position. However mundane and even unmemorable it may be, it can become worthy of remembrance if it fulfils the feature's criteria. With algorithmic remembrance technologies, there is a particular conceptualisation of what

constitutes a memory. There is an underlying logic that frames remembering not so much as a result of age, experience and situated sociality as of production, accumulation, and density. Algorithmic remembrance technologies tend to discursively conflate memories and their digital objects. The digital object – whether it is a Facebook post, Instagram picture, or a video stored on your smart phone - is often equated with 'a memory'. Whether or not these are memories per se, this tendency to conflate suggests something interesting about the changing nature of memory making. With algorithmic remembrance technologies, data points are compressed into 'memories'. In this view, memory making is intimately linked with how past data is stored, analysed, categorised, ranked, and resurfaced.

This compression of data points into memories also becomes apparent when thinking about the volume of data needed for these memories to appear. For example, when trying to access my 2018 Year in Review montage video on Facebook, I was met with a mostly blank interface, which stated:

> Thanks for being here! Benjamin, we don't currently have enough content to create your 2018 video. Keep posting to see more memories and have a happy new year.

On one level, this may seem self-evident: if one does not participate on a platform then there will not be any content for the platform to mine and resurface as 'memories'. Yet, this also begs the question: what is *enough* content? How much *more* do I need to post to start seeing my 'memories'? For the LG G7 smartphone, for example, this question becomes clearer and more unequivocal. Within the Gallery app in the smartphone, there is a section called 'Memories' that certain photos are grouped within at certain points. As LG states in their online Help Library, 'To create a Memories album, enable location information in the Camera app and take at least 10 photos.' It is important to note that both the LG smartphone and Facebook, albeit less explicitly, suggest a certain relationship between memory making and a threshold of participation, that is a certain level of participation that is needed for one's 'memories' to be produced and resurfaced. On memory features such as Facebook Memories, there is a certain minimum amount of uploading, posting, sharing, and liking one must do before one can take part in reminiscing – or, before the platform can resurface and remind users of their 'memories'. Therefore, the question is not simply about storing, but also about access and the criteria of access. On Facebook Memories and LG G7, the criteria for seeing 'memories' is based on the user's level of participation. As such, there seems to be an inextricable link on algorithmic

remembrance technologies between participation and ‘making memories’ as well as being able to relive them.

This logic signals a notion of memories in terms of capture, as documentation, as production, as a certain kind of freedom, that is, the ability to be ‘free to make more memories’ (Ever). As Michel Foucault ([1967]1984, p. 1) observed in his lecture ‘On Other Spaces’, ‘our experience of the world is less that of a long life developing through time than that of a network that connects points and intersects with its own skein’. The same can be said about the way algorithms and memory-making practices currently intersect. Memory making is about connecting and intersecting points and networks. It is more about capture and production, instead of lived experiences and a ‘long life developing through time’. As such, algorithmic remembrance technologies facilitate a shift in the way remembering is conceptualised. Through discourses of unlimited and safe storage opportunities, algorithmic remembrance technologies are shaping the conditions through which the present is captured and the past relived. Moreover, through discourses of ‘capture more’, these technologies are also shaping the conditions of memory making – as something produced, captured, accumulated, and resurfaced.

4.3.2 Smart

Another significant aspect that also emerged from the content material was the representation of algorithmic remembrance technologies as ‘smart’. The use of AI and machine learning is near ubiquitous in contemporary society. The use of ‘smart’ algorithms to find patterns in datasets, to generate correlations in quantities and frequencies, to reduce these into actionable outputs, is no longer solely the property of data analysts or programmers; its utility and relevance has spilled out into industries, social media, and everyday life at large. The use of AI and machine learning can also be seen incorporated into various algorithmic remembrance technologies. Many of these remembrance technologies employ discourses around ‘smartness’ and ‘smart technologies’ as a way of attracting customers and to frame themselves as providing cutting edge technologies that are dynamic in nature, taking part in how people store, curate and reflect over their mediated memories. Notions of smartness are integral to the ways algorithms are reconfiguring how people remember, how mediated memories are stored and organised.

Before I discuss what exactly is meant by these technologies being ‘smart’, it is first important to note that algorithmic ‘smartness’ is framed as a desirable attribute. For instance,

the photos storage app Ever state in a 2016 Medium article that 'you deserved a smart way to organize your photos, an easy way to backup all your photos, flexibility across devices, and powerful machine learning capabilities to identify the people, places, and things you love most.' As we discussed earlier, unlimited storage and easy backup was a central part of the message of algorithmic remembrance technologies. Similarly, the storage app links 'smart organisation' and 'powerful machine learning capabilities' together with notions of entitlement: you 'deserve' a smarter means of storage as well as powerful machine learning tools. These are framed as desirables and even must-haves for users, something one deserves and is entitled to in a data-driven age.

Another characteristic that is associated with these smart technologies is flexibility and adaptability. Personalisation is a common characteristic of machine learning, that is, adapting, and tailoring the experience of a product or a platform to each individual user. Crucially, algorithmic remembrance technologies are framed as smart and able to adapt to each individual user. Google Pixel, Google's answer to the smartphone, state that in their launch of Android 9 Pie they aim to provide a service that is 'powered by AI for a smarter, simpler experience that adapts to you.' Moreover, they aim to 'make your phone even smarter by learning from you and adapting to your usage patterns.' A central characteristic of machine learning and AI, adaptability is achieved through mining and analysing the user's data and attempting to predict future or likely behaviours, like what app one wishes to open next. Learning is evoked here as crucial to this process of adapting. Indeed, a device's smartness is dependent on the extent to which data is available, which determines what can learned from users' behaviours. As Luciana Parisi (2019, p. 4) observes, 'The more data is available the more learning there can be'. For instance, in their Privacy Policy, effective from May 2018, Google Photos states that their smart algorithm, which automatically organises and curates people's digital photos, is a result of learning from users through training data. Google states that 'understanding how people organized their photos in Picasa, Google's first photos app, helped us design and launch Google Photos.'[49] As such, the idea that smartness is inextricably linked to constant learning and data mining is apparent.

Although this may raise concerns, this smartness is framed as a positive aspect of using Google Photos, as enabling a more customised service to user, to provide benefits it otherwise would not have been able to provide. This way of framing smart algorithms can also be

[49] This raises interesting questions about Google's data mining practices, ideas of (positive) consent, as well as users' rights to object to the use of their data.

observed with Samsung. In their Privacy Policy document from 2018, Samsung states that their 'Customization Service' is 'designed to help understand your interests, preferences, and location, and collects and analyses information about you in various ways.' Through mining and analysing users' photos, Samsung's Customization Service is able to learn, understand and adapt – all for the benefit of the user. As Samsung states later on in their Privacy Policy, 'the more the Customization Service understands and learns about you, the faster and more accurately it can provide you with customized content and information.' Users are therefore encouraged to cooperate, or at least acquiesce, if they want customised, accurate, and fast content and information. As such, algorithmic remembrance technologies are able to adapt to users' preferences through the constant mining and analysing of their data. As such, AI and machine learning are framed as smart and beneficial tools, providing users with content that would not be possible without learning and their data acting as training fodder for the algorithm.

Although this allows technologies such as Google Photos to provide a more customised service to their users, it also makes it possible to predict, pre-empt, and ultimately shape users' behaviours on the platform. For Mark Andrejevic (2020), total information capture allows technologies to predict what users would like to see or engage with and in turn pre-empt these desires. As Andrejevic (2020, p. 77) argues, 'pre-emption is the collapse of the future into the present… this deferred future is collapsed into the present so it can be acted upon *now*' (original emphasis). In other words, pre-emption 'imposes the imperative of ongoing, incessant, and accelerated intervention' (p. 76). Through knowing users and their preferences, through the generation of correlations across the data, algorithmic remembrance technologies are able to 'know' the future and therefore intervene in the present. This computational collapse of the future into the present has also been called 'the politics of possibility' (Amoore, 2013), the idea being that uncertainties and uncertain futures can be reduced, through data mining and algorithmic calculations, to possible and actionable futures. Through the interconnections between data, analysis, correlation, and smartness, an important facet of the power and politics of algorithms becomes visible. As Amoore (2009, p. 22) states:

> Algorithms precisely function as a means of directing and disciplining attention, focusing on specific points and cancelling out all other data, appearing to make it possible to translate *probable* associations between people or objects into *actionable* security decisions (original emphasis).

As such, algorithms function to not only know and predict the future, but to make it actionable, to arrange time in such a way 'as to govern, to decide, or to act in the present' (Amoore, 2009, p. 5). As I suggest in the section called 'Organised', this algorithmic smartness is coupled with automation in a way that seeks to learn from users' behaviours in order to provide actionable or customisable content.

The idea of smartness is also intimately coupled with the idea of depth. Personalisation is a powerful way in which algorithms come to matter in the social world. On many algorithmic remembrance technologies, the ability to tailor content to each individual user and to adapt to each user's behavioural patterns is said to provide a 'deeper' understanding of the individual user themselves. For instance, Amazon Photos, deploy various computer vision algorithms, such as object and facial recognition, to understanding the ways in which people photographically capture, store, and engage with the present. In their 'Amazon Photos UI Design Case Study', the company and Amazon partner, Metalab, state that they provide users with 'a smarter photo experience'. They state that:

> Together we broke down the photo lifecycle and examined every detail that could be automated. That deep understanding of the 'capture, review, edit, share, store, and publish' cycle informed every decision.'

Amazon Photos' 'deep understanding' is predicated on the ability to pixelate and isolate data points in order to make analytics more effective. It is dependent on actively intervening in the photo's lifecycle, in order to assess the extent to which processes should be automated. In other words, smartness in this instance implies a tripartite form of understanding: an understanding of the technology and the algorithm, a deeper understanding of the so-called 'photo lifecycle' as well as an understanding of the habits and behavioural patterns of the users.

On one level, this evocation of '*deep* understanding' is a reference to deep learning and neural networks, which are designed to loosely mimic the operations of the human brain.[50] The implication is that the algorithm's smartness derives from their ability to discover patterns and in features in the data that would otherwise have been impossible. The evocation of 'deep understanding' suggests a novel mode of discovery, of finding patterns and deep structures in

[50] Deep learning is a specific mode of predictive modelling where algorithms recursively generate correlations and find patterns in large datasets, and in turn develop a set of rules to 'interpret' datasets. Once neural networks have learned how to identify patterns in training sets, they can be deployed to identify similar patterns and correlations in other similar data sets. For more on various machine learning and deep neural network systems, see Adrian Mackenzie's (2017) comprehensive overview in his book *Machine Learners*.

users' behaviours that users themselves were not even aware of. They are therefore depicted as inscrutable and powerful, as being able to dig 'deep' into the data and learn about users in a more intimate way. Through this form of 'deep learning', algorithmic remembrance technologies are therefore able to better provide users with 'the best'. For instance, the photo storage service Ever states in one of their promos that 'our platform is getting smarter and more relevant in re-introducing you to your best memories.' Deep learning is said to not only provides relevant memories, but the *best* memories. Of course, this highlights the link between algorithms and the production of relevance (Gillespie, 2014) whilst simultaneously raising the question: how to determine the *best* memories for someone? Yet, the evocation of deep learning suggests that algorithmic remembrance technologies are able to understand users on an even more granular scale and therefore provide them with their 'best memories'. Through this, smartness inextricably linked with ideas of data mining, prediction, pre-emption, and ranking. As such, algorithmic remembrance technologies position themselves as smart, as being able to learn, know, predict, and pre-empt what mediated memories users would like to engage with.

The idea of smartness is also intimately coupled with the idea of the individual user. For instance, one of Google Photos' promotional taglines is: 'Finally, a photo app that's as smart as you.' Here, smartness is figured in anthropomorphic terms, as something comparable and equal to humans. This is also echoed in the description of Google Photos on Apple's App Store: 'Google Photos is a smarter home for all your photos and videos, made for the way you take photos today.' In short, smartness is meant as beneficial to the individual users, to their individual way of taking photos. As such, algorithmic remembrance technologies such as Google Photos depict themselves as smart technologies able to reflect users' own patterns of image capture, technologies one can be alongside with, a harmonious balance and melding of individual human and machine agencies, a partnership between humans and algorithms. In this view, memory making practices are represented as a human-nonhuman assemblage, as a form of co-production between human actors and algorithms that are able to learn from users.

However, this agential balancing act obfuscates a crucial aspect of the power and politics of algorithms, namely the inextricable relationship between the individual user and the wider user population. As I pointed out earlier, Google Photos' algorithm was trained on data from user's behavioural patterns on the technology's prior iteration, Picasa. In the age of algorithms, mediated memories are never solely one's own. Of course, mediated memories are captured, stored, networked, and connected to those of others (connectivity will be discussed later). Yet, mediated memories also provide tech companies with data to train machine learning

algorithms and to generate patterns and correlations across their user base. As Lury and Day (2019, p. 18) observe about algorithmic personalisation, 'It is never about only one person, just me or just you, but always involves generalization'. Crucially, mediated memories in the age of the algorithm comprise, at least partly, the attributes, correlations, and patterns that have been generated across multiple data populations. As Taina Bucher (2020a, p. 615) argues, 'what a user sees is never just a reflection of their past choices and clicks but the image of multiple moments and residues of data involving others' – a point also developed at length in Louise Amoore's (2020) new book *Cloud Ethics*. Mediated memories, therefore, are not simply the result of individual habits – the ways they are captured, remembered, shared and networked with others – but rather the result of algorithmic calculations and the attributes, patterns, and correlations emerging from other people's data residues.

4.3.3 Organised

Closely related to the idea of smartness are the issues of organisation, classification, and order. Sifting through photos, organising them into folders, can be a daunting and time consuming task when one has 4000 images on one's the smart phone alone. Because of this, algorithmic remembrance technologies often position themselves as not only providing the means to capture and store photographs, but also as providing the means to organise them. Some technologies draw a sharp contrast between traditional means of organisation and the ones they provide, telling an attractive story of their own efficacy. The photo backup and storage app Ever, for example, state that 'Gone are the years of important memories stuck on the shelf collecting dust'. The implication is that using their app is a means by which these important memories are able to come to fore instead of lying dormant, collecting dust. On Samsung's Support Page 'Find Photos Quickly on Your Phone', they write that 'with so many photos, your Gallery is more unorganized than your desk.' The implication here is that there is something reassuring and comforting about the promises of centralising all memories in one place. As the photo storage service Fotofami states on their homepage, 'Save all your cherished photos and videos into one place', or as Apple Memories' tagline says, 'Single destination for your Memories.' Echoing Nathan Jurgenson (2019, p. 1), Samsung uses a metaphor here that 'frames newness within something familiar' in order to create a connection between the user and a novel product based on their emotional back catalogue.

Metalab, writing about their work on Amazon Photos, produce a particularly vivid picture of the importance of organisation: 'Precious memories are left, neglected in a disorganized mass, vulnerable to technical meltdowns. Not an ideal scenario.' As we discussed earlier, the risks of data loss are often evoked as a means to rationalise or justify the platform itself. Still, there is another suggestion latent in this statement. It suggests that traditional means of organising photos are inadequate given the increasing deluge of data as well as the new means of capture and working on the present. It is not enough for 'precious memories' to be captured, stored, and collated; they must be organized as well. In a sense, organisation is here framed as a form of memory work. One must make sure to 'keep your memories organized' (Amazon Photos) or, more profoundly, 'take care of your memories' (Ever). Organisation is framed as the equivalent as tending a garden that could soon overgrow. Therefore, it seems the act of actively organising or curating one's mediated memories becomes arguably more pressing as storage options continue to grow and capturing the present becomes easier.

Although algorithmic remembrance technologies encourage their users towards actively curating their digital photo libraries, they also position themselves as dynamic archons in their own right. As subscription-based genealogy app, MemoryWeb, states in the 'Our Story' section of its main webpage:

> We needed a photo app that could do more for us on all levels. More of the upload work. More of the organization. More to keep our photos safe but also at our fingertips. More to deliver effortless fun now and for generations to come.

In this context, the role of automation becomes increasingly prevalent. As there is a demand for an app that 'could do more for us on all levels', a need for automation is created at multiple levels of analysis, both in terms of upload work, organisation, and safety. This is what Mark Andrejevic (2020) calls 'the cascading logic of automation'. As Andrejevic (2020, p. 9) observes, 'automated data collection leads to automated data processing, which, in turn, leads to automated response'. In other words, automation necessitates further automation: 'once automated systems are used to make sense of the data, the next logical step is to automate response at scale' (p. 9). As such, with automation, there is an emphasis on the need to delegate more and more roles to algorithmic systems such as capture, storage, safety, organisation, curation. Increasingly complex systems, it is suggested, require increasingly complex modes of assessment and response.

The ‘cascading logic of automation’ as well as the evocation of organisation permeate the landscape of algorithmic remembrance technologies. Yet, it is crucial to note that automation is not coupled with organisation simply to make life easier for users; the automation of organisation necessitates further automation, namely of meaning and significance. Organisation and automation are used as a way to shape the conditions of meaning of the mediated memories themselves. For instance, platforms and features such as Apple Memories, Amazon Photos, Google Photos, and Ever automatically curate people’s photos into pre-existing folders, or what Apple calls ‘curated collections’. As Apple writes on their Apple Support page called ‘Enjoy Your Memories in Photos’, ‘Photos scans your library for significant people, places, holidays, and more, and presents them in curated collections called Memories. Day after day, you'll find new Memories ready for you to enjoy.’ Apple also states that their Photos app ‘automatically creates curated collections of your most meaningful photos and videos’. This means that the app creates collections of photos called ‘In Nature’, ‘My Four-Legged Friend’, and ‘On Holiday.’ Using computer vision such as image and face recognition technologies, the Apple feature can differentiate between various photos as well as deconstruct what each photo consists of. This can also be seen on Amazon Photos, where one is able to tag and search photos by keyword (searchability will be discussed below). Google Photos, for instance, is able to recognise, within each photo, categories such as people, places, things, faces, famous geographical landmarks, moments such as birthdays, buildings, animals, good, and so on. One common thread for these algorithmic remembrance technologies is that they can analyse the content in each photo and identify various visual features. In a sense, mediated memories are then not merely organised, kept in order. They are organised, automated, and curated according to their level of meaningfulness. Again, the cascading logic of automation can be seen at work: photos are automatically collected and stored, automatically organised, automatically assessed, which in turn makes possible their automatic resurfacing.

These automated categories of meaning, however, do not naturally reside in the photo. Rather, they are based on prior assumptions and understandings of what counts as meaningful. As seen by Google Photos and its former iteration, Picasa, these automated categories of meaning can also be based on correlations and patterns generated from large datasets. Crucially, however, these categories form part of what David Beer (2013) called the ‘classificatory imagination’ of algorithmic remembrance technologies. That is, they form part of someone’s vision of the world, someone’s conceptualisation of users, of memory and the role it plays in everyday life. For Beer, a classificatory imagination suggests an entanglement of

classificatory processes, both by human and nonhumans. On algorithmic remembrance technologies, this entanglement can be seen in the coupling of organisation and automation.

By evoking organisation, algorithmic remembrance technologies seek to participate in the shaping of the meanings attached to mediated memories. They are capable of not only reflecting what a person thinks is meaningful but also to shape the very parameters of meaningfulness. For instance, the app Ever state something similar in their tagline: 'Ever also organizes your photos to help you find and share the memories that matter the most.' Moreover, Google Photos wants to organise people's photos so that they may find 'your best moments', making sure that photos are 'automatically organized by what matters.' Through the relationship between organisation and automation, the politics and power of these algorithmic remembrance technologies comes to the fore. They generate the categories of meaning into which mediated memories are automatically organised. 'Curated collections' suggest grids of meaning that are produced and imposed on digital objects so as to appear more meaningful and memorable. Organisation and automation can therefore be seen to participate in the shaping and production of meaning as much as its ordering and organisation.

4.3.4 Searchable

Another theme that was salient throughout the content was the idea of searchability, that is, increasingly speedy navigational possibilities. As was discussed in the previous sections, algorithmic remembrance technologies are presented as unlimited, smart, organised, and automated. They are depicted as being able to learn what is meaningful for each individual and organise as well as automate accordingly. The idea of rendering photos and videos searchable emerged repeatedly in the data. For instance, in their Apple's App Store entry, Amazon Photos encourage their users to 'search your photos to find your memories' and that 'your photos are now searchable… no tagging required – just search 'dog' to find all the photos of your pup.' In Google's smart phone, Google Pixel, one can search pictures by 'location, keywords or even emojis to quickly find and organise your photos.' The same search criteria can be found on Amazon Photos and Apple Memories, where users may search based on animals, objects, and people as well as locations and environments such as sunsets and beaches. Moreover, Swarm, the lifelogging app developed by Foursquare Labs, Inc., also uses geotagging data to identify where people have been or where they have checked into. The app has incorporated a search feature within their platform, where users are able to search for past check-ins, cities, and types

of places such as hotels, restaurants, and shops. Their aim, they state in a Medium article introducing Swarm 6.0, is to help you 'remember all the places you've been and lets you instantly rediscover them through search or browsing the map.' Search seems ubiquitous to the efficacy of algorithmic remembrance technologies.

One obvious reason for the widespread use of search is, of course, findability or speedier retrievability. As was discussed in the section on storage and capture, the current trend towards increasing storage and capture of the present means both that organisation will be increasingly important and that the ability to find certain things becomes more desirable. Organising thousands of photos and finding individual ones can be time consuming tasks. The emergence of searchability can therefore be seen as both an extension of the use of machine learning and automatic organisation as well as a way to navigate people's ever-growing digital photo libraries. The logic of unlimited storage is inextricably linked with the logic of 'capture more'. As Amazon Photos state in their App Store entry, 'Your photos are easy to find because the app organizes your photos automatically.'

Yet, the ways in which mediated memories are rendered increasingly searchable and findable, is inextricably linked to the emergence of a widespread 'culture of search' (Hillis et al, 2013). With the advent of Google, search became a prevalent mode of knowledge acquisition, shopping, and just being in the world. As Hillis et al. (2013, p. 4) claim, search is 'operationalized across the Web as a way of life.' Indeed, according to some scholars, search engines reflect 'an increasing cultural expectation of being able to search for items' (Anderson, 2018, p. 8). This cultural expectation has also permeated algorithmic remembrance technologies, many of which are part networking sites, part search engines, part memory tools. The idea of searchability suggests the extent to which mediated memories have been pixelated and rendered knowable by algorithmic processes as well as the extent to which memory practices have been streamlined – there is no longer a need to sift through an extensive digital album when it is automatically organised and rendered searchable for users.

Still, there is also a need to think about searchability in terms of data mining and value. The power and efficacy of search engines such as Google derived mainly from them capitalising on people's searches, which in turn made it possible for the search engine to algorithmically rank searches (i.e. the PageRank algorithm),[51] as well as to order people's parameters of vision and attention (who cares what is on page 15 of a Google search?). As such,

[51] For more on the PageRank algorithm, see Introna and Nissenbaum (2000) as well as Pasquinelli (2009).

searches become financially incentivised, modulating visibility, and ensuring that certain third-party ads remain visible to the right kind of audience, echoing Lucas Introna's (2016b) notion of 'algorithmic choreography'. However, there is scope to examine what impact the politics of search and algorithmic mediations have on people's memory practices.

For many algorithmic remembrance technologies, the idea of searchability is also often coupled with the notion of speed or speediness. Users can find particular images fast based on the particular search criteria the technology provides. Throughout the material, phrases such as these were common in the data: 'find your photos fast' (Google Pixel), 'Prime Members can quickly find any specific photos by searching for the things in their images, like 'dog', 'sunset', or 'Seattle'' (Amazon Photos), 'Find your photos faster' (Google Photos), and 'Use Siri to quickly pull up photos and memories based on people, places, events, time, and keywords of objects and scenes in the photos' (Apple Memories). As the last example suggests, search can also be instantiated through voice commands, which in turn evokes an interesting set of debates around the use of digital assistants, data mining the voice, and surveillance (e.g. Brause and Blank, 2020; Hoy, 2018).

There is a considerable overlap, in this case, between the logic of search and the data imaginary of speediness found in the data analytics industry. David Beer (2019) argues that the notion of speed is vital when seeking to understand the seductive powers and potential of the data analytics industry. Whereas Beer discusses how data analytics allows companies to work on data rapidly, instantly, and continuously, algorithmic remembrance technologies tell users they can organise and search for their mediated memories with increased speed. As Swarm, the lifelogging app, state in the Medium article introducing Swarm 6.0, they let users 'remember all the places you've been and lets you *instantly* rediscover them through search' (emphasis added). The approach to big data in the data analytics industry is mirrored here in the wide-spread capture and curation of everyday experience through photos and videos. The same logic of 'real-time' spills over into this context: the gap between capturing the present and remembering the past is increasingly reduced, becoming almost instant with searching. It can even be argued that this is an example of how the 'data gaze' (Beer, 2019) has been extended beyond the walls, the physical and ideological parameters, of the data analytics industry, spilling over into everyday life, affecting how people capture, store, curate and reflect back on (past) data. The message of algorithmic remembrance technologies is clear: through our service, you are able to store unlimited digital traces, capture more of the present, worry less about the organisation of these mediated memories, and find these photos quicker through our cutting-

edge search functionalities. Within this framework, searchability is seen as a key aspect of these algorithmic remembrance technologies, a seductive feature where the intersection between algorithms and memory-making practices is becoming ever more apparent.

For some algorithmic remembrance technologies, such as Apple Memories, searchability is not only coupled with speediness, but also with machine learning and 'smart' algorithms. One of Apple's taglines in their iOS 12 software update was 'A smarter way to search your phone.' In other words, the software update was an attempt to make search more salient, effective, and smart. As they stated, one of the benefits of the iOS 12 update was the 'search enhancements' they had developed: 'Search enhancements make it easier to find your photos with intelligent suggestions and multiple keyword support.' Through incorporating machine learning algorithms that learned people's habits and patterns of behaviour, Apple made it even more effortless to find and draw out whatever one was looking for on their phone. This notion of 'smarter search' was also extended to Apple's Gallery feature. They state in their introduction of the iOS 12 smartphone update:

> Even before you start typing, you'll see suggestions for recent events, people, and places. And as you type, the results are smarter and more powerful, and you can refine them by adding multiple keywords.

These search suggestions are framed as a 'smart' tool, and one which can be further refined to make it even smarter. This idea is furthermore framed within a discourse of power and empowerment, as one does no longer need to know the exact photo one is looking for.

Yet, something interesting happens in the intersections of search, smartness, and automation. Exactness becomes proximity; the search terms need only be 'close enough' to the metadata of a photo in order to find it. As Gillespie (2014, p. 174) points out, algorithmic outputs or predictions need only be 'sufficient approximations' to be effective. Proximity and approximation become the responsibility of the algorithm. As is stated on Apple's introduction of iOS 12, 'Search suggestions help you find the exact photo you're looking for or rediscover a great one you forgot about.' This language of exactness, conceptualised in relation to search suggestions, also echoes claims of objectivity and accuracy that mirror some of the characteristics and promises of Big Data (Kitchin, 2014a). It is a language steeped in the confidence that being able to 'search, aggregate, and cross-references large data sets' (Boyd and Crawford, 2012, p. 663) about people inevitably results in accuracy and exactness. The equation of becomes increasingly apparent: more data, more sufficient approximations, better search

suggestions, quicker retrieval. As digital traces such as photos and videos are increasingly pixelated, they are becoming better 'known' by machine learning algorithms. They become machine legible. These algorithms are able to break down the composition of a photo and attempt to organise according to what is considered meaningful categories. Through these examples, the theme of searchability emerges in relation to the way algorithmic remembrance technologies mediate memory-making practices. Moreover, it is coupled with notions of speediness, ease, accessibility, and exactness. As mediated memories become increasingly searchable and retrievable, they are rendered more instant and present. What effects this has on human memory and everyday memory practices will be explored in chapters five and six.

4.3.5 Connective

Another aspect which emerged repeatedly throughout the material was the way algorithmic remembrance technologies represented themselves as connective or networked devices. For instance, apps such as Timehop repeatedly state in their promotional material that they 'help you celebrate the best moments of the past with your friends' and that 'The best memories are the ones with friends!' Facebook Memories, when resurfacing people's memories on their Timeline, state 'we care about you and the memories you share here' and 'Only you can see this unless you share it.' Moreover, Google Photos provides users with so-called 'shared albums', which 'pool photos with friends and family using shared albums. So you never miss a moment, no matter what device everyone has.' Evidently, sharing is a crucial way in which the connectivity and relationality of algorithmic remembrance technologies is operationalised, an important aspect of participating on the platform or feature.[52] As such, sharing mediated memories with others is made as easy, as convenient, and as streamlined as possible. After all, mediated memories do mediate human relationships (van Dijck, 2007).

However, connectivity, sharing, and participation are salient ways which the logic of surveillance capitalism becomes visible on these memory technologies. As I mentioned earlier, data becomes an increasingly central resource for the production of monetary value. As such, it is crucial to note that remembrance technologies shape the conditions in which data is produced and shared by users. For instance, Taina Bucher (2012b) argues that Facebook seeks to configure users who participate, communicate, and interact through a particular regime of visibility, through the operational logic of Facebook's EdgeRank algorithm, where users must

[52] For more on the logic and ecosystem of connectivity, see van Dijck (2013).

constantly engage with and participate on the platform so as to not succumb to the 'constant possibility of disappearing and becoming obsolete' (p. 1164). Indeed, the financial value of such platforms is interwoven with and predicated upon people's levels of participation on the platform. One can argue that algorithmic remembrance technologies are similarly underpinned by a logic of participation, one which says 'capture the present. Constantly share it with others.' Through constant sharing, these memory technologies seek to drive activity amongst their users, to induce and maintain a user base that actively participates.

Yet, going further, one could also argue that these algorithmic remembrance technologies represent an increasing intensification of connectivity amongst users. Through the use of machine learning algorithms and AI, they embody a greater push towards constant networked sharing. These technologies are synthesised to afford an amplification of sharing as a means of connecting users into categories and networks of meaning: families, friends, partners, and so on. Many of the platforms and apps draw on machine learning to develop, what Apple said about their iOS 12 update, 'a new way to share your best photos.' It is a mode of participation and sharing supplemented, augmented, shaped, and ultimately reconfigured through machine learning. This is also demonstrated by a feature that Apple Memories call 'Sharing Suggestions.'[53] This feature will both 'show you great moments from your photo library' and then it 'intelligently suggests sharing photos with the people in them.' As such, we see the coalescence of sharing, automatic categorisation, and 'smart' algorithms (or increased 'intelligence') in mediating people's memory practices and their sharing habits. Mediated memories are therefore not only produced digital traces, data points compressed into memories; they are also made amenable to ever more intelligent ways of diffusion. These Sharing Suggestions are framed as an intelligent way to share with others. Their intelligence is derived from the data the features have collated and analysed from users' behavioural patterns. In this case, the use of machine learning is not only used to better organise people's photos nor to render them easily searchable; they are also used to learn, understand and intelligently predict what mediated memories people find meaningful *and* are likely to share with others.

Google Photos has a similar feature called 'Suggested Sharing', which they launched on their platform in 2017. When describing the particular sharing feature, they stated on their blog titled 'Give and get the photos you care about':

[53] This functionality was rolled out on their iOS 12 software update.

> Suggested sharing uses machine learning to automatically identify photos and suggest recipients, making sharing as simple as a single tap. With shared libraries, sending and receiving photos with one person is effortless - You can automatically share your full photo library or customize just what you want to share.

Their description uses some striking keywords which need further unpacking. Machine learning and automation are framed as tools of simplification, a means of making sharing easier ('as simple as a single tap'). Curiously perhaps, the suggestion is that using increasingly complex systems will generate simpler solutions. Sharing and receiving photos becomes "effortless" with the incorporation of machine learning. This is clearly a prominent part of why these technologies are so seductive: they promise something automatic, simple, and effortless; let our intelligent algorithms do more so you have to do less. Sharing becomes increasingly automatic and frictionless.

The automatisation of sharing is also coupled with the suggestion that smart algorithms are able to know and predict meaningful interactions. For instance, the smartphone application, Apple Memories, suggests that 'Photos understands when you've done something meaningful, like taking a trip or attending an event, and will suggest sharing the photos with the people who are in them.' The emergence of automatic categories of meaning suggests that the algorithm not only 'knows' and is able to predict what mediated memories users will want to engage with, but also to who they are likely to share these mediated memories. This is also echoed by Google Photos in their introduction of the 'Suggested Sharing' feature, who state that 'you'll see your personal suggestions, based on your sharing habits and the people in the photo.' It becomes apparent that the intensification of connectivity, the interweaving of sharing, participation, and smart algorithms, is predicated on the data they have already been able to mine and analyse about users' behavioural patterns. How people have shared mediated memories in the past will to a large extent determine what sharing suggestions individual users will see. In other words, algorithmic remembrance technologies are presented as being able to provide a service that both learns from, understands, and in turn is able to predict how a user will act or share.

One can therefore argue that these technologies drive an intensified form of connectivity, through AI, machine learning and suggested sharing, amongst users. Participation is no longer just a matter of prompting sharing amongst users; in a sense, this form of activity is too

general. Rather, these technologies have the capacity to analyse, know, and predict people's sharing habits on a more granular level. This may create the perception that sharing, and sharing suggestions, become increasingly intimate, being able to 'accurately' suggest what mediated memories users should share with whom. In a sense, the engagement with mediated memories is increasingly transfigured in terms of a logic of targeting. But fundamentally, these predictions are productions (Mackenzie, 2015). As Adrian Mackenzie (2015, p. 443) suggests, predictions depend on relatively stable forms, categories, and classifications in order to function optimally. A potential danger of such stable forms is the way in which they may obfuscate variations that do not fit these forms. In other words, what if someone is sharing habits fall outside the prescribed grammar of sharing that these algorithmic systems provide? People are highly networked, and the push for smarter sharing patterns is a means to web people together in even more intricate, if not intimate, networks of programmed sociality. Yet, the question remains how the production of prediction changes the ways in which people remember and engage with their past.

Given that algorithmic remembrance technologies seek to mediate people's memories, it is crucial to interrogate how these conceptualise sociality. In other words, what categories of 'the social' underpin these memory technologies? One of the ways 'the social' is imagined can be seen on Amazon Photos. As Metalab, the company behind the production of Amazon Photos' interface, write in their description of the photo storage service: 'Amazon Photos redefines how families experience their photos, while allowing them to rediscover their memories in more meaningful ways. After all, isn't that the whole point of our daily snapshots?' The emphasis here is not only the way memories are shared amongst people or the way memories mediate relationships. Amazon Photos' feature aims to change the way families relate to their photos, how they rediscover them, and how they experience the present. As Metalab further state, 'It's an end-to-end experience that automates discovery, organization, and photo sharing for busy families'. The coupling of sharing and automation is framed as tailored for 'busy families'. The application is therefore presented as well suited to certain relational structures (such as families) and, more specifically, a certain configuration of these relational structures (such as *busy* families).

In order for the technology to be tailored to 'busy families', it is reasonable to suggest that Amazon and Metalab had an already-made notion of the family in mind when developing and rolling out the technology. The algorithms, in this case, can be seen to replicate and perpetuating certain normative values of family relations whilst also 'scripting' a particular

notion of the family. This could also be an example of conceptualising the family as a 'platformed' structure (Goulden, 2019), and therefore amenable to the various logics of platforms. Thus, it can be argued that the line between rendering technologies amenable to certain pre-existing relational patterns, on the one hand, and subtly shaping and (re)producing the conception of those relational patterns, on the other, is fluid and ambiguous. In short, where to draw the line between descriptive and prescriptive design.

To say that these platforms and apps are connective is therefore not merely rehashing prior arguments about how digital media connect people in various overlapping networks (e.g. van Dijck, 2007; 2010). It is pointing to the entanglement between memory making and sociality in the age of algorithms. As van Dijck (2013, p. 20) aptly observes, 'Sociality is not simply 'rendered technological' by moving to a digital space; rather, coded structures are profoundly altering the nature of our connections, creations, and interactions.' This section has attempted to show how mediated memories and connectivity, as a particular logic, are framed and evolve when interwoven with increasingly sophisticated automated processes. In this context, algorithmic remembrance technologies become a prism through which we can see how intensified connectivity is changing our media landscapes: evolving, becoming faster, easier, smarter, more automated, more intimate, more suggestive, more predictive. Algorithmic remembrance technologies represent an intensification of the logic of connectivity while being able to mediate human relationships on an even more intricate level. More generally, the combination of machine learning and sharing can be seen as an attempt to enhance participation amongst users on these different algorithmic remembrance technologies. But it is also important to note that algorithmic remembrance technologies seek to mediate not only the levels of people's participation but the nature of participation itself, shaping both the content of what is shared and the directionality of what is shared to whom.

4.3.6 Reminding

Another salient characteristic that emerged from the content material was the role of the reminder. Reminding often figures as central to how algorithmic remembrance technologies operate. Reminding relates to the ways in which past images and videos are brought back to the present, bringing back past data points or digital traces one has scattered throughout the years. With features such as Apple Memories and apps such as Timehop, for instance, it denotes the re-surfacing of past photos on the phone. In short, it is a mechanism of resurfacing. The

reminder is also variously conceived or framed in positive terms such as 'throwbacks' (Fotofami), a way to 'relive' (e.g. Apple Memories, Samsung Stories) and 'rediscover' (e.g. Amazon Photos, Swarm, Google Photos) memories, a means of being 're-introduced' (Ever) to ones memories, and so on. The affordances of storage and capture seem inextricably linked to the idea of actively resurfacing past memories.

For many applications and platforms reminding is central to their functionality (e.g. Timehop), whereas for others the reminder is an add-on feature (e.g. Facebook). On Instagram, for instance, where posting and sharing photos is at the core of the application's DNA, one can encounter notifications such as 'See your post from 5 years ago today,' which have an icon of a clock going backwards. These are becoming increasingly mundane parts of the digital landscape. Snapchat is perhaps the most obvious example of a platform switching their business strategy from photos (or 'snaps') that fade after a certain number of seconds towards something that can be captured and stored indefinitely. Snapchat introduced the feature Memories which allowed users to collate, edit, and reshare their favourite snaps at a later point. It is Snapchat's take on the digital, personal archive. But it is not only a tool for capturing and storing snaps. The feature also contains a functionality called 'Flashback', which pulls Snaps from Memories and resurfaces them to users as 'Flashback from a year ago' on their annual anniversary. It is a way for users to relive and reflect over their favourite snaps and the memories behind them. Lastly, for platform features such as Facebook Memories and apps such as Timehop, the reminder is a vital part of how users experience and use the app. Timehop, for instance, collates a user's photos and videos that have been posted across their preferred social media platforms and they show these 'memories' on their anniversary, be it one year ago, two years, or 8 years ago. In the app's Setup, one can choose for these memories to be delivered on a daily basis by pressing 'Remind Me!' The throwback or the memories reminder may seem like an inconsequential functionality in the grander design of platforms such as Facebook or apps such as Snapchat. Yet, they are becoming an integrated way for people to engage and reflect with their past photos and mediated memories.

In one sense, the reminder is emblematic of the digital archive having become crucially algorithmic or dynamic, as Wolfgang Ernst (2018) observed. Reminding has always been an everyday contour of the memory make up. As scholars have pointed out, reminders are commonly used as tools of productivity and time management. Examining the intersections of time keeping and the Silicon Valley, Judy Wajcman (2018) argues that there is an increased interest in making reminders 'smarter', to develop smart scheduling applications that 'codify

contemporary ideals about efficient time management' (p. 1). As Casey (1987) states, it is a fundamental modulation of remembering. Yet, through algorithmic remembrance technologies, the reminder is increasingly instrumentalised as yet another way to shape and produce relevance and meaningfulness. Reminding is not only a way for users to encounter past mediated memories, or being prompted to revisit and engage with these; rather, to echo Tarleton Gillespie (2016, p. 2), reminding is a way that offers users past but *relevant* content and thus offers them 'entry into and avenues through the archive.' This, in turn, keeps users on the platform for longer (i.e. stickiness) whilst simultaneously 'collecting more valuable data about them' (p. 2). As such, reminding becomes a form of *automatic navigation*, one which navigates users through their large database of past data, providing them with relevant entry points and avenues. Yet, it also provides platforms with another a data mine, that is, people's engagements with their mediated memories.

In order to understand more fully the role of the reminder in the algorithmic mediation of memory, there is a need to examine in more depth some of the ways in which reminding is framed by memory technologies. These discursive frames around reminding help posit algorithmic remembrance technologies as powerful tools in memory and meaning making practices. One of the ways in which reminding is framed is through the language of 'rediscovery'. As the photo application Ever puts it in one of their main taglines, 'Ever is a company dedicated to helping you capture and rediscover your life's memories.' The tag line for Apple Memories is 'Rediscover favourite and forgotten moments from deep in your photo library.' As these statements suggest, the capturing of the present and the rediscovery of the past are seen as deeply intertwined. The function of rediscovery is predicated on users capturing the present. There is also an interesting metaphor of the 'library' and of 'depth' at play here. A user's Gallery on Apple is compared to a photo library, a place where captured memories are stored but run the risk of lying in the depths of the library, dusty and forgotten, dormant and useless. But through algorithmic discovery, forgotten moments are revitalised, reanimated, and brought back to life. In short, they are brought back to the surface. The terminology of 'hidden' and 'deep' on algorithmic media can be read as a reference to the 'hidden layers' of deep neural networks, which means that this act of digging therefore is a very specific one – one which is complex, automatic, inscrutable, algorithmic, and ultimately useful.

The idea of rediscovery as a form of resurfacing mediated memories simultaneously perpetuates and problematises the notion of 'dormant memories', which was discussed in the literature review. It is perpetuated in the sense that rediscovery presupposes something hidden,

something latent, something dormant. In a sense, mediated memories must be dormant for them to be algorithmically rediscoverable. Yet it is problematised in the sense that rediscovery also indicates that mediated memories are, in fact, never truly dormant. Through these algorithmic systems, mediated memories are always in a state of *potential rediscoverability*. In other words, they are 'potential memories' (Bowker, 2008) because they may at any time be resurfaced by the algorithm and 'rediscovered' by the user. As such, reminding as rediscovery as well as the use of algorithmic systems suggests that mediated memories are more 'lively memories' than 'dormant memories': always in state of rediscoverability, potentially resurfaced.

The idea of rediscovery is also connected with making memory making more convenient for users. This is echoed in promotional statements such as:

> As your photo library continues to grow, we hope that features like this one make it easier to look back at your fondest memories (Google Photos).
>
> We're making it easier to look over the most recent highlights from your photos. If you take a lot of photos of your child, for example, you may occasionally get a card showing the best ones from the last month (Google Photos).
>
> It's become even easier to easier to access, organize and relive these memories wherever you are (Ever).

Features like the reminder is framed as a tool which is supposed to make it easier to reminisce. It is framed as tool as a tool which bypasses the hurdles and labour of organising one's photo library. As the algorithm resurfaces the 'most recent highlights', users 'are free' to engage with potential memories without having to spend excess time categorising and curating the ever-growing photo library. As was discussed earlier, the reminder becomes another way to position users as 'free to make memories.'

Yet, it is crucial to interrogate the politics of this reminding feature. Algorithmic remembrance technologies represent themselves as memory prosthesis, as merely memory practices easier and more convenient for users. However, through the resurfacing of mediated memories, an additional circulation of data (Beer, 2013) is introduced into the blood stream of people's digital lives. Being revisited by past memories generates new situations where users may like, share, or otherwise engage with their data, which in turn creates new knowledge about the user and creates more value for the platform. As Lee Humphreys (2018) argues, when

we are reminded of various mediated memories, the structures that underlie those memories are also ritualistically reinforced (as well as those relational and social structures those mediated memories portray). It is therefore crucial to note that such reminders simultaneously reinforce and legitimate the technologies that facilitate these memory-making practices. The memory technology seeks to render acts of engaging with one's past data an habitual occurrence; it seeks to legitimate algorithmic remembrance technologies as part of people's everyday lives.

Through this characteristic of reminding, notions of storage, capture, smart organisation, sharing, and resurfacing are seen as intimately linked in an economy of algorithmic remembering. In this economy, people can store more, capture more, and organise less. Reminders become more specific and more intimate, and sharing becomes increasingly inevitable or at least desirable. It is an economy which seeks to frame remembering within a framework of deep understanding, participation, and connectivity. Reminding becomes a form of mediation, a way of mediating past data and legitimating the continual engagement and sharing of past data. But more than that, the ways in which mediated memories are resurfaced by algorithmic remembrance technologies shapes the conditions of memory making.

4.4 Conclusion: Mediated Memories as 'Quantifiable Field of Frequencies'

In this chapter, I have looked at what happens specifically when the conditions of memory-making practices become algorithmic. As was said in the chapter introduction, algorithmic remembrance technologies are reconfiguring the conditions of memory making and what memory means. I have argued that algorithmic remembrance technologies are driving, to echo Hoskins (2016b, p. 15), 'an ontological shift in what memory is and what memory does', which in turn gives 'remembering new scale'. I has shown how the conditions of memory making have become deeply computational and algorithmic. More specifically, I have discussed six ways in which mediated memories have been pulled within the remit of datafication and computational thinking. The chapter has also sought to examine how algorithmic remembrance technologies conceptualise the relationship between memory and algorithms. It looks at the potential ramifications of memory objects being reduced to data points to be mined and processed by machines.

I argue that mediated memories are not simply amalgamations of brain, material objects, and culture, as van Dijck (2009) suggests. Rather, I argue that in the age of the algo-

rithm mediated memories constitute what Michel Foucault (1971) calls 'a quantifiable field of frequencies.' What is meant by this? In his *Archaeology of Knowledge*, Michel Foucault (1971, pp. 51-52) describes the hospital as 'a place of constant, coded, systematic observation… constituting a quantifiable field of frequencies.' For Foucault, the hospital was not primarily a place for the careful analysis of bodily sensations or sensory experiences. It was a discursive space. It had become a place where these embodied sensations were subsumed and analysed within a framework of quantification and calculability, trial, and error. It was a place with constant, coded, and systematic observation, a place where symptoms and illnesses were reduced to repetitions, frequencies, and quantifiable patterns and correlations. Reducing illnesses and symptoms into quantifiable patterns and correlative knowledge rendered them increasingly knowable and manageable to medical professionals. And as a quantifiable field of frequencies, the hospital signified a promise to manage and eradicate illnesses through numbers, through systematic observations and correlational knowledge.

Memory making, in the age of the algorithm, similarly constitutes a 'quantifiable field of frequencies.' Mediated memories are reduced to that which can be datafied, pixelated, analysed, counted, coded, classified, ranked, automated, and algorithmically resurfaced. Algorithmic remembrance technologies seek to render memories more machine-readable and more susceptible to computational problem-solving, more searchable, more quantifiable, and thus more easily manageable. As the chapter has shown, mediated memories constitute the patterns and correlations that have emerged through mining users' data and using it as training data for machine learning algorithms. They are reduced to frequencies in people's behavioural habits, frequencies that are then made actionable in the present through algorithmic resurfacing. As such, there are echoes of the clinical approach that Foucault spoke of, a logic of observation and quantification, at work within algorithmic remembrance technologies.

There are two overarching ways in which mediated memories are reduced to a quantifiable field of frequencies: pixelation and exteriorisation. Generally, these represent simultaneous yet inverse movements: a movement inward and a movement outward respectively. Pixelation, taken from Louise Amoore's (2009) work, refers to the processes by which mediated memories are increasingly deconstructed on a granular level, broken down into fragments or pixels so as to become more 'knowable' to the algorithm. The engineers at Facebook Memories call this process 'content understanding' (Paluri and Aziz, 2016). In this process, the focus moves away from the individual user and to the mediated memory itself. Using convolutional neural networks, Facebook Memories is able to identify and recognise

various visual concepts within each photo or ‘memory’ such as objects, scenes, actions, and places (Paluri and Aziz, 2016). Through pixelation, mediated memories are deconstructed to reveal their ‘hidden’ visual components. As a result, machine learning algorithms are able to provide a more granular understanding of what is contained within user’s ‘memories’. In other words, memories become increasingly perceptible and readable to the algorithm. As a result, mediated memories are dislodged from the brain, embodiment, socio-cultural networks, and material objects. Rather, pixelation is a ‘strategy of separation and isolation’ (Amoore, 2009, p. 19), a process in which mediated memories can be known on a more granular level so as to afford their automation, classification, and resurfacing.

Exteriorisation, on the other hand, represents the opposite movement. Mediated memories are a result of the patterns and correlations that are generated through machine learning algorithms. For French archaeologist Andre Leroi-Gourhan (1993), human memory was fundamentally a product of ‘exteriorisation’, the process by which it is stored within the geographically, biologically, and socio-culturally bounded regions of ethnic groups. On one level, algorithmic remembrance technologies suggest a drive to externalise and diffuse remembering across various platforms and software features. In the age of the algorithm, remembering is further externalised and exteriorised, distributed across a plethora of digital archives, databases, algorithmic networks, platforms, and applications. Yet, mediated memories are also exteriorised in the sense that they constitute the always-already Other, or better yet, Someone Else. That is, as the conditions for memory making become algorithmic, mediated memories are never purely one’s own. They are, to a large extent, the product of the memory practices of others. They are constituted, promoted, and resurfaced as a result of the patterns that have been generated from a wider user population. As such, mediated memories come to constitute a quantifiable field of frequencies through this dual motion of pixelation and exteriorisation – the move inward, towards the granularity of mediated memories as data objects, and the move outward, towards the patterns and correlations generated from the algorithmic clustering and analysis of other people’s memory making practices.

Lastly, it is crucial to return to the underlying logic of surveillance capitalism. As mediated memories are ontologically reconfigured as a quantifiable field of frequencies, they also become economically valuable. On the one hand, the intersections between algorithms and memory can be reduced to platforms and data companies wanting to increase activity and participation amongst their users. On the other hand, they represent a drive to ‘know’ (Thrift, 2004) users on a deeper level, encapsulating their mediated memories within the remit of what

counts as knowledge. As mediated memories are automatically categorised and resurfaced in the present, more opportunities for user interactions are generated, which in turn makes the user more amenable to algorithmic recommendation systems. As mediated memories are reduced to a quantifiable field of frequencies, they become more easily knowable and actionable, additional entry points for third parties.

In the next two chapters, I will examine both users utilise and negotiate these technologies in their everyday lives (chapter five) and how these technologies affect and shape people's memory practices in the present (chapter six). In the following chapter, I discuss the various ways in which users utilise and negotiate these technologies while 'emplotting' a sense of self through time.

5.0 The Emplotment of Mediated Memories: How Humans and Algorithmic Remembrance Technologies Shape Identities

5.1 Introduction

As I pointed out in the previous chapter, there is an emerging landscape of algorithmic remembrance technologies that has the potential to variously shape remembering and everyday memory practices. I argued that these technologies have the capacity to shape memory making through diverse algorithmic processes including curation, classifications, rankings, datafication, making data discreet 'memories', and so on. However, it is important to bear in mind that these technologies do not exist in a vacuum or deterministically exert their force on users. Although the apps and platforms discussed in chapter four are algorithmic decision-making systems, the act of engaging with the past and remembering past experiences through them constitutes a highly interpretative and generative process. One crucial reason for this is that algorithmic systems only tell partial stories from a user's data past. As Tarleton Gillespie (2014) states, algorithmic systems do not simply exert their force on the social world, deterministically moulding it at will, but they always exist in complex assemblages and networks as well as in relation to various human practices and resistances, or what Michel de Certeau (1984) famously called 'tactics'. It is also important to note that any form of remembering, of engaging with the past or with mediated memories such as data or digital objects, requires active work (Kuhn, 1995). In this chapter, therefore, the attention shifts from the technical aspects and advertising rhetoric of these technologies to the ways in which they are (tactically) appropriated by users in everyday life. Hence, I seek to give voice to that complex interplay between algorithms and humans in relation to memory making practices and processes, investigating the algorithmic mediation of memories 'from the bottom up', so to speak (Couldry and Powell, 2014). As such, this chapter explores the performative, fluid, and malleable qualities of both memory work and our encounters with algorithms in everyday life.

This chapter takes conceptual inspiration from Annette Kuhn's (2000) understanding of remembering or memory work as a performative and highly productive process. As she states:

> Memory work takes on board its productivity and encourages the practitioner to use the pretexts of memory, the traces of the past that remain in the present, as raw material in the production of new stories about the past (Kuhn, 2000, p. 186).

The narrative qualities of our past memories are crucial for notions of identity and sociality, and it is important to investigate ideas of stories and memories in relation to users and algorithmic remembrance technologies. As such, the argument in this chapter is two-pronged: Firstly, drawing on Steph Lawler's (2014) understanding of 'emplotment', this chapter argues that people use algorithmic remembrance technologies and mediated memories as means to emplot their lives, that is, to make use of the narratives that past memories generate 'to give deeper meaning to, and if necessary to change, our lives now' (Kuhn, 2000, p. 187). Lawler's understanding of emplotment foregrounds the role of memory practices in constructing coherent narratives of self, which never remain fixed, whilst also highlighting the moments when such endeavours become problematic and even fail. Through this, algorithmic remembrance technologies and their mediated memories are seen to be implicated in the ways in which people make sense of themselves.

Secondly, this chapter also argues that memory technologies actively participate in these processes of emplotment. For instance, the resurfacing of memories on features such as Timehop, Snapchat Memories or Facebook Memories is based on certain computational and temporal criteria, which shape user's memories of the past in particular ways (the idea of temporality will be explored in more depth in the following chapter). This means that people encountering their digital past are not engaging with a blank slate, but rather with a medium that actively and algorithmically mediates and directs *which* aspects of the past one encounters. This echoes the notion that algorithmic systems function as, what Taina Bucher (2012a) calls, 'technicities of attention'. Attention does not simply refer to a cognitive faculty by which we focus on one thing at a time. Rather, as Katherine N. Hayles (2012, p. 14) suggests, attention is 'a focusing action' that 'codetermines what we call materiality.' Hayles argues that 'materiality, like the object itself, is not a pre-given entity but a rather a dynamic process that changes as the focus of attention shifts' (p. 14). As such, attention is a crucial way in which things become matter and come to matter in the world. Similarly, by directing which aspects of the data past users encounter, algorithmic remembrance technologies shape people's parameters of attention, which in turn shapes what aspects of the data past become matter and come to matter to people. Attending to the ways algorithms are actively involved in emplotting people's sense of self through the memories that are resurfaced also brings attention to the various tactics that people use in negotiating and making sense of this algorithmic emplotment and the technologies themselves. Remembering, therefore, also involves the negotiation of those algorithmic technologies as well as the memories that they resurface.

This chapter, therefore, proposes that emplotment in this context should not be considered solely in terms of human agency. I propose that emplotment also be considered in relation to what Bruno Latour (1992) has called 'non-human actants', thinking about technologies and memory features as dynamic agents, as actively mediating and shaping how the past is approached, remembered, and understood. In this context, emplotment therefore constitutes a socio-technical process. One of the implications of widening the conceptual framework of emplotment is that the focus shifts away from people solely using technologies, drawing on the memories they resurface in order to weave narratives of self and others. Instead, this chapter will investigate both how memory features actively participate in these processes of emplotment and how people contend with, negotiate, and navigate the technologies themselves as well as the memories they are reminded of. As such, algorithmic remembrance technologies and people's engagement with them can be understood as complex sites of memory work, of labour, of discontinuities and gaps, unrecognisable moments, recognition, and redefinition. In short, of weaving together past memories into present narratives.

Drawing on interview and focus group data, I outline and investigate three ways in which emplotment can be understood in terms of socio-technical practices: managing, sharing, and anticipatory positioning. These practices or areas emerged as a result of participants discussing the various dimensions of using algorithmic memory features as well as their experiences encountering their digital past. Through management, sharing, and anticipatory positioning this chapter suggests that both humans and algorithms actively participate in the shaping, constructing, maintaining, and emplotting of identities, drawing on mediated memories resurfacing via memory features. But first we need to clarify what exactly we mean by 'emplotment' and it how it relates to memory practices.

5.2 Emplotment as a Conceptual Framework

In order to explore how my participants used algorithmic remembrance technologies, encountering the digital past through the memories that these technologies routinely resurface, I will here revisit the notion of 'emplotment' in more detail. Emplotment originally derives from the field of literary and narrative theory, especially the works of Aristotle and Paul Ricoeur. Steph Lawler (2014) draws on Ricoeur's understanding of emplotment when exploring how memories feature in the formation and maintenance of narratives of self. For Ricoeur, the term delineates the minimally necessarily elements needed to constitute a narrative – these elements

being characters, action, and plot (Ricoeur, 1983). Every narrative, in other words, needs to have someone in it, something that happens, and a plot which, as Lawler (2014) points out, is what actually 'makes' the narrative. As she states, emplotment signifies the 'processes of *producing* an identity through assembling various memories, experiences, episodes, etc., within narratives' (2014, p. 24; original emphasis). This means that memories, experiences, and episodes are not 'thrown together at random but are linked together' (p. 24). Emplotment, in this context, Lawler suggests, is the mechanism by which these disparate elements are brought together into 'a meaningful whole' (p. 24). Ricoeur defines emplotment as 'a synthesis of heterogeneous elements' (quoted in Lawler, 2014, p. 27) As such, emplotment refers to the processes of weaving together disparate events and actions in order to construct a meaningful plot. It is the synthesis, as Ricoeur states, or the linking together of disparate events and experiences into something more wholistic, something meaningful. Remembering, in this context, is therefore always an act of membering and re-membering, that is of re-assembling memories, narratives, and meanings (the idea of 're-membering' will be explored later in the chapter).

The crux of Lawler's argument is that this process of synthesising events and episodes into a meaningful narrative, of weaving wholistic stories, is fundamental to people's memory practices and their sense of self through time. Lawler points out that identities do not come pre-packaged, but are rather continuously made and remade, woven with the mingled yarn of stories, meanings, and memories of the past. Emplotment therefore figures as a powerful conceptual framework, Lawler suggests, to understand how people remember the past and make sense of their memories in the present. In her work on processes of identity formation, Lawler examines ways in which people draw on memories of incidents and episodes that happened at various points in their lives in order to make sense of themselves. Crucially, these experiences may not be causally or 'naturally' connected, and in fact the efficacy of emplotment does not depend on it. Rather, experiences, events, and memories are *made connected*, they are emplotted, synthesised in a narrative structure that provides people with a framework to make sense of themselves and their place in the world.

Memories are particularly crucial in Lawler's analysis. They provide the basis for an understanding of the self through time. As Lawler (2014, p. 29) suggests, memories are made to form part of a continuous narrative of interconnected episodes that give the impression that these incidents have 'inevitably' led individuals to where they are now. As such, we see that memories are heavily implicated in the narratives we produce and the causal inevitably that

accompanies them. As Lawler (2014, p. 26) argues, the relationship between processes of emplotment and sense making are imperative since it is '*through* the narratives themselves that we produce our identities in this way' (original emphasis). Therefore, a sense of continuous self is ultimately a product of these recursive processes - of engaging with, interpreting, reinterpreting, negotiating, and organising one's memories in relation to the narrative of one's life.

Emplotment can also be seen as a crucial part and dynamic of the 'memory work' (Kuhn, 1995) people do when encountering the past. For Annette Kuhn, photographs are a powerful medium through which the past is made present, engendering various affective states, yet they are also imbued with politics and power.[54] Moreover, she argues that any act of remembering or any encounter with the past through objects requires a form of 'memory work,' that is, 'an active and directed work of memory' (Kuhn, 1995, p. 3). Memory work is conceptualised as a 'form of inquiry': 'like detective work and archaeology', it is 'searching clues, deciphering signs and traces' (p. 4). Kuhn's notion of memory work can be brought into dialogue with Lawler's understanding of emplotment, as both seek to examine how remembering is fundamentally active and investigative. As such, drawing on Lawler and Kuhn, remembering can entail interrogating and negotiating the objects through which memories are mediated, be it photographs, diaries, or Facebook posts. Emplotment means that memories often seem to configure 'a self which appears as the inevitable outcome and actualization of the episodes which constitutes a life' (Lawler, 2014, p. 29-30). Memory practices, conceptually informed by both Kuhn and Lawler, can be understood as performative, active, and interrogative; ways in which people weave narratives of self through the memories they encounter.

Although both Lawler and Kuhn emphasise the active and performative qualities of memory, there is scope to use their frameworks to go beyond discussions of (analogue) photography to also investigate how contemporary algorithmic systems may be implicated in these processes of emplotment. Similar to what Lawler wrote about emplotment, algorithmic remembrance technologies can be seen to configure a wholistic self as an inevitable result of past memories (Jacobsen, 2020a). However, memory features such as Facebook Memories or Google Photos do not provide users with memories in the form of completely pre-packaged, fully realised, and easily discoverable autobiographies. Instead, these mediated memories have been variously emplotted, based on certain computational criteria as well as processes such as

[54] Kuhn (1995) argues that photographs, when deconstructed, often reveal how notions of gender are reified and perpetuated. bell hooks (1995) similarly argues that photographs have the potential to depict and perpetuate racial biases and prejudices in wider society, and therefore require an interrogating eye.

datafication, classification, and resurfacing. As such, the analysis in this chapter seeks to move towards a more socio-technical understanding of emplotment, as distributed amongst various human and nonhuman actors.

This conceptual framing has implications for how to think about remembering and memory work, how people encounter and engage with mediated memories. When technologies such as Timehop or Apple Memories display certain images or posts to users ('here is a memory from five years ago'), people engage with these 'memories' in various ways. During the interview period, participants discussed how these algorithmically resurfaced memories set the stage for remembering, prompting certain feelings from the past, instantiating certain acts of sense making in the present. In other cases, mediated memories would refer back to a time or an event that participants had forgotten and therefore needed to revisit and investigate. There were also cases where participants were faced with painful memories or memories that reflect a time or person that they no longer associated with. As a result, many of the participants I talked to not only sought to make sense of the memories themselves that were resurfaced, but they also sought to navigate and interrogate the technologies themselves as well as why some memories were resurfaced and not others. This means that the remembrance technologies themselves also figure in the ways participants seek to emplot their lives. In this chapter, the relationship between mediated memories, algorithms, and emplotment emerges as a set of complex and multifaceted processes, involving various active agents (human and nonhuman), memories, technologies, and forms of socialities. As a result, I examines three ways in which emplotment features in people's uses and reactions, to algorithmic remembrance technologies; three ways in which people used these mnemonic encounters as a mode to emplot their lives. One of the main ways emplotment emerges as a visible process is through issues of management.

5.3 How Humans and Algorithms Weave Remembering

5.3.1 'A little pre-emptive damage control': Managing the Data Past

As people's data and their digital traces only increase over time, some of the interviewees worried about the repercussions of this development. In this section, I will discuss some ways in which interviewees sought to manage undesirable, uncertain, or fragmented aspects of their data past. In particular, I will discuss the use of deletion as well as the practices of what I call 'filling in the gaps' and 'putting the pieces together.' As one of the interviewees, Imogen,

pointed out, ‘who knows what sort of old pictures you might have hidden away in the depths of your phone that you don’t necessarily pop up on an app five years later.’ Yet, being revisited by the algorithmically-resurfaced past was not solely a question of seeing surprising images, but also how to manage mediated memories that referred to painful events in the past, awkward images, content one no longer believes in, or something that simply does not make sense in the present. Emplotment, in this instance, refers to the different tactics used by the participants to manage the digital past, especially its more ‘undesirable’ aspects. As such, one salient aspect of algorithmic remembering and emplotment was how to manage the data past and certain mediated memories that resurfaced.

One way in which participants sought to manage the data past was through acts of deletion. For Francis, remembrance technologies such as Timehop were useful for what he calls ‘a little pre-emptive damage control.’ Their resurfacing mechanism allowed her to go back and ‘delete some of the more cringy things I might have put on social media or put out there.’ Still, this was merely ‘damage control in an innocuous sense’ as it chiefly related to corny jokes from high school. Similarly, Jack would only delete memories ‘for weeding out meaningless content that I don’t really need to see every year,’ whereas Oliver found memory features useful as a way to assess whether some resurfacing memories met a ‘certain threshold of stupidity,’ which meant he would ‘delete this so that I never have to encounter this tweet again.’ In the cases just mentioned, the use of deletion as management tool was understood more as an act of curating, organising, or simply tidying ones digital photo galleries, a form of ‘weeding out.’

However, there were also cases where people were faced with resurfacing memories that were less innocuous, so to speak. Miriam, for instance, stated that she would delete mediated memories if they no longer seemed ‘appropriate,’ including photos and posts she did not ‘agree with anymore.’ In these cases, deletion constituted a way to manage and tweak the past presentations of self, ensuring that such memories would not be resurfaced in the future. Oliver mentioned that he would similarly delete mediated memories that now seemed inappropriate and embarrassing. Yet, in his case, deletion figured less as a tool to ensure damage control and instead a way in which he could negotiate the meaning of the past in light of the present. In the interview, Oliver discussed how he, some years ago, had taken a ‘very short-sighted point of view’ when tweeting about a certain football team. As this tweet now resurfaced as a memory, it represented a disjoint between his past and present perceptions. As such, Oliver stated that ‘I’m going to eliminate this’ since ‘I no longer believe that’s true anymore.’ This suggests that

deletion is not simply a technology of self in terms of self-presentations or image management; rather, it is a tool for reflection as well as a mechanism to ensure consistency. In other words, it is a way to hone past memories in order to construct a consistent story of the self, progressing through time. As certain mediated memories from the past no longer fit the trajectory of the self and where it is in the present, deletion comes to figure as a complex and intimate way of emplotting a present self by reasserting certain opinions or characteristics whilst discarding others.

Acts of deletion were also deployed as a way to manage different or imagined audiences. This was echoed in the interview with Paul who stated:

> I actually deleted a few tweets just because we live in such a social media age. Anything you say can get you in trouble… In America there are people just bringing back tweets that people said or interviews. Anything you say can be held against you. I actually always believed that... tweets that I see now that I wrote 7 years ago, and I wouldn't have noticed, and even last year that I thought were funny, at least now I'll say, even though I think it's funny it can definitely be misinterpreted and I delete them. I'll go and find it and delete it.

Paul highlighted the potential tensions or risks implicated in the resurfacing of past memories in the present. Some aspects of his data past, he suggests, pose a potential threat to his future prospects. This is a salient issue since every digital trace that is produced is archived and retained indefinitely in the current social media age. Paul's dilemma suggests that mediated memories are not only memories to be enjoyed, recalled, and shared, but also constitute data that can be resurfaced and therefore become subject to misinterpretation. This sentiment was also echoed in the interview with Keith, who stated that he would only delete memories 'if it's something that I truly think could really hurt me going forward.' As such, acts of deletion can figure as a way to eradicate the risks associated with certain aspects of the data past resurfacing in the present, a way to ensure that they are not misinterpreted in the present and in turn come to impinge on the future.

For others, this relationship to imagined audiences was more complex or ambiguous. For Grace, for instance, her use of Twitter and Timehop had changed significantly over time. As she observes:

> When you think about it, what we do on social has really changed… I don't have 200 followers anymore; I have 14,000 followers. It makes space to really go

> really go back and say, okay this is inappropriate for the audience I have now. I should delete this.

This relationship between memories and evolving audiences demonstrates the ambiguities and fluidity inherent in acts of deletion. Grace suggests that things that may not have been offensive to 200 Twitter followers may come across as inappropriate to a group of 14,000. As such, deletion may constitute a strategic response to the meaning of changing audiences, assessing to what extent certain aspects of the past will be offensive to online audiences. As a mode of management, acts of deletion constitute highly reflexive ways of revisiting, assessing, negotiating, and making sense of one's data past. Deletion figures as a tool of managing online presentations of self as well as a tool of removing certain aspects of one's data past deemed inappropriate. Overall, deletion constitutes a complex, contested yet intimate way to relate to one's mediated memories whilst simultaneously making sense of oneself in the present.

As we have just seen, deletion can be understood as a tactics of dealing with undesirable 'memories' resurfacing on algorithmic remembrance technologies. Given the possibility that users' data might not be fully deleted off social media platforms,[55] deletion in this context can be understood as a way of rendering certain aspects of the past invisible, or at least to ensure that they do not resurface again at future points. However, many of the participants found the idea of deleting memories, or data points from their past, a problematic management tactic for various reasons. Many participants, therefore, found other ways to manage the aspects of their data past they found painful. For instance, Keith stated:

> The only time I ever delete photos is if it's a blurry photo or a screenshot I don't need anymore. I don't like to delete anything, just because I have enough storage on my phone, through the cloud and all that crap, that I don't need to. And every story has some sort of focus or point or story or something that when you delete a photo, whether or not it's five photos in a row of the same thing, each one can evoke a different memory, can evoke a different feeling. Whereas I don't want to lose that. That's the whole point of taking photos is that you want to remember everything.

For this participant, every digital photo was a potential conduit for a memory, and the idea of deletion was therefore seen as problematic. Deletion amounted to the loss of memories and

[55] When users 'delete' their data off of social media platforms or online databases, it does not necessarily mean that these are fully deleted. For more, see section called 'Unlimited' in chapter four as well as Hern (2019).

various feelings images could evoke. In his book *How We Became Our Data*, Colin Koopman (2019, p. viii) argues that the idea of deletion will occupy an increasingly contested and complex role as people are increasingly 'swaddled in data.' Contemporary life is constructed and construed through data, which means that data is intimately implicated in people's notion of agency and personhood. In other words, data are intimate parts of who we are. It therefore follows, Koopman (2019, p. 4) suggests, that deletion comes to engender a kind of existential fear. As people increasingly make and are made up by data, the deletion of their personal data can come to be seen as a sort of violence, a tampering with the self, or even a removal of the self. Much research has already been done in how people's data-led lives produces so-called 'data doubles' (e.g. Ruckenstein, 2014; Lupton, 2012). It is crucial, however, that these doubles are not seen as somehow detached or external representations of already-holistic analogue selves. Rather, they suggest how data and selves are becoming increasingly interwoven and inextricable in daily life (Lupton, 2020). Deletion may not amount to an existential angst for Keith. He nonetheless expresses an explicit desire to not lose the memories and feelings that may be evoked by his digital images.

The contested space deletion occupies also suggests, in this case, a problematisation of any clear ontological limits between mediated memories, data, and the self. This blurring of ontological boundaries is alluded to in the interview with Charlie, who stated:

> My photo gallery on my phone has actually been left intact for Timehop, and it has caused me a lot of problems because I have past relationship photos in there, and my girlfriend will say to me, like, why don't you want to delete these? I have built the concept that if I eradicate these, I'm sort of eradicating the memories.

Deletion, in this case, is no longer a question of simply honing or curating a certain presentation of self by discarding certain points such as images or posts. It amounts to the deletion of actual memories. Rather, it has become intimately entangled with issues of identity and memory, and any decision of what to delete and what to keep therefore becomes not only highly affective, but also becomes a complex negotiation and process of emplotment of one's own sense of self. How to manage one's data past, then, becomes a question of how to manage aspects of oneself or one's narrative of self.

This connection between the tensions of deletion and a sense of self was more starkly suggested with other participants. Some interviewees did not want to delete anything because, as Becky put it, 'bad memories make you who you are as much as good memories.' Others,

such as Diana, did not want to be 'too Eternal Sunshiny about it' and have 'a hand in creating a rosy past. That feels artificial in ways that makes me uncomfortable.' Paul stated that he would not want to delete memories he was shown by algorithmic remembrance technologies because 'I don't want to lose my sense of humour.' However, he also points out that whilst 'I'm funny and I'm weird and I'm different and I think that's amazing,' he is aware that some mediated memories, were they to resurface and become public again, 'definitely can be misconstrued.' For Paul, the question of what to delete and what to keep was not only a question of presentations or managing different imagined audiences; rather, it becomes intimately related to the question of identity and people's individual personality, or in this case, his sense of humour.

Several participants also mentioned other ways in which they sought to manage the resurfacing of painful or awkward memories. For example, when shown certain memories from Facebook, Miriam responded that 'I just try to scroll past it as fast as possible, because I'm like oh I don't want to be reminded of that.' Similarly, Oliver stated that in order not to relive certain a American presidential election again, 'I just kind of opened it and clicked it a couple of times without looking till I looked through past 2016.' This tactic of just tapping or scrolling through those painful reminders was also echoed in the interview with Diana, who stated that:

> There are times of year when I know that the vague tweedy thing that I said was referring to something that I prefer not to remember. There are times of the year – or if I see something and I'm like, oh I know what we've come up upon because it's been years – I'll give myself permission to tap very quickly through it and not engage with it, and just get to the end, and close the app and be done with it.

For this participant, quickly tapping through the mediated memories that are resurfaced on the memory feature became her way of managing the more uncomfortable aspects of her data past. When asked if she still has emotional connections to these memory objects that she is reminded of, Diana responded:

> DIANA: Only choosing not to have an emotional connection that day. Not today, maybe next year I'll reread this memory
>
> INTERVIEWER: Is there a particular reason for you maybe not to have an emotional connection to some of the photos?

> DIANA: Yeah, I think it's more just, okay I know what just happened. I will deal with this emotionally at the time and place of my choosing. It's not today. But I also want that streak number, so I know what I have to do to get over it, to get to the end of this. I don't know, there's something kind of survivalist about it, not now, go away, delaying you for another year. I know that I won't have to think about this for a year once the notification goes away.

As this case shows, remembering with algorithms involves conscious decisions *when* to emotionally engage with certain memories. As such, there is a temporal dimension to these encounters with one's data past. By delaying the memory, engaging with it 'not today, maybe next year', the participant can be more emotional prepared to 'deal with this.' More generally, this demonstrates the ways in which users are situated in relation to these algorithmic remembrance technologies, as active agents, utilising multiple tactics to manage and navigate the more uncomfortable mediated memories from the past. However, it also suggests how memory features are not passive conduits or archives for personal biographies, but are rather active agents themselves, curating and resurfacing certain memories at certain times. It can be argued that as people increasingly become their data, the role of deletion will occupy an even more contested and complex role in relation to digital memory practices. As such, the decision whether or not to delete resurfacing memories becomes intimately interwoven with how people manage, make sense of, and ultimately emplot the story of themselves through time.

Another salient way in which the past is managed and made sense of is through filling in the gaps, so to speak. As people use algorithmic remembrance technologies, they are not only occasionally reminded of painful memories from the past but also memories that seem out of place, where the original context has been lost. As Lydia pointed out:

> Sometimes a few things will come up and I will look at it and think, what was that? There was no link… then you don't know what the link is. Like yesterday it must have lots of them, because I was constantly going back to the links and reading the tweets. I think it was just I was having conversations with people and I was curious as to what started the conversation off.

The seeming absence of 'links' suggests that algorithmic remembrance technologies do not resurface pre-packaged, coherent narratives, but often resurface decontextualised and even disjointed mediated memories. Emplotment, in this case, amounts to a reflexive process of linking, of joining tweets together, so as to produce meaningful coherence and meanings that

cohere. It corresponds to the management of voids and invisibilities, that which is not shown, said, or contextualised.

The importance of context for remembering was also echoed in one of the focus groups, where members Brian, Daniel, and Anna discussed the idea of a relationship between continuance and remembrance technologies. The discussion is worth quoting at length:

> BRIAN: If you're cued during conversation, that one then leads to something else; if you're cued off a phone, you go oh look that's interesting! I remember x y z and then it stops
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> DANIEL: Exactly!
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> BRIAN: There's not a continuation of it, it's very short, and I presume that's why you have to do it often, because you get no chain. You don't get the chain of thoughts and memories because it just dies itself down, because it's not being reinforced by the other person
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> ANNA: If Catherine and Daniel, for example, were having a conversation about some boat fishing out of Hull, they would already be thinking that part of their memory's already being accessed, accessing memories on Hull and fishing, and then something crops up, so it's already partially activated your memory in that area, so then you'll tie in. Whereas if a boat just arrives out of the blue and you're in the middle of the garden there's no –
>
> BRIAN: The only time the chain can continue is if you then decide like oh that was Dave, I better email him and say 'hello how are you doing.' Then you might get the chain. There's no chain just from a picture.

Here, the continuance of memory is conceptualised as 'a chain.' That is, the extent and emotional depth of a (resurfacing) memory depends on its context or, more specifically, the position it occupies in the linearity of the chain of events. Later in the interview, some of the focus groups members further suggested that memories are shallower because algorithmic remembrance technologies only provide what they think is a memorable image and not the context around it. As such, the seeming disjoint between someone's memory of the past and the mediated memories resurfaced by these features may generate tensions, especially when 'there's no chain.'

The absence of a chain, of sufficient contextual information, implies the importance of processes of emplotment in weaving together disparate elements. Reacting to cases where there was a lack of context, Oliver stated:

> In the times that I do have a bunch of photos there, it is occasionally fascinating to be like, 'oh what was I doing on this day? Oh right, that was my brother's wedding.' And that's why there are 45 photos there, when the day before there were zero and the follow day there is probably going to be zero. If I see that there is a whole bulk of activity on a platform that I don't usually have a bulk of activity, that's a sign that I should be digging a little bit further to remind myself what was this.

The absence of a chain, the insufficiency of contextual cues, and the absence of links - these necessitate greater involvement by the people using these memory technologies. As Oliver puts it, remembering with algorithmic systems requires 'digging.' Digging is understood here as a form of active contextualisation, a process akin to 'linking', as was discussed earlier. Still, how is this process of contextualisation, this 'digging,' actualised? This was well expressed in an interview with another participant, Keith, who stated:

> There are some days where I'll see a status, I'll see a photo in my library, and I'm just like 'what the hell was I doing that day?' I have to go down a rabbit hole almost to figure it out. I'll go on Facebook; I'll look who I tagged, and I'm just like trying to figure out why are we there? Eventually I'll get to it.

As Keith suggests, the process of making sense of mediated memories can be akin to going down 'a rabbit hole.' Digging can be seen as a process by which participants would revisit the original platform the mediated memory originated from, checking the tags, who tagged, when it was tagged, and so on. Thus, digging, or what Oliver later in the interview called 'social media palaeontology', becomes a way to fill in the gaps and make these memories intelligible and meaningful in the present. Here, engaging with algorithmic remembrance technologies becomes an active form of meaning making: a process of making sense of the resurfaced past. It showcases a way in which aspects of the digital past, insufficiently contextualised, come to matter in the present. However, this process of digging does not amount to an unearthing of a 'pure past,' so to speak. As one Diana pointed out, 'the story is a lot more complicated than that, but that requires a lot more digging and thought and memory, than the thing that I'm shown regularly.' As such, making sense of these insufficiently contextualised memory objects

is akin to digging, a form of labour. That is, the process of emplotment is simultaneously a process of memory work.

Another way that participants managed and made sense of the digital past was to look at what was *not* shown, to attend to the voids or the gaps themselves. As Lydia states:

> If there's very little coming up and I think, 'I wonder what I was doing that I was so busy that I didn't have time to be on here.' So even if there's nothing there, I'm thinking, 'what was I doing?' Then I look in my diaries, 'yeah I was doing I was here, I was there, I was on holidays or something'... what was happening on that day? Was I somewhere where I couldn't access it?... But if it is very very quiet, I am sort of curious and think, 'what was I doing that I was busy that I had no time to do that? What engaged me?' So yeah, I wonder why I'm *not* doing things on Twitter.

Whereas earlier tensions arose from a lack of context surrounding certain memories, this participant points out the importance of examining the voids, so to speak, 'why I'm *not* doing things on Twitter.' Accessing remembrance technologies and not seeing anything on certain days made Lydia is curious as to what she was doing that made her too busy to take photos or post on social media. Similarly, Anna stated:

> When you go through Timehop, it'll show single photos or it throw a series. It's not unusual to come across in mine a series that says 63 photos. There will be 1,2,3 63, 1,2,3, 40. So when I look at Timehop, I have a lot of photos… This last year I didn't take very many photos, and it made me sad, because I thought next year there is going to be a hole in the series. And 2018 is going to be a big fat – I wasn't feeling very feel, and I wasn't taking photos. So Timehop made me aware that coming up there will be a *space*. 2018 was a year of depression, I wasn't seeing, I wasn't taking photos, nothing interested me. For me, it's really been a useful tool of self-reflection, personal history.

Paying attention to these 'spaces' and reflecting over them made the participant aware of how her mental condition affected her use of social media and Timehop. In this case, the space both presupposed and revealed a narrative about the effects of depression: 'I wasn't taking photos, nothing interested me.' As such, the emplotment of gaps and empty spaces, the things not shown on algorithmic remembrance technologies, emerge as a way to manage and make sense of the digital past. It showcases that these technologies can figure as 'tools of self-reflection'

where they can encourage one to think around the memories, to interrogate the offline conditions for certain gaps, why one is *not* shown something. Overall, these examples demonstrate that emplotment is heavily implicated in the ways in which people variously manage their digital past. More specifically, in this case, it relates to the ways in which people manage the lack of context surrounding certain memories and the empty gaps, the things they are not shown and why. It suggests that engaging with and remembering through memory technologies constitutes active memory work. It suggests that people weave stories of themselves, drawing on memories that are resurfaced on remembrance technologies. But it also shows that coherence and meaningfulness are not a given, but rather are the result of active processes of emplotment. Thus, filling in the gaps is a way in which people manage, negotiate, and ultimately make sense of the past in the present.

If the issue in the last section was on too little data concerning their individual narratives, the issue here is what people do with disparate and dispersed past data or mediated memories as fragments. Here, emplotment also constitutes managing multiple platforms. Algorithmic remembrance technologies function in various ways even if there are substantial overlaps. One common feature is to resurface in the present particular images, posts, or data in general from a certain point in the past. However, whereas Facebook Memories and Apple Memories resurface data that has been produced exclusively on their platforms (e.g. Facebook Memories only resurfaces images or posts people have uploaded to Facebook at some point in the past), Timehop is, as Oliver described it, 'platform agnostic.' That is, one can choose how many platforms to incorporate into its functionality, whether that is Facebook, Snapchat, Instagram, iCloud, or Dropbox or all of them. This is not to prioritise one remembrance technology over another, but rather to highlight their differences, which in turn suggests both what they resurface and how they resurface varies from platform to platform.

Discussing the memory feature Timehop in particular, I asked one of the participants, Beth, how she found Timehop in comparison with other remembrance technologies and she responded that:

> The major difference that I like is that it doesn't just pull in Facebook, it pulls in Twitter and Instagram and other places as well. I think I've realised that, partly because of Timehop I think, I'll talk about professional stuff that I'm doing on Twitter and more family and friends-oriented stuff that I'm doing on Facebook; and it's an interesting split to see what I've shared in which places, and realise

> that, you know, some things that are more work-related but that friends and family might also be interested in hearing about don't always end up in both places.

As Beth points out, using Timehop has made her aware of the differences in content from platforms such as Facebook and Twitter, to see 'what I've shared in which places.' Whereas she would post more 'work-related' things on Twitter, she would post more 'family and friends-oriented stuff' on Facebook, and this is reflected in mediated memories she is reminded of in the present. When asked how she finds being reminded of this seeming 'mix' of memories, Beth replied:

> I think it gives me a more wholistic picture of what the year has been or what the couple of years has been since then, right... There's a something of a difference between remembering what you did last year in your personal life and remembering what you did last year in your work life, sometimes. So it's been an interesting like wait, hang on, that happened around the same time as that did? Oh, I guess so! And so it's a weird kind of 'putting all the pieces together' experience.

Encountering resurfacing memories enables her to draw parallels between her work and private life, examining the past within this broader framework. Drawing on memories from these different platforms ultimately allows her a 'a weird kind of 'putting all the pieces together' experience.' Another participant, Donna, echoed something similar when stating that 'there's just many pieces and that's just like me utilising different platforms to express different things and then Timehop pulling it all together.' The notion of 'putting the pieces together' suggests that remembering with algorithmic systems can be a fragmentary experience, and thus requires work. It requires not only digging, but the pulling together of disparate pieces from multiple sources and platforms.

Through these examples, remembering with algorithms can be seen as platform dependent. In other words, using algorithmic remembrance technologies entails drawing on memories that are platform specific. As such, one could argue with Pierre Nora (1989) that social media platforms are ontologically akin to what he calls 'sites of memory' (*lieux de mémoire*). He argues that such sites of memory originate where there 'is no spontaneous memory, that we must deliberately create archives, maintain anniversaries, organize celebrations, pronounce eulogies, and notarize bills because such activities no longer occur

naturally' (1989, p. 12). Nora argues that as memory is increasingly divorced from socio-collective groups, it instead 'crystallizes and secretes itself' into material, symbolic, and functional sites such as 'museums, archives, cemeteries, festivals, anniversaries, treaties, depositions, monuments, sanctuaries, fraternal orders' (p. 12). In essence, 'memory attaches itself to sites' (p. 21).

In today's media- and data-intensive society, there is scope to argue that (social media) platforms are material, symbolic, and functional sites of memory: people do indeed remember through and because of them. Yet, this is only a partial argument. In a sense, it is too general. These are heterogeneous platforms that people use in different ways and for different purposes. Platforms also have different underlying logics as well (van Dijck and Poell, 2013). It therefore stands that the mediated memories that these platforms resurface will reflect this heterogeneity. As a result, there is a need to think of and conceptualise algorithmic remembrance technologies not simply as sites of memory, but as sites of particular *kinds* of memory. The memories these resurface are variegated and reflect how people use various technologies and platforms. This suggests how people 'live,' so to speak, differently on different platforms, which in turn affects everyday memory practices.

In the context of emplotment as a form of management, it suggests, metaphorically speaking, how people use various kinds of yarn from the past to weave a story of themselves in the present. In other words, people emplot wholistic stories about themselves, drawing on and piecing together memories from different places, whether that is Facebook Memories, Snapchat, or Timehop. Emplotting, therefore, or remembering with memory technologies, entails not only managing painful memories nor digital memory objects with insufficient context; neither does it only suggest how people manage those gaps when nothing resurfaces, how they fill those spaces. It also entails managing different platforms and different kinds of memory. It entails putting the pieces together, drawing from various platforms and memory features to weave a 'more wholistic picture' of one's self, and thus emplotting a narrative about the self in the present that is both meaningful and significant.

5.3.2 'Keeping the past alive': Connecting with Others Through Sharing

It is crucial to acknowledge that any form of memory making, any mode of remembering and engaging with the past, involves other people. Memory practices are emphatically social practices. Practices of remembering and negotiating the past are embedded in various networks,

groups, and relationships, and this was also reflected in how people used memory apps and platforms. As such, encountering mediated memories through algorithmic remembrance technologies does not only engender issues of management; it also encompasses social practices and various 'networked socialities' (Baym, 2010; Hoskins, 2018), that is, connections, communities, relations. In this section, I want to examine in more detail three ways in which sharing can be seen as a central aspect of people's memory practices as well as those processes of emplotment through which people, drawing on the data past, weave narratives of themselves and others. I have chosen to call these: reaching out, building community, and re-membering identities.

As Steph Lawler (2014) suggested, emplotment is always already a social process of identity formation. Emplotment involves drawing on not just memories from one's own past, but also various shared digital pasts as well as already established social cues, images, and metaphors. Moreover, processes of emplotment involve working on past memories in the present. It is way of rendering the (social) present meaningful. One way in which emplotment can be seen as intimately connected to notions of sharing is through people 'reaching out' to others as a result of the resurfacing of mediated memories. One participant, Jack, stated:

> One thing that I enjoy seeing is some past interactions with people maybe I don't have contact with, and it'll kind of remind me, 'I kind want to reach out to that person, see how they're doing, it's been a while,' that kind of thing.

This was also echoed by Keith, who noted that memory features such as Facebook Memories were a 'kind of a tool to keep me engaged with old friends.' As we see here, algorithmic remembrance technologies feature as tools of connectivity (van Dijck, 2013), that is, ways of connecting with people in the present. The connection between sharing and emplotment also highlights how memory practices entail a 'working on the present' (Bowker, 2008), weaving a story involving, amongst other, 'old friends.' Sharing mediated memories and 'reaching out' becomes a form of communication, a sort of communicative act, an effort to maintain certain relationships in the present.

For Anna, the use of algorithmic remembrance technologies such as Timehop was closely related with the idea of reconciliation. As she states:

> In a few instances I have sent Timehop pictures, the ability to share them is sort of reconciliation: whether we have active relationships right now or not. I treasure the memories, I treasure those times, so I place high value on relation-

> ships and expressing gratitude and appreciation. So through this means of using of photo to say, 'Hey didn't we have a good time'… So as to the definition of reconciliation and establishing relationships, Timehop has been really useful to find, remember, and reshare. It has kept the past alive, so to speak. It uses the photos we are so busy taking in a positive way.

Here, practices of sharing mediated memories is implicated in efforts to maintain and care for past relationships as well as 'keeping the past alive.' Moreover, the suggestion is that as algorithmic remembrance technologies repeatedly resurface memories, these mediated memories can be used as a way to reconcile with people from one's past. It is a means of reconciling past relationships, a means of weaving together social networks. Remembering with algorithms is always already remembering with and through others.

Sharing practices also facilitate the reciprocal exchange of mediated memories. When I asked whether he ever shares memories that he has been reminded of on Timehop, one of the participants, Francis, replied:

> I have another friend who uses Timehop every day, and sometimes our memories will intersect, because we would always hang out through our high school. Even though we went away to college now, we still maintain a really close friendship. But he'll text me a photo when maybe I hadn't gone on Timehop myself that day, and I'll wake up with the daily reminder to use Timehop, and then a message from him, something that he pulled from his own Timehop. So it kind of lets us reconnect over these memories that we both share during our social media experience and that we share again with each other.

As is suggested here, the effectiveness of memory features is predicated first and foremost on how the present has been captured. Francis and his friend both use Timehop routinely, which engenders the potential for their mediated memories to intersect. These mnemonic intersections, where both are separately reminded of the same mediated memories, provided a space to 'reconnect over these memories' and to maintain their friendship. Conceptually speaking, this form of reaching out – that is, continually sharing and resharing memories from the past - can be understood as, what Blakely and Moles (2019) call, a 'system of reciprocity.' Drawing on Mauss' concept of 'gift,' Blakely and Moles explore how people share narratives and material artefacts with and within their wider socio-cultural community. The sharing of material artefacts produce, they argue, wider 'systems of reciprocity' (p. 1) where mediated

memories are routinely exchanged, which in turn assigns value to both the memories themselves and the relationships underlying these reciprocal systems.

Similarly, using algorithmic memory features to share resurfacing memories, to reach out, can be understood as facilitating such a system of reciprocity. The sharing of mediated memories allows for the continual exchange of the past, which in turn may produce mnemonic intersections, as well as help to establish and perpetuate networked socialities. 'Reaching out,' as a modality of sharing practices, can thus be seen to be implicated in the ways the participants emplot their lives. It refers to how people not only negotiate their own past but also the various ways in which people chose to populate their past and may still populate their present. Sharing mediated memories and establishing reciprocal systems figure as a way to emplot one's story of the past in the present, negotiating one's position in relation to others, reconciling oneself with others, staying in touch. Sharing memories can be seen to engender minor systems of reciprocity where value is assigned to both the act of sharing memories but also to the relationships underpinning it.

In the section above, algorithmic remembrance technologies were used as a means of 'reaching out' or deepening existing social relationships. The connection between emplotment and sharing, however, could also be seen through the various socio-technical communities that are engendered through remembering with algorithms. One of the interviewees, Nicole, talked about the way memory features, and Timehop in particular, were an effective connective tool in relation to social media group chats. As she explains at length:

> It's one of the ways that I will start convos in a group chat that I have with some of my girlfriends. We have been in some version of a group chat for the last ten years. Over that time, our lives have gone in very different directions. Some are parents, some are married, some are divorced. A lot of these memories give us something to look back on really fondly, and we can ask that question of like, 'when we were this age we were doing this, would you let your kid do x? Would you feel comfortable doing this? Can you imagine what it would be like to be that age in this time and have all of these things available to you, what do you think that would feel like?'... It's definitely a window into some conversations with other people either to say, 'oh wow look how far we've come or how things are still the same.'

Using Timehop figured as a useful social tool, for Nicole, a 'window into some conversations with other people,' and a way to relive and re-appreciate the conversations she and her friends have had over the years in their group chat. But moreover, seeing such memories resurface affords the maintenance of that group of friends she has had over the course of ten years. Grace mentioned something similar with regards to friendship groups on social media:

> From a lot of times in group chats, someone else will be going through Timehop and they'll drop a memory in there, and it allows us to bond all over again over this moment that happened a year ago, two three years ago. And it takes us right back and reminds you why people are in your life, and it helps to secure those connections.

Using remembrance technologies provided Grace and her friends with the mnemonic means to 'allow us to bond all over again.' As Grace puts it later in the interview:

> At one point in time, I would go through my old Twitter Timehop memories and reshare. And then it became, on the Timeline, a kind of like community, looking back together, and I was like, 'oh my gosh that was so funny!'

Sharing mediated memories, therefore, highlights the collective aspect inherent in algorithmic remembrance, as well as emphasising the social attachments that are strengthened as a result of sharing mediated memories. Sharing figures as that which affords the possibility of 'a kind of like community.' In short, it builds and maintains (digital) communities of people.

Yet, there were also participants who talked about what happens where the sharing of memories is not reciprocated. As Lydia stated in her interview, when asked whether she shares memories and whether these memories get much engagement from others, 'No, that doesn't tend to happen. I will share tweets from the Timehop app but it gets no response at all.' As such, Lydia states that Timehop 'it's more for personal use.' Connectivity and sharing is an underlying logic of memory technologies, which means that it may create tensions and disappointments when shared memories are not reciprocated.

Seeing resurfacing memories on algorithmic remembrance technologies, as these examples suggest, can also become a way for users to emplot other people into the narratives of their own lives, and to strengthen and maintain the manifold narratives they are already implicated in. As Grace puts it, encountering algorithmically resurfacing memories reminds her 'why people are in your life.' This echoes some of the claims made by Maurice Halbwachs

about the nature of collective memory. 'We preserve memories of each epoch in our lives,' Halbwachs ([1952]1992, p. 47) stated, 'and these are continually reproduced; through them, as by a continual relationship, a sense of our identity is perpetuated.' The sharing element of using algorithmic remembrance technologies demonstrates not only its role in building communities and networks; it also highlights how all attempts at making sense of people's personal narratives always already involves other people. By engaging with and making sense of their past memories being resurfaced, people are simultaneously emplotting and weaving their relationships with other people – as, indeed, they are being emplotted and woven by others in return.

However, some participants acknowledged the fact that relying too heavily on remembrance technologies to experience and remember the past runs the risk of insularity. As Oliver explains:

> There are definitely times when it's nice to be able to go back and say, 'oh hey, this is the way that I remember doing x and this is what it reminds me of.' But there are definitely times where my experience of an event was either limited or was less than positive, and there are times where I would wish that somebody, who had a different or better experience of that event, were the one reminding me of it, so that I might get more rose-coloured glasses on the recollection, rather than the brown ones that I am currently wearing.

As he points out, remembering with algorithms, through memory features and platforms, runs the risk of providing a 'limited' and therefore 'less than positive' lens on some past experiences. Oliver suggests that these potential negative experiences do not necessarily reflect the event or experience itself, but rather indicates that memory features, by focusing heavily on the individual user and his/her own past data, can provide a seemingly narrow perspective on the past. Oliver found that the best way to obtain such 'rose-coloured glasses' was through sharing his mediated memories on social media such as Twitter. As he stated:

> If I do go back and share something that was my recollection of an event, I'm doing it because I'm hoping that the other people, who I am connected to on social media who were a part of that event, or who remembered me being there, will then tag on their own recollections of it.

When I asked Oliver if this was a way 'of building on to your own memory,' he replied 'A bit, yeah. It gives people a little bit of that opportunity, that soapbox on which they can explain and

share what they were thinking about and feeling at that time.' As Oliver points out, sharing those memories he has been reminded of on memory features constitutes a means by which other people can 'tag on their own recollections of it', thus skewing the memory in a positive direction. On one level, this raises the question of even if the algorithmically resurfaced memories may be accurate to the individual, it may not be helpful. Indeed, there is a suggestion here that a 'skewed' perspective of the past is needed in some cases in order to obtain more 'rose-coloured glasses' of the past. It also suggests that we need to critically examine what is meant by 'sociality' in an age of algorithmic remembrance technologies. Although Oliver suggests there is a need for other people's perspectives to combat potentially insular viewpoints of the past, there is a need to interrogate what kind of communities algorithmic remembering is engendering and how these differ to those communities described by Halbwachs.

Through these examples, one gets a snapshot of some of the dynamics of collective remembering in a social media context: when memories are shared, they are engaged with by others who attach their own remembrance and experience to them. Memories, therefore, are extended, enriched, and even skewed in a social context, made to fit certain narratives, becoming both something more than and something different than it was before. Through this, Oliver states, people are provided with a 'soapbox,' an opportunity to share their version, so to speak, of a past event. As such, sharing memories can be seen as one of the mechanisms of emplotment, since it not only maintains and develops existing communities but has the potential to give rise to new ones. People can bond and develop relationship over the remembering of certain past events shared in the present.

These different aspects of sharing mediated memories cement the social processes underlying emplotment. Moreover, I want to highlight how the sharing of mediated memories can be seen to affect and shape people's identities. In one of the interviews, Sarah talked at length about her relationship with her sons and how they all use memory features such as Facebook Memories and Timehop. Given the fact that Sarah's youngest son was 14 years old, and been using Timehop in particular daily for two years, provided rich discussion about the family dynamics of remembering with algorithmic remembrance technologies. Sarah pointed out that the importance of her family for her own use of Facebook Memories:

> I started using Facebook when I was pregnant with my second son. So 2008, and I have always posted their funny quotes. That has been one of the things that I've done a lot, and it's always fun to get those served back to me on a regular basis

> so I can remember the funny things that they say. You know, that's one of the number one pieces of advice that people give you is write down what your kids say because you'll forget it. I just chose to do that on Facebook, for the most part, and so it's really great to have a way for those to come back and be reminded of them.

As I have reiterated elsewhere in this chapter, memory features are often used as a means to 'be served' on a regular basis with one's past, with data one has captured and documented, repackaged for present consumption. Sarah also points out that being a mother with young children became a motivation for her to capture everything they say. Here, the capture of the present and the sharing of mediated memories can be seen as an outgrowing of motivations such as familial relationships. But as she also points out later on in the interview, the dynamics of having a family and using memory features did not simply encourage her to capture and document their shared present moments. Instead, she felt a seeming obligation to share these memories back with her sons. This led to an interesting and rich discussion, which I have consequently chosen to quote in full:

> SARAH: I think that at the point that my oldest son got an Instagram account, I started to see the moments as things that I could share back with him. When I was able to start, I love that it's something I originally posted it on Facebook but I can share it as a memory and post it on Instagram… It became this way for me to share with him the funny things that he had said. I actually think that the way that I have shared their funny quotes has shaped part of them seeing themselves as funny human beings
>
> INTERVIEWER: In what way sorry?
>
> SARAH: Yeah, because I think being able to capture what was funny about it. My husband is really funny too, and so they have this natural ability to say funny things, sometimes intentional, sometimes not intentional. And I think I have this really good ability to capture it in a way that is really succinct and gets at that heart of the moment. They can see it in written form what that funny moment looks like. They laugh when they see it fed back to them. I hear all the time when I talk to people who are connected to me on social, 'oh your boys are so funny!' I think it has created part of their identity as being funny

INTERVIEWER: By constantly being able to see like oh you have been funny and capturing that almost reinforces that?

SARAH: Yes

Sarah's penchant for sharing memories from Facebook with her sons is predicated on a two-pronged mode of perception: firstly, she started seeing present moments as 'things' to be shared, and secondly, she saw her past data on social media as a 'memory' to be shared with her sons and the wider community. Based on this observation, and taken more theoretically, Nathan Jurgenson's (2019) notion of 'documentary vision' is not simply a uniform mode of perception; rather, it is multi layered, referring to a mode of perception where multiple meanings coinhabit and converge. Sharing mediated memories can also be seen here as a mode of assigning and continually recognising certain relationships and social structures. Moreover, Sarah suggests that her memory sharing habits have helped shaped the way her sons understand and see themselves. Sharing mediated memories, in this instance, can be seen as a way to emplot or weave a narrative of self, but not necessarily one's own narrative. As this case suggests, the sharing of memories with others helps weave multiple stories. On one level, Sarah seeks to weave or emplot 'they are funny' into the narrative of her son's identities for their own sake. One another level, it also helps weave a wider narrative of her family ('my husband is really funny too'), which in turn can be validated and recognised by the wider community ('oh your boys are so funny').

As such, it is reasonable to suggest that the emplotment of individual narratives is not an isolated process, involving only the remembering human and technical agents. Sharing memories with others becomes a means to, as it were, re-*member*: shape, reconstruct, and reassemble identities and how people see themselves. In the case of Sarah, sharing mediated memories is a way through which to re-member her son's view of themselves, a view which parallels their father's personality. This form of re-membering also requires a form of witnessing and recognition, as people Sarah is connected to can say 'oh your boys are so funny!'. As such, emplotment, the weaving of narratives through memories, affords the reconstruction and shaping of identities. An understanding of the significance of sharing mediated memories helps to demonstrate the ways people draw on the algorithmically resurfaced past to emplot a multiplicity of overlapping narratives: of identities, of social attachments, of communities.

5.3.3 'I know that it's going to surprise me': Anticipating the Memory

Another salient feature of remembering with algorithms, participants suggested, was the affective states that memory features, apps, and platforms engendered. People stated that one of the main reasons for using technologies such as Apple Memories and Timehop was for ways these technologies made them feel on a continual basis. People, however, not only used memory features because it made them feel good about the past; participants mentioned how they drew on and sought to make sense of what Kathryn Stewart (2007) calls 'ordinary affects' such as joy, surprise, or comfort in order to negotiate and weave narratives of self and others.

Yet, what was particularly striking was not only these ordinary affects themselves but how exactly these were engendered in users. Often, they were not randomly felt by users, but rather anticipated. More specifically, users would position themselves in such a way, in anticipation of the memory, in anticipation of being affected by the memory features. This I call 'anticipatory positioning', and it was a crucial practice by which the data past was felt, negotiated, and emplotted in people's everyday lives. More specifically, the notion refers to users positioning themselves in such a way, in relation to the technology, that these affective encounters between the data past and the present became possible and meaningful. For, 'it is the way in which the body sits in space that allows signification to be grasped' (Gill quoted in Thrift, 2000, p. 46-47). Participants often mentioned how they put themselves in the way of the memory feature, in order for the feature to resurface memories and remind them of increments of their data past. Many suggested that they would position themselves in relation to algorithmic remembrance technologies because they anticipated seeing mediated memories resurface. In other words, users were in anticipation of a variety of affects – of being surprised, of being moved – rather than actively seeking to dig through their digital memory archives. As the interviews pointed out, anticipatory positioning also figured as a crucial aspect of emplotment as well as remembering with algorithms. In this section, I look at particular instances where the anticipatory positioning of interviewees using memory technologies becomes salient: then-and-now moments, surprise encounters with the past, 'big' and 'small' memories, and comforts and discomforts.

One aspect through which the relationship between emplotment and anticipatory positioning could be seen was through the 'then and now' perspective that algorithmic remembrance technologies afforded users. This may not be surprising, however, considering that algorithmic remembrance technologies such as Facebook Memories and Apple Memories are

essentially mechanisms for collating and resurfacing past content to a (social media) user. The past content or 'memories', as they are also called, are resurfaced typically on their annual anniversaries, with taglines such as 'Here's a memory from 5 years ago.'. As Francis noted, 'it's a comprehensive look back at your social media personality' and an insight into 'specific snapshots from different increments of time.' As such, the main thrust of algorithmic remembrance technologies therefore remains this backwards glance at particular increments of time in the past, drawing on data and content such as Twitter and Facebook posts, images stored on a user's smartphone or those uploaded to Instagram, Snaps saved unto to Snapchat Memories, and so on.

For some participants, it was fun and sometimes embarrassing to see an image pop up from years ago where the hair style was different or where one was skinnier. Miriam even said that seeing such memories resurface 'definitely makes you feel older.' Generally speaking, algorithmically resurfacing memories becomes something 'we encounter, that hits us' something that produces emotional responses in us (Bennett, 2001, p. 4). In her book *The Enchantment of Modern Life*, Jane Bennett (2001) explores mundane affects and 'the wonders of minor experiences' through the notion of enchantment, that is the various affective states that are produced in the encounters between humans and other (nonhuman) beings. In this context, it is important to attend to these algorithmic encounters as enchanting states, because it provides a better understanding of the affective, intimate, and embodied dimensions of everyday memory practices as well as remembering with algorithmic memory features. Stewart's (2007) notion of 'ordinary affects' relates to Bennett here, and both are crucial for understanding the encounters between humans and other (nonhuman) beings and the various affects these may engender.

Enchantment, for Bennett, is not only something people encounter passively, but an 'active engagement with objects of sensuous experiences' (Bennett, 2001, p. 5). This active engagement Bennett calls 'comportment.' By this she means that a state of enchantment is not only given, but can be achieved through people positioning themselves in such a way that renders them susceptible to enchantment. In other words, a state of enchantment is achieved through a specific posture, an active positioning of oneself. In Bennett's view, positioning is conceptualised as a form of practice, a form of actively engaging with objects and processes. This understanding also underlies what is meant by anticipatory positioning. It is an active engagement with algorithmic remembrance technologies, a way in which users position themselves in relation to memory features that renders them susceptible to the mediated memories these resurface, thus engendering affective states. In other words, 'using' memory

features, apps, and platforms often becomes equivalent to putting oneself in a position of being affected by algorithmically resurfacing memories. In the context of these algorithmic technologies, anticipation, positioning, and practice are intimately interwoven.

What are some of the outcomes, then, of this anticipatory positioning? For many participants, for example, encountering the algorithmically resurfacing past was a helpful tool as the memories documented growth and change over time. As Oliver suggests, using memory features such as Facebook Memories constituted a 'self-contained measure of growth.' It measures change and how interactions with other people have changed 'commensurate with that.' 'It's reassuring to see how I have grown,' Grace puts it, 'but it's also a reminder that like yikes I used to be this person (laughter).' Remembering with algorithmic remembrance technologies, Grace suggests, affords a mix of emotional responses as the various increments of the past resurface in the past. It can be both reassuring and embarrassing.

Grace also mentions that using memory features can be both a measure of growth, but also a 'time and space to reflect' over these digital increments time that are being algorithmically resurfaced. Rather than a disinterested record of the past, some participants also hinted at the active engagement with these resurfacing memories. As Quentin states, 'I don't want to say I feel smarter from it, but I feel like I know myself better after I use it.' This 'then and now' perspective taps into notions of self-knowledge and getting to know oneself better through seeing mediated memories from various increments of time in the past. One participant, Jack, even described the use of such memory apps as a form of 'self-check-up,' a way to see that 'hopefully I have improved as a human being.' As such, using memory apps was understood to have a certain pedagogical value, a means to learn and to know oneself better, a sort of ethical stance towards oneself. Memory features, one can also argue, constitute what Jane Bennett (2001) calls 'sites of enchantment', a space where users can encounter mediated memories being algorithmically resurfaced, a space where affective states are engendered and where people can actively engage with their past and weave narratives of self and others.

However, some participants also pointed out that the pedagogical value of resurfacing memories depends how far back in the past the memories reach. After asking whether she feels more emotional invested in the more recent memories rather than the early ones, Diana responded:

> Yeah. They're fresher, I guess, because I haven't thought about them, but also because they were closer in the past. Whereas I have thought a lot about the more

> distant past… I feel like there's less to learn at least from what Timehop shows me.

As Diana points out, the usefulness of remembrance technologies such as Timehop depends on how 'fresh' a certain memory is. For this interviewee, notions of distance and proximity matter. The extent to which one can learn from the past is predicated on its distance from the present. For Diana, there was 'less of an emotional connection' to the more distant past, because it had already been emotionally processed. [56] Conversely, the pedagogical value of remembering, Diana states, was based on memories that 'were closer in the past' and therefore she hadn't 'thought' about them.' The enchanting quality of seeing memories resurfacing depends here on a variety of factors such as proximity, distance, and emotional investment. These algorithmic remembrance technologies can therefore only provide users with isolated, resurfacing memories, fragmentary threads and affects through which users must weave stories of how they have developed and progressed. Users drew on these memories, 'then and now' perspectives, and affective states in order to learn about themselves as well as to make sense of their progression and growth through time.

Another prominent way emplotment can be understood as a form of anticipatory positioning is through everyday encounters with what some participants perceived to be difference between 'big' and 'small' mediated memories. Encountering and navigating an apparent mix of memories, what Francis called a 'comprehensive look back' at one's data past, was a common experiential aspect of remembering with memory apps amongst my interview and focus group participants. For example, memory apps were commonly said to be used for reliving and appreciating the big milestones. Describing her use of Timehop since becoming a mother, Imogen stated:

> My daughter is two and a half. It's like one of my favourite things every day to look and see, like, 'oh my gosh, look at her two years ago, look how tiny she was, look at what she was doing'... What I like about it is just being able to watch my daughter grow and have those constant reminders every day, the big milestones in her life that sometimes maybe you forget about.

As Imogen points out, her memory app usage has been dominated with memories from her daughter's life. The emotional connection to the past and to the remembrance technology itself,

[56] This question of distance and proximity raises an interesting, and probably impossible, question: what is the threshold? When do memories become distant and when do they remain 'fresh' and 'closer in the past'?

she suggests, has changed following the birth of her daughter. Whereas as she now tends to scroll through work-related memories 'a lot more quickly,' her daily use of Timehop has become 'more emotional for me in a kind of positive way,' seeing her daughter's transition and growth through time.

Yet, algorithmic remembrance technologies such as Timehop and Facebook Memories are mechanisms for resurfacing a wide variety of past content and not just big milestones. When I asked Oliver what he thought about being reminded of this seeming 'mix of memories' on Facebook Memories, he responded:

> I think it's helpful. I think if it were just major things that I've posted over the years I think that a) there would be a lot less to look through. There would be days where just nothing major happened. It was only the mundane. And I think it also could become overwhelming. If you only have major things to sort through you don't have that palate cleanser of, 'oh yeah, here is this time I tweeted about another team's crazy acquisition.' I don't need to be inundated with the intense. It's helpful to have the mundane as the palate cleanser. And oftentimes some the conversations I have with people, that are most entertaining to relive a year later, are the ones that sprung out of the mundane rather than the intense.

As Oliver points out, the enjoyment of using memory apps would be affected if only the 'major things' were resurfaced. For Oliver, there is therefore a link between the enjoyment of using memory apps and the accumulation of content being resurfaced. In short, the enchanting qualities of algorithmic remembrance technologies is predicated, at least in part, on *how much* is resurfaced and not only *what* is shown. He also suggests that being reminded of more mundane images and posts from the past functions a 'palate cleanser,' which helps downplay the intensities of some of the major things, so one is not 'inundated with the intense.' As such, some of ways in which algorithmic remembrance technologies are used and anticipated in everyday life resides not in the big milestones, but also in those mundane moments – in those moments described by Paul as 'little gems that can make you very happy.'

One participant, Diana, also pointed out that being reminded of 'smaller' memories, such as mundane moments aspects of her data past, helped put the bigger milestones such as 'jobs and relationships and apartments' in perspective. The emotional value of this kind of perspective is not necessarily the same that was discussed in the 'then and now' section above.

Instead, Diana talks about the value of being shown the 'continuity of smaller things.' What does she mean by this? Later in the interview, she stated:

> In a short-term way, it's actually been more interesting and more, for me, beneficial to see what I've was doing 2 years ago as a way of creating a sense of the past where a lot of things in my life haven't change in the past 4 years. I have been in the same job, I've been in the same apartment, a lot of things have been the same. It's a cool daily low-lift way of showing the dynamics of all that time, provides a smallish way of being, 'oh year ago today I was flying to New Zealand.' That's so interesting, that would not have occurred to me. The smaller forms of backwards reflections have come to be more useful and more beneficial to me than the really heavy-lifting stuff of what I did when I was in my early twenties.

Being encountered with the data past through algorithmic remembrance technologies affords not only glimpses into big milestones or dramatically different 'then and now' moments. As Diana points out, seeing the mundane aspects of the past resurface provides her 'smaller forms of backwards reflections.' The value of this form of remembering resides in getting a 'sense of the past' where most of life has remained the same over the years. This was also echoed by Nicole, who stated that memory apps allowed her to say:

> Let's see what you were up to, let's see how much you've grown as a person, but also let's see how you've stayed the same, your coffee order is the same and it has been since 2008 and that's cool.

As a result, both 'big' and 'small' memories featured in the ways people made sense of their own progression through time, to make sense of the various 'dynamics of all that time,' as Diana put it. As people used memory features, they expected to encounter both 'big' and 'small' memories from their data past. One could argue that part of the emplotment value of these remembrance technologies resides in the way they both resurface a mix of memories, milestones as well as continuity and consistency – what Diana aptly calls a 'smallish way' of remembering the past. This mix of memories provides materials for more nuanced and textured narratives of self.

Another prominent way emplotment relates to affective states and anticipatory positioning is through surprise encounters. As algorithmic remembrance technologies resurface a wide variety of past content to users, it is inevitable that some of these mediated memories

they present may surprise and strike, evoking feelings and moments from the past that have been forgotten or are not fresh in someone's mind. Yet, some participants stated that these surprise encounters were one of the main reasons they used these technologies. That is, many of the participants mentioned that they anticipated being surprised by aspects of their data past. Miriam claimed that 'there are things that surprise me every single day,' whilst Nicole noted that 'it's always a surprise even though I've done it every single day for the past, I think, 703 days.' Surprises or surprising memories, it seems, are a common and even daily experiential characteristic of using algorithmic memory apps. These surprise encounters also accentuated the way emplotment figured as a way to anticipate as well as mentally and emotionally 'prepare' for such encounters, a way that users positioned themselves in relation to memory technologies.

But what is the value of such surprises? Oliver stated that 'It is definitely helpful to have the flexibility to click through and be reminded of that. I would never have come up with that context, with that memory, on my own.' For this participant, surprise encounters were a result of engaging with memory features that are not passive conduits or archives of memories. Rather, they actively resurface past content in the present. This ability to 'click through,' according to Oliver, has provided him with a flexible approach to the past, one where he can enjoy the memories he 'would never have come up' on his own.

Yet, these surprise encounters can also come across as a somewhat disruptive. As Nicole mentions:

> I have had some mornings where Timehop has caught me a little off guard. Even when the memories that come up are not necessarily positive memories I can look at how long it's been since that time and go, 'wow, this amount of time has passed!' Look where I am, the date after this I thought this is going to suck forever and here we are three, four years later, and I was actually surprised by it, because it wasn't the thing that took over the entirety of my brain space.

As this statement suggests, surprise encounters are often ambivalent, taking users 'off guard.' This is echoed in Jane Bennett's (2001) understanding of surprise encounters and their relationship to the notion of enchantment. For Bennett (2001, p. 5), enchantment can be understood more specifically as a form of 'surprise encounter', that is, a 'meeting with something that you did not expect and are not fully prepared to engage.' Central to Bennett's understanding of surprise encounters is their inherent ambivalence. As she states, surprise encounters

can give rise to both ‘a pleasant, charming feeling’ but also a ‘slightly off-putting sense of having been disrupted’ (p. 5). This duality of affect implies that surprising memories must be worked on, reflected upon, and investigated. The value of surprise encounters, Bennett states (2001, p. 6), lies in that which they engender: ‘new ideas, perspectives, and identities.’

The generative nature of surprise encounters is also echoed in the case of Nicole. For this participant, being reminded of certain memories sometimes ‘caught me off guard’, especially if these were not entirely ‘positive memories.’ Yet, encountering surprising memories on algorithmic remembrance technologies became a way for Nicole to engage with aspects of her past she would not necessarily have done otherwise. For example, being caught off guard in this manner provided her the space to think ‘wow this amount of time has passed’ and ‘I thought this is going to suck forever.’ Through these encounters, Nicole was able to emplot a different story, one where the past and the present are forced into perspective, where they are dialectically interpreted and negotiated. As such, encounters with surprise memories not only engendered various emotional reactions, but that these surprises were a key aspect of people’s attempt to emplot their lives, weaving together a narrative that stretched from certain aspects of the past they had not engaged with before and into the present.

It is also important to note that different memory features operate and resurface memories differently, and this had an impact on how certain users encountered and engaged with the digital past. Donna, for instance, mentioned that one of the main reasons she uses remembrance technologies was ‘for the element of surprise, the element of I anticipate seeing or finding something, and something that I can either look at or feel.’ The element of surprise was therefore not only a desirable aspect of using memory features, but was expected, anticipated. Comparing memory features to subscription-based make-up boxes, Donna states that this feeling of being surprised was central to how she wanted to encounter her data past. As she points out, ‘For me, that’s like how I use Timehop. It’s like I really never know what I’m going to come across. I love it for that reason.’ However, as mentioned above, the criteria for what to resurface and when varies from feature to feature. Where Facebook Memories and Google Photos attempt to select and to resurface only certain things, Timehop would resurface content indiscriminately. This was Donna’s reason for not using Google Photos as much as Timehop: she knew that there would be a lot of past content that she would never encounter, that would never be resurfaced which, to her, was a shame because ‘I think the most interesting things are things that you’re not looking for.’ However, Donna stated that:

> Timehop to me – I know its purpose. It's like that package, I know that it's going to surprise me and it's something I look forward to. I have absolutely no expectations versus every other app. I feel like it's [the app] very intentional and I know its purpose and I know basically what to expect, so it's just really different.

Through this, an interesting paradox emerge: these memories, these surprise encounters, are not entirely surprising. They are expected and anticipated. They have been selected, they are programmed, and they are algorithmically resurfaced. As such, algorithmic remembrance technologies figure as so-called 'spaces of anticipation' (Thrift, 2004, p. 175), where they are accepted and enjoyed because 'they show up more or less as expected.' Although these technologies may resurface surprising or shocking memories from the past, they operate in expectable and unsurprising ways. As such, users position themselves in front of memory features, wanting and expecting to be reminded, surprised, and even taken aback. Through surprise encounters in particular, the notion of emplotment must consider the role of the algorithmic remembrance technologies themselves and the way they actively participate in the narratives people create of themselves as well as the way users anticipate this narrativisation of their own past. The next section will look more closely at what happens when the participants were reminded of something that brought not only comfort but also discomfort.

For some participants, there was a certain sense of comfort attached to the use of remembrance technologies. For instance, Becky stated using memory features such as Facebook Memories does not affect how she lives 'other than that I feel more grounded in who I am and where I exist in own my personal timeline.' Diana called it a 'very strange form of comfort' to know that memory features are able to both document and 'replay' the past 'at a point in the future.' Echoing this idea of comfort, Miriam stated that algorithmic remembrance technologies and their ordering mechanisms engender 'a kind of a sense of stability,' adding that 'It's just comforting to know that I have something to keep all of my memories in order by year by day.' As such, there is a comfort in both how memory features are able to document, store, resurface and order the past. This also echoes the discussion in chapter four. As the photo backup and storage app, Ever, put it in one of their promotional taglines, 'We have the distinct honor of hosting your photos and videos, so that you are free to make memories.' The promise and comforts of using algorithmic remembrance technologies resides, at least in part, in the delegation of storing, ordering and resurfacing people's mediated memories to these features.

Conversely, using algorithmic remembrance technologies also engendered a sense of discomfort in some participants. The reasons for this discomfort were various. For some participants, there was a sense that the technologies 'knew' too much. In one of the focus groups, one member, Lily, suggested that the reason she no longer visited Facebook Memories was 'the fact that they constantly involve themselves, pick more stuff up about you leaves me a bit creeped out.' To her, Facebook's memory feature came across as creepy because there was a sense that increasing aspects of her everyday life were being mined and exploited, echoing a form of what Nick Couldry and Ulises Mejias (2019) call 'data colonialism.' Within this framework, the increasing extraction of people's past data churned into resurfaceable 'memories' comes across as exploitative and a breach of boundaries ('they constantly involve themselves, pick more stuff up'). For Lydia, a data threshold seems to have been transgressed, leaving her 'a bit creeped out.' This sense of the invasiveness of memory features was also echoed by Helen. When asked what she thought the purpose of Facebook Memories and Apple Memories was, she promptly replied 'Well, I think basically what it's doing is having access to all your past photographs', adding that 'I would be very loathed to let third-party apps have access to my photographs.' For this participant, memory features are not merely resurfacing memories in the present but also engender a sense of anxiety in terms of their data mining practices.

Yet, as other participants also pointed out, this sense of being creeped out was platform- and context-dependent. Raymond noted:

> You know what Timehop is going to want you look at, which is something I've been on this year. Whereas Facebook – it thinks it knows what you want. I don't know, that's creepy, I don't like that... I mean it's different in that I know I'm not going to get tripped. I know what I'm going to get. I don't know what the content is going to be, but I know what the algorithm is. The algorithm is very simple. It's like, what I posted on these days in the previous years, whereas Facebook I just don't know. The trust level just isn't there.

In one sense, the algorithms underpinning these different memory features presuppose different ways of mediating memories, different ways of remembering with algorithms. Raymond points out that where the algorithm is relatively simple, it is easier to know 'what I'm going to get' and that 'I know I'm not going to get tripped.' As a result, the participant also found it easier to position himself in relation to the technology, because he knew what he could expect. In

short, technologies with more complex algorithmic mechanisms for mediating memory (e.g. Facebook Memories) engendered a sense of discomfort because, Raymond stated, 'it thinks it knows what you want.' This, in turn, gave rise to a sense of something creepy, a sense of unknown, a sense of artificiality.

This idea that memory features think they know 'what you want' was also echoed by in one of the focus group. Commenting on the difference between remembering with diaries and photo albums, on the one hand, and algorithmic memory features, on the other, Eva noted:

> I think there's a definite difference because if you're a writing a diary, making a photo album, it's you actively writing down what you want to remember. But if it's like Apple or Facebook or Snapchat, they're picking this is probably what she wants to remember. So in my opinion, when I see it, I'm not like this is a photo album; I'm like this is a Snapchat photo album or this is what Apple chose. I'm never like totally immersed in it, it's always through a technological lens.

As the participant suggests, there is a certain discomfort that arises from the awareness that remembrance technologies are not passive tools in memory making. She is aware that they are actively participating in shaping and emplotting her life through approximating what she would want to remember. On one level, this is not surprising, since a salient aspect of algorithmic systems is their supposed ability to predict people's future patterns of behaviour based on large data sets (Mackenzie, 2015). This means that memory features such as Apple Memories, Facebook, or Snapchat do not simply repackage and resurface someone's past data as memories; rather, they actively seek to show those memories they think users would most like to engage with. In such cases, memory features can then be seen to actively participate in the emplotting of people's lives.

Still the narrative of self they weave is underpinned by particular by criteria. For example, Facebook's annual Year in Review memory feature actively seek to avoid showing what they consider 'painful' memories (Jacobsen, 2020b). This sense that mediated memories are not simply resurfaced, but have been analysed, sorted, curated, and classified produces, for some users, a 'technological lens.' That is, a lens through which remembering is filtered, where the user is never 'totally immersed' in the experience of using memory features. As Eva implies, this distance between the user, their data past, and the technology in question creates an awareness that the participant is implicitly 'configured as a user' by Apple Memories (Woolgar, 1990). The sense of discomfort and detachment derived from this discernment

serves as a reminder that people do not simply domesticate algorithmic remembrance technologies. Rather, they are also constructed and positioned as users in relation to the technology. Users do not merely anticipate algorithmic technologies; they are also anticipated by the technologies themselves.

There is, therefore, a sense that algorithmic remembrance technologies are not just passively facilitating people's remembering. For users such as Raymond and Eva, there is an awareness of their underlying memory politics, which engenders a critical eye towards the features themselves. As this section has begun to explore, emplotment in relation to algorithmic remembering seems to be distributed amongst human and nonhuman agents. It is a dialectical process, which engenders both a sense of comfort as well as discomfort and detachment.

5.4 Conclusion: Towards a Socio-Technical Understanding of Emplotment

This chapter has sought to highlight the social, technical, entangled, and fluid qualities of memory making and memory practices in relation to algorithmic remembrance technologies. Drawing on Steph Lawler's notion of 'emplotment' as the overall conceptual framework, I have investigated the ways in which users may draw on algorithmically resurfacing stories, meanings, and memories from the past to make sense of and negotiate their identities in the present. Whilst Lawler's notion has great analytical value in understanding processes of identity formation, emplotment also helps to amplify some of the micro dynamics of what Annette Kuhn has called 'memory work.'

However, the analyses in both Lawler and Kuhn is predicated on the centrality of human subjectivity, agency, and memory. It accentuates the ways in which humans remember the past as well as work on it, anticipate it, interpret it, seek to make sense of it. It focuses on the ways in which users negotiate its importance for the present as well as the multiple meanings necessarily emerging from any 'evocative objects' such as photographs, diary entries, and Snapchat 'memories' (Turkle, 2007). In response, I has sought to widen the conceptual frames of emplotment, understanding it as a socio-technical process of memory. I have suggested that remembering with algorithms constitutes, amongst other things, a multifaceted negotiation - of the mediated memories themselves, of the algorithmic technologies, and of various social groups. Through the intersections of human users, memory practices and algorithmic remembrance technologies, this chapter has demonstrated that the emplotment of identities and narratives of self are distributed amongst both human and algorithmic agencies.

Firstly, I have argued here that humans draw on past data and content that is resurfaced through algorithmic remembrance technologies as 'memories' to make sense of themselves and to weave narratives of self and others. The chapter looked at some of the principal reasons why and how people use memory features. For instance, some the participants that were interviewed stated that they appreciated the affective states that the features engendered from seeing various mediated memories from the past resurfacing on a continual basis. They also pointed to the importance of anticipatory positioning, that is using these technologies with the anticipation to be surprised, shocked, and affected by the technologies and the memories that were resurfaced. Moreover, seeing certain mediated memories resurface helped provide users with meaningful perspectives, as they encountered both small and big memories as well as more distant reminders in contrast with fresher, more recent ones. Moreover, many of these memories were not only meaningful to the individuals using memory features, but on multiple occasions became the means by which people maintained relational ties, friendship groups and wider communities through acts of sharing. As such, the findings from the interviews and focus group data corroborate Lawler's claim that emplotment is an emphatically social process as well as fluid, malleable and subjective. In fact, sociality runs through the fabric of any narrative and any form of remembering.

Secondly, I have argued that algorithmic systems actively participate in the emplotment of identities, making decisions of what memories to make visible and when. This has implications for memory making practices. Many participants suggested that they did not only have to negotiate and make sense of the memories being resurfaced, but also the very technologies doing the resurfacing. This engendered multiple situations of tensions and contradictions amongst participants. This was demonstrated in the comforts and discomforts people felt when being encountered with their data past. For some, encountering the past was always accompanied by a feeling of seeing through a 'technological lens,' an underlying discomfort and awareness that the parameters of what users see and remember have always already been demarcated by the technologies themselves. For others, it raised questions about the nature of algorithmic visibility such as: why are certain memories resurfaced and not others, which ones are being left out and why, and *when* are they resurfaced. These various questions and considerations informed the ways people sought to make sense of their past and present.

For other research participants, using algorithmic remembrance technologies engendered more visceral encounters and responses. Many participants, for instance, experienced being reminded of mediated memories alluding to painful or socially awkward events and

experiences from the past. As a result, processes of emplotment emerge as a form of management, that is, processes and practices of managing the past in the present through deletion, filling in the gaps, and putting the pieces together. It also became apparent to many participants, through such instances, that memory features are not neutral archives or conduits for their mediated memories. As such, remembering the past through algorithms produced multiple levels of interpretation and reinterpretation. Emplotment is seen as an iterative process.

Yet, within this framework, emplotment is not only subjective, fluid, and malleable. It is, as Tarleton Gillespie (2014, p. 183) noted, 'a multidimensional entanglement between algorithms put into practice and the social tactics of users who take them up.' Anticipating, encountering, engaging with, working on, remembering and emplotting the past should be the domain of the assemblage. It should be seen as a complex and contested interplay between algorithms and humans, between a variety of human and nonhuman agencies, all of which participate in the weaving of stories and identities through the resurfacing of mediated memories. Within a socio-technical conceptualisation of emplotment, any notion of self and others is not a given, but is rather emplotted. That is, a heterogeneity of meanings, feelings, memories, events, and past experiences are synthesised into meaningful wholes and made to matter in the present. Moreover, moving towards a more socio-technical understanding of emplotment also helps to make visible some of the dynamics inherent in all forms of memory work, whilst also showcasing some of the tensions specifically inherent in the various human interactions with and uses of algorithmic remembrance technologies. In the following chapter, I will focus on one such dynamic, namely the issue of temporality and timing in remembering with algorithms.

6.0 'Not just an arbitrary date': The Importance of Timing for the Algorithmic Resurfacing of Memories

6.1 Introduction

The emphases of the previous chapters have been on the algorithmic affordances and architectures of memory features as well how people use and negotiate these features in everyday life. In contrast, this chapter will look at how these technologies affect and shape people's encounters and experiences of the past, that is the ways people experience the effects of algorithms. As I have already underlined, algorithms come to matter in particular situated contexts as they fold data, methods, epistemologies, social relations, tensions, negotiations, and so on (Lee et al., 2019). Algorithmic systems take on meanings and showcase their social power in situated practices and experiences, such as being recommended music on Spotify, seeing personalised ads on Amazon, or being identified in a crowd by facial recognition software. However, the central argument of this chapter revolves around the issue of algorithms and temporality. Understanding algorithms as 'apparatuses of mattering' (Amoore, 2020), here I examines particular instances *when* algorithms come to matter. This chapter suggests that analysing specific temporal instantiations and dynamics of algorithmic media may provide a better understanding of the social power of algorithms in everyday life.

In recent years, there has been considerable scholarly work written that focuses on the relationship between algorithms and data, on the one hand, and speed, acceleration, and efficiency, on the other (e.g. Beer, 2018; Wajcman, 2015; 2018). Past research has focused on, for instance, the temporal affordances of algorithms in the financial sector (Borch, 2016; Hayles, 2017; Mackenzie, 2011, 2018), driving a logic of speed. In her book *Unthought: The Power of the Cognitive Nonconscious*, N. Katherine Hayles (2017) points out that the allure of high-frequency trading (HFT) algorithms is not only the ways in which they are capable of locating the opportune stocks to either buy or sell, but also the sheer speed by which they operate, a speed which far exceeds the cognitive abilities of human stock traders. This, Hayles argues, results in 'incommensurable timelines of human and technical cognizers' (p. 155). The

financial incentives of speeding up as well as the capacity for real-time data analyses has led to a so-called 'arms speed race' amongst investment companies, that is, a push toward 'faster and faster algorithms' (p. 165). In the case of financial derivatives and high-frequency trading, algorithms are efficacious because they occupy temporal slices inaccessible to human actors, a time frame in which only algorithms can operate.

There have also been many studies examining the importance of algorithms for 'real time' data analytics. Rob Kitchin (2014b) pointed out that real-time analytics was one of the promises offered by the advent of Big Data. Within this framework, data could be processed and analysed immediately after it was mined, eradicating the temporal delay which existed between the period when the data was collected and the period it was analysed and made actionable in particular social or institutional settings. The importance of real-time analytics is also echoed by José van Dijck (2014) who argues that real-time analytics remains an essential component of the meta-process of datafication. In van Dijck's (2014, p. 198) view, datafication refers to 'the transformation of social action into online quantified data, thus allowing for real-time tracking and predictive analysis.' Commenting on the close interrelation between speed and real time, David Beer (2019, p. 39) states, 'visions of speediness and the promises of real-time knowing are central to the spread and intensification of data-led processes throughout the social world.' This coupling of speed and real-time data analytics has been widely diffused in society. In education, for example, developments in AI and machine learning promise regulatory bodies the abilities to analyse and intervene in school systems in 'real time' if schools were experiencing problems (Luckin et al., 2016). Along with data mining and predictive analytics, real-time tracking has become a crucial part of what Couldry and Mejias (2019) call 'data colonialism,' the exploitation of people and societies through the mining and processing of vast amounts of data.

It is evident from these sources that algorithmic systems encapsulate a variety of heterogeneous temporalities. As Bruno Latour (2002) would say, multiple temporalities are 'folded' within the functionalities of technological objects such as algorithms. Although the focus of recent critical media scholarship has tended to gravitate towards speed and real-time data analytics, others have claimed that algorithmic media such as Facebook highlight another, yet equally significant, temporal configuration (Bucher, 2020b; Humphreys, 2020). According to Taina Bucher (2018), Facebook's News Feed is as much governed by a logic of 'right time' as it is real time. In fact, Bucher argues that this logic of right time is 'the key temporal mode of algorithmic media' (p. 80). Her line of argumentation derives from a series of claims made by

representatives of algorithmic media companies such as Facebook. On their NewsFeed FYI blog series, Facebook claims that 'Our goal is to show the right content to the right people at the *right time* so they don't miss the stories that are important to them' (quoted in Bucher, 2018, p. 80; original emphasis).

This issue of timeliness has also been touched in relation to the way Twitter trends appear (Gillespie, 2016), and in relation to some of the algorithmic remembrance technologies discussed in chapter four. For instance, the cloud-storage service app called Ever claim that they are 'a platform we built to dynamically show the most meaningful photos to you at *just the right moment*' (emphasis added). For platforms such as Facebook and Ever, the focus is not only to operate in real-time, continuously learning about people's behavioural patterns, but also to be able to operate at the *right time*, being able to find and show content that is most relevant to users at opportune points in time.

During the qualitative interviews and focus groups, the intersections of temporality, timing, memory, and algorithms became salient. One participant noted the importance of not only what she was being reminded of, but also *when* memories were being resurfaced. As Alice stated, their timing matters as 'it's not just an arbitrary date.' This chapter works with Bucher's concept of 'right time' on algorithmic media as well as Alice's claim about the specificity of the date in order to investigate the intersections between memory practices, timing, and algorithms. In this chapter, I argue that timing is a crucial aspect of algorithmic remembrance technologies. They algorithmically resurface and remind users of their past data in the form of 'memories'. It is therefore vital to examine how their timings are algorithmically instantiated and how users are affected by this mode of temporality. *When* a person is reminded can be as significant as *what* they are reminded of. As this chapter will show, these technologies are a crucial way in the temporal mode of algorithmic media can be explored in further detail.

In order to better understand *when* algorithms come to matter, I propose the notion of 'anniversification.' Anniversification can be understood as a particular manifestation of the way timing, temporality, algorithms, and affect intersect. Through this conceptual framework, timing emerges as a particular temporal and computational practice rather than an already-given reality. It suggests that even if well-timed moments and the 'right time' may feel natural and inevitable, they can be manufactured and algorithmically produced. More specifically, this chapter argues that through algorithmic remembrance technologies and their timing the logic of anniversification is encapsulating increasing segments of social experience and everyday

life. Although anniversaries are both highly socio-cultural and personal phenomena – such as birthdays, public holidays, commemorations as well as mundane events – these technologies have pulled common occurrences, everyday experiences, and mundane 'non-events' into the realm of 'anniversary.' I argue that through algorithmic remembrance technologies these occurrences have been incorporated or pulled into the logic of anniversaries, producing 'memories' to be remembered, celebrated, and shared in a cyclical manner. The notion of anniversification therefore functions as a way to investigate how algorithms temporally frame remembering in order to produce affective states, behaviours, habits, and routines. It is an avenue for exploring the 'politics of temporality' on algorithmic media, that is, how temporality and timing are used and practiced by these media to shape how people remember the past and work on the present.

The chapter starts by unpacking the notion of anniversification in more detail, focusing on the idea of timing as something computationally manufactured or engineered. Afterwards, I discuss Taina Bucher's (2018) notion of 'right time' and how it relates to anniversification. I then investigate how the intersections between temporality and algorithms affect and shape people's memory-making practices and their overall engagement with the past, themselves, and with others. Overall, I argue that the concept of anniversification will contribute to our understanding of the social power of algorithms and how they generate new, heterogeneous temporalities.

6.2 What is Anniversification?

Before examining the various ways in which algorithmic timing affected the participants and their memory practices, this section will unpack the notion of anniversification in greater detail. As I mentioned in the chapter introduction, anniversaries carry a plethora of often-competing meanings. The idea of 'on this date in history' has long been a staple feature of various newspaper outlets (Humphreys, 2018; 2020). These dates provide snapshots of interesting or noteworthy occurrences in the past. With algorithmic remembrance technologies, however, this anniversal logic increasingly shapes and defines people's encounter with their mediated memories as well. For these technologies, anniversification refers to a particular logic and temporal dimension of how memories are repeatedly resurfaced. Basically, they are a mechanism for collating a person's past data content from their phones or various social media accounts and resurfacing this data on its (annual) anniversary as a 'memory.' Apple Memories, a built-in

feature of the smartphone software, resurfaces photos one has taken and stored in the gallery as a 'new memory.' Snapchat Memories resurface old Snaps one has saved on their annual anniversary. Instagram occasionally notifies users with throwbacks such as 'See your post from 4 years ago today.' Facebook does a similar thing, but also uses machine learning algorithms to rank, classify, and ultimately determine what and when memories are resurfaced (Paluri and Aziz, 2016; Konrad, 2017). Features such as Timehop are a bit different in the sense that the app asks for access to all of a user's social media platforms and resurfaces this content within the app on its annual anniversary as a memory one can revisit and share. Platforms such as Facebook Memories and Apple Memories have also started experimenting with resurfacing monthly or even weekly memories: 'look at your memories from last month.'

What all these technologies have in common is that mediated memories are resurfaced according to a specific temporal pattern or logic. I have chosen to call this logic 'anniversification.' Although these mediated memories are not explicitly called 'anniversaries' within these technologies, the concept highlights an underlying temporal logic through which algorithmic remembrance technologies attempt to position mediated memories as 'right' moments, as important moments, as moments that stand out, as moments that beckon to be remembered, celebrated and shared. In short, moments that inevitably draw the user closer to the platform. In other words, memory technologies frame past events, stories, meanings, and memories in specific temporal ways in order to try and maximise users' experience, engagement, and participation on their platforms, in order to generate affective states and new behaviours and behavioural patterns. It is a form of *data slicing*, that is temporally freezing certain past experiences into discreet 'moments' or 'memories' in the present.

In March 2019, I interviewed software engineer and Timehop co-founder, Benny Wong. During the online interview, we covered a wide variety of topics relating to the app itself, issues of privacy, the role of platforms in memory making, what counts as a memory, and so on. A subject I was especially interested in was this idea of *when* users are reminded of their data pasts. When I asked Benny Wong what the relation was between memories and their anniversary-like resurfacing, he replied:

> The year timeframe was something that we had arrived at after testing a whole bunch of stuff. We started off with a year but we were like, wouldn't it be interesting to do a month or six months or some other timeframe? But the year ago timeframe was actually very powerful, because so much of your life is the

> same year to year on this day. It's like the seasons are the same, the weather is about the same, holidays are around the same time. Because all of those things are things are the same, the differences in your life, between you right now and you then, is almost highlighted by contrast, right. We did something where we did six months back and so much is so different that you can't place your own self in that time. Right now it's in the middle of winter and if we see photos or memories from the summer, we can't really sort of like put yourself in that mindset, but since you are already in this mindset of this same environment, it's much easier to see the differences from a year ago to years ago and so on.

In other words, the resurfacing mechanism on features such as Timehop follows a cyclical understanding of time, reflecting the way wider society is already structured. That is, it follows the same logic and temporal structure as other more ingrained societal anniversaries such as birthdays, weddings, national holidays, and festivals. A more generic notion of anniversary might signify specific, special, memorable, socio-culturally significant events that 'beckon' to be remembered, celebrated, or at least noted. For some participants, this (seeming) parallel between the inhabited temporal structures of society and the way apps like Timehop resurface memories was noted and came across as a 'an organised way' to do remembering. For instance, Jack stated that:

> I think it's cool because our lives progress by year. Everything is done, that's how we process things, our lives are segmented by years is what I should say. So being able to take myself on this date and compare to that date the same time previous year I think it's worth something.

Of course, the idea of anniversary can also signify something personal and unique to certain individuals or groups. Anniversaries can be appropriated and modified, suggesting that they are highly fluid and contextual phenomena. In short, they can mean various things to various people. As Benny Wong points out, algorithmic remembrance technologies such as Apple Memories or Timehop exploit this 'floating signifier'-quality of anniversaries. As we see here, mundane happenings such as picking up coffee from Starbucks or seeing a rainbow on the way back from work, are repeatedly resurfaced as if they were anniversaries. This might seem like a mundane and inconsequential fact, but the processes through which resurfacing mechanisms on algorithmic remembrance technologies are temporally determined suggests otherwise.

As Benny Wong further notes, the software engineers at Timehop tested multiple time-frames such as resurfacing a memory after only a month and after six months to see which one would work best for them and have most emotional impact on their users. They then settled on the 'a year ago' timeframe because, as Wong states, 'it was actually very powerful.' One of the reasons for this, Wong continues, was that annual memories generated a sense of both 'parallel' and 'contrast': by mapping a memory unto a similar season, similar weather, similar cycles of holiday, the development, trajectory, and narrative of the user would be heightened as a result. By doing annual anniversaries, the parallel would highlight a contrast between the state of current and former self. In other words, memories from only six months ago are unable to elicit this same sense of contrast, Wong proposed, because the parallel is not strong enough: 'you can't place your own self in that time.' This suggests, therefore, that the memory feature inscribes significance into certain past events or experiences by engineering distance and juxtaposition into its functionality. In short, the memory is far away enough to still be relevant and close enough to still be meaningful. By juxtaposing the past and the present in this manner, drawing parallels between different 'memories' and their temporal position in the present, Timehop was able to create memory 'anniversaries,' or what Benny Wong later in the interview called 'a memory product', which is aimed at extracting the meaningfulness of every mundane situation. Within this framework, every mundane event can therefore become an opportune memory, something one needs to engage with.

It is also important to stress at this point that the ways in which memories that are resurfaced on algorithmic remembrance technologies are highly contingent. Timehop's decision to choose the 'one-year framework' between the documentation of a memory and its resurfacing may seem like a given, a logical decision arising from the inevitable condition of the ways in which society structures time and conceptualises anniversaries. Yet, as Benny Wong points out, that decision was presupposed by and the result of a culmination of multiple trial runs. It was a product of careful consideration and testing, feedback loops, and processes of trial and error. As a result, the logic of anniversification implicates everything from philosophies of time, socio-cultural observations, presuppositions about memory, and the affordances of algorithms. It not only reflects the way anniversaries are framed in wider society; rather, the temporal 'one-year' framework emerges as part of specific contexts, concrete circumstances and sometimes contested sociotechnical processes.

Anniversification is therefore not a given, but refers to the socio-technical construction of memories resurfacing at the 'right time.' It must be understood as an algorithmic tailoring

of events as well as a sociomaterial reality, emerging from various contested processes that have a hidden 'social life' (Savage, 2013). This was echoed in the interview data, where one participant stated that Timehop is 'specifically tailored towards a daily memory' (Imogen). The logic is part of a certain politics, a certain way to conceptualise time and remembering and the affordances of algorithmic systems. Anniversification is a logic that asks *when* to resurface what memories. It is a logic that extends the imperative to remember and celebrate, to increasingly larger parts of everyday life. Moreover, the underlying drive behind anniversification is to induce remembrance, engagement (e.g. sharing), and further participation on the platform. While the temporal framework of when to resurface memories may only seek to extract the meaningfulness out of mundane everyday events and memories, it also participates in generating affective states. But before examining how anniversification can be seen to shape people's experience of the past in specific ways, it is crucial to define what exactly is meant by '*right* moments.'

One of the central features of anniversification is the production of timing, of what Taina Bucher (2018) calls 'kairos moments' or 'right moments.' In her book *If…Then: The Power and Politics of Algorithms*, Bucher (2018) claims that 'right time' is the key temporal mode of algorithmic media. This notion of right time is drawn from the work of J. E. Smith (1986), who examines two particular modalities of temporality, 'chronos' and 'kairos', and how these were originally understood in Antiquity. The former, Smith defines as 'the uniform time of the cosmic system' (p. 4), a sort of absolute or 'objective' notion of time. Chronos, within this framework, is temporality as measured, as quantifiable duration. As Smith (1986 p. 4) states, 'In *chronos* we have the fundamental conception of time as measure, the *quantity* of duration, the length of periodicity, the age of an object or artifact' (original emphasis). It is a notion that sees time as measurable, as a linear succession, constituting hours and days, summers through to winters. It is the imposition of an objective order on time as something that can be measured, compared, predicted, anticipated, and shared.

Smith's (1986) notion of 'kairos,' on the other hand, refers to the more qualitative character of time. As he states, kairos points to 'the special position an event or action occupies in a series, to a season when something appropriately happens that cannot happen just at 'any time,' but only at *that* time, to a time that marks an opportunity which many not recur' (p. 4). In a fundamental sense, kairos refers to something that eludes the sequential order of things, to the 'special position' of an action or event that happens within an intersection of other actions or events, something that could only happen then. It is a sense of time that 'does not allow itself

to be measured in conventional ways,' as Stuart Elden (2006, p. 174) wrote about Martin Heidegger's notion of *Ereignis* ('event'). As such, the term is often translated as the 'right time' (Smith, 1986, p. 4), the special temporal position of a particular action or event. In short, opportune times or moments. It emphasises time as a flow of lived, embodied, and interconnected experiences, as points in time that resist the conventional measures and objective order of chronos. It is something that stands out from past and future points in time.

Bucher (2018, 2020b) draws on this notion of kairos in her own work on the temporality and politics of algorithmic media. As she notes, it is a 'useful way of understanding the kind of temporal work that algorithms perform' (Bucher, 2018, p. 80). For instance, in her study of Facebook and the algorithmic construction of visibility, Bucher (2012b) points out that 'time decay' or timeliness is one of three central components of Facebook's EdgeRank algorithm in determining what will resurface on a user's Facebook Newsfeed and when (p. 1167). On Facebook, something is considered relevant if it is the right content for the right user, resurfaced at the right time. Algorithmic media, Bucher (2018) claims, seek to surface content at the 'right time' to users, when the content will have most emotional or cognitive impact, making it increasingly likely that content will be shared or liked, which in turn makes it more likely that people will continue participating on the platform. Although there has been ample focus on temporality and social media, especially with regards to real time, Bucher (2018) argues that the way social media platforms increasingly emphasise finding the most interesting and relevant pieces to show users means that the issue of timing is bound to become more prominent.

Similar to Smith, then, Bucher uses kairos to signify temporal slices or moments that are uniquely positioned in the succession of things. In other words, it is a question of timing. In contrast to Smith, however, Bucher conceptualises timing as a sociotechnical construction rather than something ontologically fixed, as something inherent to temporality itself. As Smith (1986, p. 13) argues, the time of kairos is not a 'human standpoint', but rather constitutes 'an ontological element in the basic structure of things.' Timing, for Bucher, is rather imagined, designed, tested, contested, implemented, and tweaked.[57] In short, what can be considered the 'right time' is never ontologically pre-determined but always-already programmed or engineered. This conceptualisation of timing is best demonstrated by the ways in it is operationalised algorithmically. As Bucher (2018, p. 80) asks, how does 'the news feed algorithm

[57] For more in the interconnections between complex temporalities, technical objects/assemblages, and 'time as enfolded', see Bruno Latour (1994; 2002).

determine when the time is right?' How platforms and algorithmic remembrance technologies determine what is the 'right time'? What criteria underpin these decisions? As the interview with Benny Wong illustrates, the power and politics of algorithms are made apparent in the interstices of these decisions. *When* algorithms resurface memories to users constitutes a way in which algorithms 'give account' of their own temporal logic (Amoore, 2020).

What is the relationship, then, between anniversification and kairos? I argue that the logic of anniversification can be seen to underpin the ways in which algorithmic remembrance technologies make the data past matter in the present. The concept of kairos or right time helps to illustrate how the logic of anniversification seeks to produce well-timed reminders from the past. Drawing on interview and focus group data, this chapter examines situated encounters where timing can be seen to be algorithmically programmed and the logic of anniversification revealed. Anniversification could be seen in the data to generate a variety of affective states in users. More specifically, the chapter will examine four particular ways in which the logic of anniversification is seen to participate in shaping people's encounters with and experience of the past: Alignment, personalisation, habituation, and performativity.

6.2.1 'It's more momentous to remember it at that exact moment': Alignment

Many participants talked about the effects it had being reminded of memories *exactly* a year, or 3 years, after a photo was taken or a tweet was shared. For example, Helen stated that the difference between photo albums and features such as Facebook Memories is that the latter is 'so much more immediate. You can easily get your hands on something, cause you can look at the date.' Having the exact date of a digital image at hand creates, for Helen, both greater immediacy between photo and memory but also makes images more easily findable and searchable. For other participants such as Quentin, the feeling was more visceral and corporeal. He stated that:

> You think like, oh photos bring back that memory or something, and when people look back at photos that brings that whole nostalgic feeling. But to get it on that same day, I feel like I could walk outside and the weather was closer to the same.

Quentin points out that receiving a memory on 'that same day' on algorithmic remembrance technologies helps to make it more real, more visceral. He suggested that this was something

that went beyond feelings of mere nostalgia, but rather is something that emphasises the way remembering is always an embodied process (Connerton, 1989). Thus, seeing memories resurfacing 'on that same day' helps brings back his whole frame of mind, feeling the earth underneath him and how the weather was close to the same as well. Another participant, Paul, stated something similar to Quentin. He said that being shown memories on their exact date on Timehop produced a similarly embodied feeling: 'Sometimes I think I can actually almost feel like where I was a year ago or two years ago or three years ago.' For Imogen, seeing memories resurface on their annual anniversary did not transport her back to the past as much as it made the memory more acute in the present. As she observes:

> I think it makes it more acute where it maybe if I don't have the exact time marker to it, or the exact chronology, it can kind of feel like just a nebulous [inaudible] that's out there. But having a reminder that shows up in this tangible way of like this day, this year, it's February 19th 2016… or what exactly popped up this morning, but I think it makes them more acute and more real. There are definitely times where I'm able to remember what I was feeling or how funny I thought that was or I was sad about something or whatever the case might be, but I think it makes it just a little bit more real and just in context if that makes sense.

The reason that memories felt 'more acute' or 'more real' for Imogen was that when memories surface in this manner they show up 'in this tangible way,' they are made more concrete, more immediate. As a result, the timing of resurfacing memories helps to create a sense of immediacy, acuteness, and a tangible sense of the past and its memory as well as a corporeal sense of being transported back into the past.

However, other participants also mentioned how the exact timing of memories on algorithmic remembrance technologies added weight to their own remembrance of the past in the present. For example, when asked about what Timehop has meant to her over the years, Sarah stated:

> Timehop has meant that I feel connected to those daily moments that meant a lot to me when I experienced them. There's something special about having them delivered back on the same day a year later, five years later, three years later. I guess because there does seem to be a thread that runs through time and space on that same day that makes it feel more momentous to remember it at that exact

> moment. I don't feel that way every day, but there are certainly days when I think, oh that's right! That was eight years ago today, how crazy that that's, you know, already been eight years since that moment?

This participant noted that there is 'something special' about the way memories are resurfaced. In her view, being reminded of memories 'exactly' a year ago, or two years, or five years ago helps make these memories feel more 'momentous' and significant. Yet, she points out that the reason 'it makes it feel more momentous to remember it at that exact moment' is because of the 'thread that runs through time and space on that same day.' She adds that this does not happen every day, but seeing the present and the past run parallel on memory apps produces what can be seen as 'kairos moments' (Bucher, 2018) for her, that is 'days when I think oh that's right!' The logic of anniversification is seen here to provide so-called a thread through time, which adds a sense of continuity and specificity that makes memories feel more momentous in the present.

This was also echoed in other interviews, where the specific timings of memory reminders helped 'heighten' the memory of certain events. As Francis stated:

> I think that Timehop's useful in that sense because I think the exactness when it comes down to the timing I think that does heighten the remembrance of it a little bit, because it's such an even way to break it down, rather than like oh this happened around this time, this happened in this group, you can just say that for a while that this happened exactly three years tonight. So I think it's really interesting in that sense, because it's a more rigid structure of time. In that sense, it's easier to recognise it, so it takes away all the vagueness of the time passing. My friends and I go to premiers of films a lot in the theatre. Two years ago we were seeing this, now we're sitting in our seats seeing this so it's kind of interesting in that sense, seeing how things maybe align… it maybe provides easier linkages to what you're doing that actual day, what you're doing in the present versus what you did in the past.

Francis touches on several interesting notions to do with the exactness of memory reminders. Firstly, he states that being reminded of something on the day 'heightens' his memory of it because it is 'such an even way to break it down.' In other words, by resurfacing memories at particular times, algorithmic remembrance technologies such as Timehop impose a 'more rigid structure of time' on memory making, making it both 'easier to recognise' and 'it takes away

all the vagueness of the time passing'. Framed temporally as anniversaries, Francis finds that these reminders 'heighten the remembrance' of his past. Still, what exactly is meant by this notion of 'heighten'? As Francis has already pointed out, this temporal framework makes remembering certain memories less vague as well as providing 'easier linkages to what you're doing that actual day' and 'what you're doing in the present.' When asked to elaborate on what he meant by 'easier linkages,' Francis stated:

> I'd say maybe in the sense that when things align it makes it more unique. If it's just every day, and I'm looking at it as part of my daily routine and it's just a day when I go to school all day or work all day, it might not be that unique, but if it's, like I said, when things align, like when we're at the same event with the university, or my friends and I were in the theatre again, watching a different movie something like that, and we see oh we had a picture from the premier three years ago. I think it makes it unique in that sense because it has a definite link to the past that that specific day has that maybe the next day or the previous day wouldn't have.

In one sense, the timing of certain resurfaced memories helps to make memories clearer. More specifically, Francis suggests that the way memory reminders are framed temporally, in terms of their timing, also creates a particular relationship to the past, one which is more acute, more real, and more recognisable. In short, one which heightens the memory itself. Echoing what other participants also mentioned, Francis stated that anniversaries provide 'definite links to the past.' This helps make certain memories seem 'more unique' as things in the past are made to align with the present in such a manner. Crucially, Francis emphasises that the anniversary of a memory functions as a mechanism of alignment, bringing past memories to bear on the present day in a more visceral, 'definite' way.

Drawing a link back to the beginning of the chapter, the notion of alignment echoes what Benny Wong, co-founder of Timehop, said about the reason for choosing their specific temporal framework for the resurfacing mechanism. Benny Wong stated, as I mentioned earlier, that they chose the 'a-year-ago' framework because it provided enough *contrast* to seem different and yet enough *parallel* to seem familiar. Francis suggested earlier, the particular timing of resurfaced memories helps to align these memories with other memories and with events in the present. As a result, this heightens the remembrance of the past. What other participants stated – the feeling of exactness, of memories being more real, more acute –

constitutes effects of the temporal alignment of memories, where the past and present are juxtaposed in such a way as to create a sense of contrast and parallel. Here, exactness is not just a question of presenting a memory as an exact object, but also a question of presenting it at *exactly* the right moment. Exactness and alignment therefore become augmentation, ways to heighten the remembrance of the past.

Here, alignment emerges as a key effect of the logic of anniversification, which in turn demonstrates how opportune moments can be algorithmically programmed and executed. Yet, Anniversification can be seen here to problematise the distinction between chronos and kairos, as both temporal modes participate in producing a sense of affective alignment with the past. As Francis put it, the sense of alignment was partly an effect of 'a more rigid structure of time' in which memories were resurfaced. Overall, the logic of anniversification generates a sense of alignment, which in turn shapes and affects how people encounter, experience, and remember the past.

6.2.2 'These self-dates just have more internal feel': Personalisation

Temporally framing the resurfacing of memories in particular ways also gave participants a sense of intimacy in relation to certain aspects of their past. The particular 'memories' or 'anniversaries' that popped up on algorithmic remembrance technologies were often conceived in personal terms as a result of the timing of their resurfacing. This point became particularly salient in the interview with Ethan, who stated:

> I know what I put out there. Will I get surprised? for sure. But I'm more so surprised on two basis – that's the second dynamic I want to take – my ability of surprise when I look at dates is based upon wow that's five years ago, two years, three years ago *today*?... Then it's the date. I'm more conscious of dates and I always say this is the more exploratory part, see if you can see this trend. Cause it's almost like my own holidays in the sense of if today February 12th I did this a year ago and I did this two years ago, this three years ago, this four years ago go and it's all something dynamic and different and I'm going something kind of like common or cool now, but I can't appreciate it because I'm in the moment of working towards a goal. I can't even appreciate that moment because I was working towards something, right… That dynamic it's there so you can think about that. If this has happened so much today must be a special day for me as

> opposed to being told this holiday is why we celebrate it and it has no direct impact. So I think that's the interesting dynamic.

Here, Ethan reflects on the dynamic that comes with the app's temporal framework ('on this day a year ago'). He states that the timing of when memories resurface on the memory app is a 'more exploratory part' for him, helping him see these resurfacing memories in a new light. They constitute something more than a mere documentation of a particular past date; rather, their timing gives them a weight which makes them feel 'almost like my own holidays' or 'something dynamic and different.' He states that seeing these memories pop up on within the feature at such specific moments helps give value and meaning to something he would otherwise have forgotten because he is 'working towards a goal' in the present. This anniversal functionality creates an interesting dynamic for memory making because it gives the sense of that 'this has happened so much today *must* be a special day for me' (emphasis added). The inscribed temporality of the resurfacing mechanism adds to past experiences and events a weight that participates in engendering a sense of meaning and significance – a direct impact that for Ethan other more societally established holidays, festivals, or commemorations sometimes lack. In other words, seeing memories resurface on algorithmic remembrance technologies such as Timehop engenders a sense of a date being particularly important, and seeing that something has 'happened so much' only emphasises the sense of today being a special day. Later on in the interview, Ethan goes into more detail about this relationship between timing, dates, and memory. He states:

> Now, I check these dates and I have noticed this day was an important day, and it's always like that year in and year out. So those dates enable you internally to feel special. They probably have more meaning than Boxing Day or Columbus Day or President's Day. These self-dates just have more internal feel, and that shows you that you really have control of what makes you happy and what innately gets you going versus being told by the government.

Although the participant suggests that the timing of resurfacing memories gives him a sense of days being special and meaningful, he goes further and states that it also has an impact on the way these dates are conceptualised. As memories are surfaced on their precise annual anniversary, they not only 'probably have more meaning than Boxing Day or Columbus Day', but the timing feature also enables him 'internally to feel special'. In other words, these become what the participant calls '*self-dates'*: dates which for Ethan have 'more internal feel' than

other more established anniversaries and events. He also points out that these dates can become really important for an individual especially since it is 'always like that year in and year out.' Interestingly, these 'self-dates' give Ethan a sense of agency, an ability to decide for himself what is considered a memorable and meaningful event or memory. The ability to decide for himself both 'what makes you happy' and 'what innately gets you going' as opposed to being told by external, societal structures. In short, the ways in which the resurfacing of memories are timed helps personalise the encounter with the past whilst simultaneously add meaning and gravity to certain memories. The timing feature on algorithmic remembrance technologies is implicated in processes of personalisation, creating a closer intimacy between user and mediated memories that are being resurfaced.

This notion of the 'self-date' also echoes a crucial aspect of Facebook's memory feature called Memories. In a Facebook research rapport outlining the software engineering that had gone into making Facebook's On This Day, the prior iteration of Memories, Manohar Paluri and Omid Aziz (2016) emphasise the centrality of personalisation for the feature. They state that personalisation was a crucial aspect in seeking to optimise the user experience of the feature. Facebook developed a machine learning model to try and accurately predict what memories people would want to see more of on the memory feature. Central to this was also the decision to not only to do annual anniversaries ('a year ago') but also what they call 'memory recaps' (e.g. 'Your September Memories', 'Your Summer Memories', and so on). The machine learning algorithm underpinning Memories and its prior iteration, On This Day, was trained using personalised data. That is, the Facebook engineers used signals such as users' previous interactions with the On This Day feature, demographic information such as gender or age, and the attributes of particular memories. Personalisation was a way in which the Facebook engineers were able to determine the number of times they should resurface memories to what users: 'If a person has shared many memories from On This Day in the past, we can dial up the number of memories we show them in News Feed in the future,' but conversely, 'If a person has dismissed many memories, then we reduce the number of On This Day stories they see in News Feed moving forward' (Paluri and Aziz, 2016). For Paluri and Aziz, this sense of personalisation and greater intimacy is not only an effect that is produced by the interaction between technology and user; it is also baked into the very fabric of these technologies itself. The logic of anniversification is not limited to one feature or platform but can be seen to underlie multiple algorithmic remembrance features. In this context, the Facebook memory feature illustrates the way in which timing can be increasingly personalised

through the use of intricate machine learning algorithms (see also Prey and Smit, 2018). In other words, the Facebook memory feature demonstrates the way in which machine learning models may be used to sharpen the affective role of timing, which becomes an increasingly crucial aspect of memory making.

The effects of Facebook Memories more specifically were also discussed in the interview with Mary. She stated that she enjoyed their monthly or seasonal memory recaps more than the annual anniversary:

> MARY: I quite like this 'your September memories', because I thought it was only just 'a year ago' or 'two years ago' and I didn't realise they did the previous month. I think it's quite nice, just a recap.
>
> INTERVIEWER: Do you find it nicer than to be reminded of something more recent then than something five years ago?
>
> MARY: I think so because sometimes it's nicer to be reminded of things in the past that you might not necessarily have thought of otherwise. But at the same time, a lot of those memories might not be things that are significant to you anymore, whereas like things that've happened more recently are more relevant to you today. The things that happened to me in the last month, I think, are more important to me in the moment than something I might have posted four years ago with somebody who I don't talk to anymore, right, a relationship I'm not in anymore.

As this participant suggests, so-called seasonal memory recaps may sometimes produce more of an effect on her than anniversaries from years back. This is because as the person changes, 'memories' from further back in her Facebook history increasingly refer to events, experiences, or relationships that no longer seem relevant to who she is now (e.g. 'a relationship I'm not in anymore'). On the other hand, seeing memories resurface from only a month ago or two may be 'more important to me in the moment' or may be 'more relevant to you today.' Of course, this raises questions about the processes through which relevance and meaning are computationally operationalised and generated. Still, Mary's statement is indicative of the way memories can be personalised and made more relevant and significant through algorithmically-engineered timing. In short, as algorithmic remembrance technologies demonstrate, the logic of anniversification is not an ontologically inherent quality of 'time itself', as Smith (1986)

would argue, but rather a sociotechnical effect, an engineered product, a thought-out construct and framework underlying the resurfacing mechanism.

These notions of timing and personalisation, however, are not without tensions. For instance, some participants commented on the way the Facebook memory feature in particular did not seem to a have a clear-cut logic to when memories are resurfaced. As a user of both Timehop and Facebook Memories, I asked Emma which one she generally preferred using:

> I think I like Timehop the best because it does show me everything. There's really no rhyme or reason to what Facebook shows me when it shows me. Sometimes I feel like I get my memories on Facebook and sometimes I'm like, 'oh gosh, I haven't seen that notification in a few weeks so!' Theirs feels inconsistent.

Here, the more 'random' temporal structure of Facebook is contrasted with Timehop, which has a more predictable and less surprising resurfacing mechanism. Whereas Timehop follows a more 'rigid' rule-based algorithmic structure, only resurfacing memories on their annual anniversary, Facebook Memories utilises a machine learning algorithm to determine *when* to show *what* to users and *how often*. For users such as Emma, this sometimes resulted in the feature feeling 'inconsistent' in the way memories are resurfaced. Instead of personalisation creating a more frictionless experience of the past it can be seen to engender the opposite effect. In this instance, the issue is not so much that the memories being resurfaced are inappropriate or embarrassing, but that the timing of the memory reminder does not fit neatly with the expectations of the user. This is indicative of the tensions that are inherent in the logic of anniversification; the tensions inherent in any attempt to engineer and personalise memories as right moments in the present.

On the one hand, the timing of when memories are resurfaced can add a sense of meaningfulness and emotional weight to the remembrance of the past; on the other hand, when ill-timed, the resurfacing of memories can be conceptualised as a misstep or inconsistency, as in the case of Emma. It does not align and is therefore construed as ill-fitting, as something that has 'no rhyme or reason.' Such instances are therefore crucial, because they demonstrate that just as well-timed resurfaced memories produce a sense of intimacy, meaning and significance, failures of timing produce a disconnect between the user and the memory feature. This echoes what I argued in chapter five that a crucial aspect of emplotment and remembering with algorithms is users' anticipatory positioning. Here, timing and anticipation can be seen to inter-

weave, suggesting that if the timing of certain resurfacing mechanisms are seen as too 'random' it may engender a sense of discomfort and tension.

6.2.3 'It reminds you so constantly': Habituation

Another salient aspect connected to both the exactness and personalisation of these temporal reminders was the way participants found them to be constant or perpetual. Many of the participants stated that the impact of memory reminders did not only depend on how they aligned with the past or how personalised they were, but also often they 'popped up.' Interestingly, this particular turn of phrase – 'popping up' – was used by many of the participants. In chapter four, I mentioned reminding as one of the overall characteristics of algorithmic remembrance technologies. As Edward S. Casey (1986) observes, reminding is a crucial mechanism of encountering and remembering the past. It is a way to surface memories that may have been forgotten as well as a mode of revitalising past data as memories.

The logic of anniversification presupposes the continual and repetitive resurfacing of certain memories for greater emotional impact. With algorithmic remembrance technologies, users are reminded of memories every day given that they have posted or documented something on that day in the past. Features such as Facebook Memories, which deploys machine learning algorithms to more intimately learn people's mode of engagement with the feature, seek to capitalise on users that visit or otherwise engage with the memory feature by upping the number of memory reminders that users see on a regular basis. Here it is suggested that the logic of anniversification is predicated on processes of making data traces or mediated memories from the past continually visible, 'year in and year out' as Diana stated. As a result, this raises questions concerning the effects of repetition or cyclicality on people's everyday memory practices. The idea of the constant reminder highlights ways in which algorithmic remembrance technologies come to matter in people's everyday life and how they weave themselves into daily habits and routines. The constant resurfacing of memories 'at the right time,' in other words, seeks to legitimate and habituate a form of algorithmic memory making in users.

This anniversal resurfacing of memories as something that repeatedly shows up in their Facebook Memories or Timehop was discussed by various participants in the interviews. One participant, Grace, noted that every time she was encountered with mediated memories from the past, 'it sears it into your memory even more.' As Diana put it, 'it is very strange, to be

encountered with your past in this way, every single day.' The strangeness of memory apps, Diana points out, does not necessarily reside in which particular 'memories' they resurface at what particular time, but how often they do it. Repetition, temporality, and memory become intimately linked on these memory devices, having the apparent ability to 'sear' past events into people's memory.

The issue of repetition has long preoccupied those that work with social, cultural, and collective understandings of memory (Connerton, 1989; Hoskins, 2009; Brighenti, 2015; Chun, 2016). Maurice Halbwachs (1992), for instance, argued that people's memories of the past are preserved through continual reproduction, that is, by a continual engagement with them. This in turn helps to legitimate and perpetuate people's personal and social sense of identity in the present. As Halbwachs (1992, p. 47) put it, 'these memories are repetitions.' Repetition and reproduction, in other words, play a crucial role in how people manage to keep their memories alive 'during otherwise dull routines of everyday life' (p. 25). 'It is of the nature of remembrances,' Halbwachs concludes, 'when they cannot be renewed by resuming contact with the realities from which they arose, to become impoverished and congealed' (p. 106). Likewise, Andrea M. Brighenti (2015) has stressed the link between repetition, reproduction, and the continuation of memory. Drawing on the work of French sociologist Gabriel Tarde, Brighenti states that 'memory as well as habit are the outcome of repetition' (p. 45). The habitual occurrences of diverse rituals, traditions, celebrations, and commemorations help to counter the tendency of memories to fade through time. Repeated acts of remembrance or continual engagements with the past in the present constitute an attempt to keep memories from fading in a society that continues to adopt new values, new technologies, and new forms of sociality. As society changes, and its social and structural make up is re-arranged, the conditional frameworks for memory are reconfigured accordingly, which only demonstrates even more the importance of repetition for memory making.

In the context of algorithmic remembrance technologies, the resurfacing of memories on at the 'right time', demonstrates the importance of repetition for current modes of memory practices. It also highlights an important aspect of algorithms, namely their capacity to form novel patterns of behaviour. For instance, many participants pointed out that the particular timing aspect of resurfaced memories was conducive to everyday routines. The continual feedback loop, the constant resurfacing of memories, seeks to incentivise not only engagement on the platform but a habitual, ongoing engagement. One particular way this is done is through the so-called 'Streak.' Operational on applications such as Timehop and Snapchat, the Streak

is a device to amplify participation on a feature, a metrical incentive for users to stay engaged on the feature for a long period of time. Like the Streak functionality on Snapchat, the Streak on Timehop reflects how many days in a row one has been on the app to check memories. Many participants stated that the Streak had an impact on how they used Timehop. For Miriam, the Streak added a 'competitive' edge to her use of the memory app:

> MIRIAM: I remember before, you just scrolled through. You hook up your Facebook and you scroll through and it tells you everything. But I feel like once the Streak started, I got competitive about it. That's how I ended up getting really into it (laughter).
>
> INTERVIEWER: Did that properly change it then, getting the Streak, making it into a daily routine?
>
> MIRIAM: Yeah, I think right now this is the longest I've actually been on it. Like every single day. The first thing I do when I wake up in the morning is check my Timehop. It's kind of interesting too, because you see things from 10 years ago, and I've been on social media since I was a kid, so to me I'll see things that I'm just like, 'oh wow!' Every morning I'm just checking it and some things I do remember, I'm like, 'oh I can't believe that happened!' or whatever. I started getting really competitive with it and when I lose the Streak, I get frustrated. Now I'm really addicted to it (laughter).

Miriam stated that the streak encouraged her to check the app 'like every single day,' and if she lost the Streak, she would get frustrated. For her, the Streak made her 'really addicted' to the memory app. Moreover, the Streak functionality added a competitive edge to her memory app usage, resulting in frustration if the Streak was lost. Remembering the past, in this case, becomes equivalent to keeping up - keep producing, keep revisiting, keep sharing, keep up the numbers. It becomes a habit. For Paul Connerton (1989), the link between repetition, memory, and the self is made most salient in the way memory making is ritualised and transformed into embodied habits. Arguing that habit is crucial for the transmission and legitimation and collective memory, Connerton also suggests that memories are enacted and remembered and revitalised both through public, ceremonial rites but also through personal engagements with the past. Repetition, in other words, leads to embodied habituation. As Emma aptly stated:

> I do think it becomes more valuable as it goes on. I think probably the first few years that I used it was kind of 'eh whatever.' But now I know that there are

> things in there that I look forward to seeing, or that will be neat to see one day in your Timehop. Now I think I'm more invested, like I need to check my Timehop today, I want to check my Timehop today.

This suggests that the Streak, having the capacity to affect users emotionally and behaviourally, takes on a certain value over time. Emma pointed out that the Streak may not be valuable when she first started out but it became valuable over time. She suggests that if her use of Timehop at first was just 'eh whatever' it is now something she is 'more invested in,' that is 'I need to check my Timehop today.' For Emma, the Streak had the capacity to transform the emotional engagement with the app from detached curiosity to something she *needs* to do. This suggests algorithmic remembrance technologies seek to embed themselves in people's lives, becoming 'habitual new media' (Chun, 2016), whilst simultaneously seeking to legitimating their own presence through the repetitive resurfacing of memories and the Streak. Connerton (1989) similarly argues that repeated acts and embodied habits serve as tools of legitimation. As he observes, 'we may say that our experiences of the present largely depend upon our knowledge of the past, and that our images of the past commonly serve to legitimate a present social order' (p. 3). Legitimation of a social order therefore presupposes continual claims of continuity with the past, which in turn demonstrates the necessity and importance of repetition for ritualisation. In the case of Timehop and Snapchat, the Streak is a nexus, the point where the power of metrics meets algorithmic temporality and anniversification. It is the reward for continually engaging with the continually resurfacing memories. As users routinely engage with the platform, adding to their Streak daily, the power and artificiality of numbers, in turn, produce affective states and patterns of behaviour, infusing, for instance, notions of competition and production into users' attitudes to digital memory making.

The Streak embodies and typifies the aim of algorithmic media to be fundamentally addictive platforms. Through the continual resurfacing of memories at the opportune moment, algorithmic remembrance technologies not only try to manufacture kairos moments, instances of well-timed memory reminders; they always seek to engineer habituation through repetition. On one level, the reason for this is obvious. Any form of engagement with these apps and platforms is translated into data and thus rendered valuable, both in terms of knowing users more intimately and as a commercial outlet. Hence, using the Streak on Timehop and Snapchat as well as machine learning algorithms on Facebook to predict what 'good' memories users want to engage with become effective ways to keep users habitually engaged on their platforms.

More importantly, these examples show how anniversification, through repetition, seeks to habituate users to the platform and routinise the use of the platform in their everyday lives.

Although using memory apps was part of many users' daily routine, there were also participants that pointed out the problematic nature of repetitive resurfacing of memories. In the first focus group with local community group members, some of the participants were worried about the effects that may emerge as a result from this repetitive resurfacing. Discussing the Facebook Memories feature in particular, a couple of the participants had used it before whilst the others had a rudimentary understanding of the feature. At the start of the focus group interview, Anna stated that:

> The other thing is the frequency with which it happens, cause if you look at a photo album you tend to do it very rarely, don't you, or we do. We sort of do it on a special occasion, or you do it once a year if some elderly relative came around. You go 'oh yeah, should get them out sort of thing.' It's not a daily thing to actually go through a physical photo album, not in my experience anyway.'

Anna finds the 'frequency with which it happens' a noteworthy component of Facebook Memories. She compares it with the way she would look at photos, adding that 'if you look at a photo album you tend to do it very rarely.' This in and of itself poses an interesting contrast between algorithmic modes of memory making and other modes such as looking at photo albums, namely how often one does it. Later in the group interview, other members commented on Anna's point about frequency. This is a longer discussion which I will quote it in full in order to give a sense of the variety of viewpoints on this matter. Wanting to return to Anna's point about the repetitive nature of these memory apps, I ask whether they thought it would have any effect:

> INTERVIEWER: One thing that you [Anna] mentioned earlier, which I thought was quite interesting, I think there is something interesting about the fact that as you guys mention whenever you remind each other you cue each other oh I remember that or I remember this. But the fact that in many of these apps you're being reminded of photos you have taken quite often, so maybe like every day. As you said, it seems to be so often, and I'm wondering what effect does that have that you're seeing it so often?
>
> CATHERINE: You switch it off

ANNA: You could switch it off you could, but you become immune to it

INTERVIEWER: But there are a lot of people that want to see it on a regular basis

CATHERINE: Well you wouldn't want to, would you

ANNA: I mean, I want to see, and it also depends upon your level of usage and how many other distractions you have in life. Say, at the risk of, you know, generalising, say you have what we would view to be a normal life: you're outgoing, you have social interactions, you've got a job, you don't spend all day on the computer or on your phone, you know, physical exercise (overlapping agreement) – all the time if you live in a digital world –

DANIEL: It's a time waster

ANNA: Is ultimately, you know, is it the extreme end, is there going to be a risk of your memory stream and your timeline going to be so confusing, you know –

CATHERINE: It's sad isn't it if it got –

ANNA: Get mixed up into it, I don't know

CATHERINE: The younger elements, it's time they got themselves out, got crackin'

ANNA: Well

This group exchange illustrates a variety of different attitudes towards how young people relate to their memory and their technologies.[58] For Catherine, the prospect of these constant memory reminders is a source of unease, and proposes that one could indeed just 'switch it off' because 'you wouldn't want to' see them. Another participant, Daniel, echoes this sentiment, stating that these apps are a 'time waster.' However, Anna states that one of her worries about the frequency by which memories are resurfaced is the level of confusion it may engender in people. One of the effects, she suggests, is that people's 'memory stream and your timeline [are] going to be so confusing.' Anna's worry seems to presuppose a clear distinction between memory and someone's social media timeline. It is grounded in the way continual reminders may conflate people's lived experiences and memory stream, on the one hand, and their digital

[58] Note, the average age of this focus group was between 60-70.

timeline on the other. As she states, 'the extreme end' is that these two can become 'mixed up' into each other, which in turn would showcase how algorithmic remembrance technologies intervene and shape memories and particular representations of the past.

Repetition and habituation therefore can become a source of anxiety for some when thinking about the ways it can affect people's memory-making practices. When a certain form of remembering becomes habitual, whether that is in a social media context or not, it seeks to legitimate and perpetuate its own position in users' lives. As Brighenti (2015, p. 46) points out, 'Repetition creates strata or plateaus where souvenirs and habits, beliefs and desires come to be stored.' In this view, remembering always undergoes a process of stratification when repeatedly enacted, a process which constantly seeks to legitimate and reproduce itself. As Jacques Derrida (1996, p. 11) reminds us in his book *Archive Fever*, 'there is no archive without a place of consignation, without a technique of repetition.' Seen as digital archives, algorithmic remembrance technologies such as Facebook Memories, Google Photos, and Amazon Photos seem to fit this description. Through techniques of repetition, engagement with a memory app or a platform can be turned into user habits. In this view, the logic of anniversification, as an algorithmic technique of repetition, helps to nudge behaviours and engagement into habits and routines.

For many participants, therefore, using algorithmic remembrance technologies was an everyday habit, part of their daily routine. For others, however, these technologies were a source of anxiety concerning the potential effects of continual reminders on people's memories. Through the intersections of anniversification, kairos, repetition, and routinisation, memory practices are configured as both participation and habituation. It is my contention that the logic of anniversification, the constant resurfacing of memories 'at the right time,' seeks to legitimate and habituate a form of algorithmic memory making in users. That is, as algorithmic remembrance technologies become akin to 'habitual new media' (Chun, 2016), they become self-legitimating. Writing on the notion of habits, legitimation, and digital remembrance, Lee Humphreys (2018) similarly points to the importance of repeated acts of documenting and remembering in legitimating our social order on social media. As she states, 'remembrance is a media practice that ritualistically reinforces our social collective' (p. 27) or, in other words, 'how the act of creating media traces of our experiences and of those around us transform experiences into ritualized accounts that can reflect and reinforce the social order' (p. 115). However, these technologies both legitimate the social order and their own form of mediation, ultimately shaping the way people engage with the past. As Paul Connerton (1989, p. 4)

reminds us, 'performativity cannot be thought without a concept of habit.' Habituation, in a sense, is exemplary of the performative power of algorithmic remembrance technologies and their anniversal mode of resurfacing. The following section focuses on the logic of anniversification and how it can have a performative effect on users, both in terms of how they view the past and how they act in the present.

6.2.4 'Sometimes it feels like you got to replicate it, make it a thing': Performativity

According to many of the participants, the way memories are temporally framed as kairos moments or anniversaries on algorithmic remembrance technologies had a performative effect on the way they viewed the past. Anniversification, as a temporal logic of algorithmic media, has the potential to shape how users see and understand their past experiences. It affects how memories and past experiences are perceived as well as enacted. For one of the participants, Raymond, seeing memories resurfacing on particular days and in this specific way, made remembering some experiences seem somehow 'compressed.' Talking about a very particular incident in his life, Raymond observes:

> I think it's part of the experience. It is very specific, like the example of the graffiti phenomenon… It happened over time, so it's not a thing that Timehop can exactly capture as a thing that happened on a day, because it happened over a couple of months. Like, 'there's another one!' And then two days later, 'there's another one!' and then three days later, 'there's another on!'... That's sort of what Timehop does 95% of time is, 'here is the boring picture I took on that one day.' There's always things that get compressed in terms of memory but it happened over the span of more than one day.

As this respondent points out, being reminded of something continually skews the perception of a memory or the way a past experience progressed through time. In Raymond's case, the extended, embodied remembering of past experiences seems temporally compressed. By this he means that the series of events went on for over two months, but as he only took one picture on 'that one day,' all those other memories attached to that event got compressed into one. The logic of anniversification has the capacity to compress multiple memories into one, altering the depth of the way past experiences or events are perceived and relived.

Similar ideas about the potential generative power of anniversification were also echoed in the interview with Diana. When I asked her whether she ever comes across memories she is surprised by on Timehop, she stated:

> Absolutely. Although, as I have used the app more, I found that because I have encountered myself of approximately 2007 to approximately, let's call the date in the past 2013, I feel like I have sufficiently watched that cycle. Some of the emotional edges have been worn off, and it's become a glossier past. I don't know. Having seen my yearly cycle of artifacts that I have created publicly in some ways I think it is worn smooth the messier or undocumented memories that I might have of that time. Does that make sense?

This respondent suggests that the way memories are packaged creates a 'glossier past,' a version of the past where 'the emotional edges have been worn off.' One of the reasons for this is because Diana has gone through the Timehop yearly cycle of memories multiple times which in turn has 'worn smooth the messier or undocumented memories that I might have of that time.' Elaborating on this notion of the cyclicality of resurfaced memories and the question of temporality, she continued:

> DIANA: If I reflect on the past or remember something because something contextually came up in my life that feels a little different from being like I'm going to show a picture of something that you took a picture of a year ago to remind yourself to do something about and never did anything about it. Or I'm going to show you this status update that reminds you that you haven't spoken to this friend in three years, I don't know. Time is the element that forces you to think about it as different from day to day context.
>
> INTERVIEWER: In terms of time, what do you mean exactly?
>
> DIANA: I guess the cyclical nature of time forcing me to look back on x number of years to that day is in some ways an almost an objective feeling forcing function. I use the word objective, I think, because it makes me think I know why I don't like this friend now, and maybe what I would do today is see a thing that she had done and be like, 'oh she's annoying!' or whatever. But when I'm encountered with the evidence of the thing from the past because it's in front of my face where I'm like, 'oh we went to this thing together!', I remember all these

> things about it. I don't think that I would extend that generosity if I were not faced with my literal self from the past who would have felt differently.

Diana states that the effects of anniversification, of seeing memories pop up on their annual anniversaries year in and year out, has given her remembrance of the past a 'more objective feeling forcing function.' Given the cyclical nature of time and the way memories are resurfaced, users are forced to adapt to the platform's particular resurfacing format, that is, "look on x number of years to that day.' This is no longer an encounter with a memory as such; rather, it is an encounter with 'the evidence of the thing from the past.' For Diana, these anniversaries become more than memories to reminisce, celebrate and potentially share online; they also become evidence of past events, placed 'in front of my face.'

In a sense, the notion of a glossier past and the compression of memories can be understood as collateral damage of the drive to render the world memorable and amenable to digital documentation. Geoffrey Bowker (2008, p. 71) stated that memory practices, whether mundane or scientific, always 'skew our available ontological space,' which both permits novel forms of capture and memory making whilst also excluding other forms. This performativity, inherent to algorithmic remembrance technologies, also resides at the very nature of the archive. As Jacques Derrida (1995, p. 16-17) argued, a fundamental trait of the archive is exactly that 'technical structure of the *archiving* archive also determines the structure of the *archivable* content in its very coming into existence' (original emphases). With algorithmic remembrance technologies, not only are digital traces of past events compressed and rendered glossier in the present; they also seem to have a qualitative impact on users' remembrance of the past. Anniversification, in a crucial sense, has the capacity to shape a user's *feel* of the past, giving it a glossier tinge and shade, as Diana suggests.

That being said, other participants also pointed out the potential of algorithmic remembrance technologies to accentuate certain memories of the past. In one of the interviews, Francis suggested that the way resurfaced memories are conceptualised as 'anniversaries' on Timehop helped to highlight certain things from the past. He states that:

> But when it's the anniversary framing sense, maybe 'diamond in the rough' is like a good phrase to use, because it's all these just mundane daily things that you did, and there's one thing that is really specific. Those days and things like that, show up on Timehop, are more enjoyable than the days where it's just me talking about work, school, just everyday life.

The temporal framing of certain experiences accentuates the meaning and significance of those memories. In this case, framing memories as anniversaries emphasises the 'diamond in the rough' amidst the mundane and every day. Conversely, Nicole points to the importance of all these small mundane events or discrete '*micro events*.' She states that:

> I think that one of the things that Timehop has given me sort of permission to do is to be okay with this idea that who I am is constantly in flux, and that doesn't mean that I'm being a phony version of self. It doesn't mean that I'm dis-honouring anything or anyone. It just means that all of these little 'micro events' they stack up on one another, and they kind of shape and shift the way that you think about yourself and your surroundings, and what is worthy of celebrating and what does celebration look like.

Nicole states that 'these little micro events' stack up on one another and can be scaled in a sense, shaping the way she thinks about herself and her surroundings and what is worthy of celebration. The participant points to the performative power of the anniversary-like framing of memories and states that these 'micro events' in a way give her 'permission' to 'be okay with this idea that who I am is constantly in flux.' What this suggests is the power of potentiality embedded within algorithmic remembrance technologies and emanating from their temporal logic. As I pointed out earlier, participants mentioned different ways anniversaries could make them feel about certain memories.

Another crucial performative effect has to do with the potentiality of anniversification. As software engineer and co-founder of memory app Timehop, Benny Wong, put it:

> BENNY: Yeah totally. And also, I'd say I think with all these memory products, if you look at the marketing material or the videos, demo these things, they go for the aspirational like weddings, graduations, those sorts of things, birthdays. And those are awesome and they are really fun to see in Timehop. But so much of the time it's the other stuff that is really meaningful, so like the random coffee with a friend or going to the bar that you almost kicked out that night for being too drunk or something. That's what most of your life is. To miss out on that stuff by only focusing on the birthdays and wedding stuff is also sort of a shame. At the end of the day, the mundane stuff is life, a lot of the stuff is really meaningful if not, you know, momentous or anything like that you know

> INTERVIEWER: Was that also the reason why calling everything an anniversary, you're adding that sense of these are important things even though they might not initially seem so?
>
> BENNY: Yeah totally. On the topic of showing everything, it's so hard for us to know in the moment what is going to be important. What's a good example? Like meeting someone who would end up being your colleague or your classmate or something like that. Those sort of things, you can't make a real-time judgment on how valuable this is until you have all of this context of what did that moment actually mean in my whole life story.

As Benny Wong suggests, the aim of their memory app was never to focus solely on the birthdays and weddings and the big experiential markers. Rather, by resurfacing everything, including 'the other stuff' (e.g. 'the random coffee with a friend'), Timehop was able to draw out and accentuate the meaningfulness of those events even if they were not 'momentous or anything like that.' Wong claims that conceptualising everything in terms of an anniversary was both an acknowledgement that mundane moments are indeed meaningful, but also an acceptance that one is unable to make a 'real-time judgement' on the value of certain documented traces of the past without knowing it will unfold 'in my whole life story.'

These timed anniversaries, however, have the capacity to do more than to draw meaningfulness from the well of these mundane events; they have the capacity to produce it. The potentiality of memories is algorithmically produced as well as temporally accentuated. This notion that potential memories are performative was also echoed in the interview with Nicole. When asked what she thought about the specific timing of memories, she stated rather extensively:

> Yeah, I think that I do look for something when it's not an event or something like that. There is kind of a part of my mind that's like, 'this is going to pop up in Timehop in a year, so what might you want to remember about this? What is something that you might want to capture?' I think the fact that it is not like a countdown, because Facebook shows you everyone's birthday for the entire year… A celebration for me might look like something really small, like I'm going to treat myself to a piece of cake or I'm going to wear something, you know, that I wore on that day. That'll be my way of kind of honouring that memory or that anniversary. I also think that it's kind of seeped into other areas

> of my life, where I'm kind of like if every day presents itself with an opportunity to show me something from my past that maybe was worth remembering and celebrating, then maybe I should be surrounding myself with that kind of stuff all the time. That has gone into my strategy for the things that I keep in my house… Every day is potentially a day that is going to come up and be remembered. Timehop is going to remember this for you, can you celebrate it? Can you celebrate something about this day?... A celebration doesn't have to be something that is huge and monumental and involving a whole bunch of other people. It can be something that is really specific to you and very private.

There are a lot of different ideas in her statement that need further unpacking. Initially, Nicole suggests that she sometimes documents in the present with the knowledge that events will pop up on Timehop a year later. This leads her to ask, 'what might you want to remember about this?' Phrased in the subjunctive, this question is very indicative of Geoffrey Bowker's notion of potential memory. The question implies that all events are potentially memorable and are therefore worthy of capture and documentation. This is the first point about potential memory: seeing everyday life as potentially memorable makes it likely valuable in the present. This is akin to what Nathan Jurgenson (2019, p. 7) has called 'documentary vision,' the positioning of the present 'as a potential future past, creating a nostalgia for the here and now.' Jurgenson argues that for a documentary vision, 'life is experienced as increasingly documentable' (p. 12) and it is therefore seen as 'pregnant with documentary potential' (p. 36). Therefore, seeing increasing parts of everyday life as potentially memorable has a qualitative effect on how people work on the present. For Nicole, 'every day is potentially a day that is going to come up and be remembered,' and celebrating these potentially memorable days is her way of 'honouring that memory or that anniversary.'

Importantly, Nicole also states that the anniversary mentality has 'seeped into other areas of my life.' For example, sometimes she celebrates that she did not scream at anyone at work or cry. For Nicole, 'a celebration doesn't have to be something that is huge' but it can be 'something that is specific to you and very private.' What the participant is saying demonstrates the way the logic of anniversification can be diffused in the everyday and not only be contained to a memory app. This logic of anniversification states 'Timehop is going to remember this for you, can you celebrate it?' The fact that the feature can remember it, and the memory is framed as an anniversary, has a performative and generative effect on how Nicole lives her everyday life, asking herself what she can find to celebrate today. In other words, the temporal logic of

algorithmic media, anniversification, shapes and generates the present as well as how people work on the present. It affects how people enact their remembrance and habituation in the present.

In the interview with Miriam, we discussed at length the effects of being reminded of memories on algorithmic remembrance technologies such as Facebook Memories. When asked if the temporal framing of memories had any effects on her, she responded:

> Sometimes. I feel like most of the little things to me just feel like that. It's just sometimes I don't know what the context of it is when it's that small. If it's something like grabbing a cup of coffee with a friend, I try to replicate that sometimes. I have a friend that lives probably about half an hour away from me and we'll bring stuff up like that. I'll go and visit her and we'll try to get noodles. We went out and got ramen in Providence. It's a little city, but we're like, 'okay, we got that four years ago, we got noodles there.' And we're like, 'oh let's got back, it's so good, we should go back!' Sometimes it feels like you got to replicate it, make it a thing, I guess.

For Miriam, the impact of a memory depended on the original, whether she knew or it not. But seeing things like going for coffee with a friend encouraged her to 'replicate that sometimes.' Similarly, with her friend, she states that seeing certain memories resurface encouraged her to 'make it a thing.' This notion of wanting to replicate a past memory as a result of a memory app was also suggested in the interview with Oliver. He stated that:

> OLIVER: Just yesterday, I think, popped up a group of chefs from Iceland came to my hometown here and did this whole tasting menu, and I had forgotten that I actually went to this thing. But then I saw it on Timehop yesterday and it was just like, 'oh yeah that was really cool!' I don't really remember what it is that we ate, but seeing just, 'oh this is where you checked in,' that's what that was for. It's interesting just to be reminded of things that you've completely forgotten.
>
> INTERVIEWER: Does it kind of transport you back to that place as well, do you feel the same things there?
>
> OLIVER: A bit. It certainly makes me wish that programs like that continued to happen again. That was something that I did yesterday when I saw that I'm like,

> ‘is that group coming back this year? Because I would definitely go and book another table in order to do that again.’ It’s not something that I would have thought to look up on my own had I not been reminded of it.

As with Miriam, Oliver states that seeing memories pop up on Timehop of certain events, like the chefs from Iceland, encourages him to ‘go and book another table in order to do that again.’ As Oliver suggests, these continual reminders are particularly powerful because there are certain memories that are not something that he would have thought ‘to look up on my own had I not been reminded of it.’ By continually resurfacing memories at the ‘opportune’ present moment, algorithmic remembrance technologies have the potential to shape how people perceive of their memories and how they are enacted in the present. As such, the logic of anniversification highlights the performative effects certain temporal framings of memory have on users and the way they remember the past. Moreover, the temporal framing of memories, resurfaced at ‘the right time,’ has the potential to shape how people live in the present, opening up possibilities for making certain past experiences ‘a thing’ in the present and future.

6.3 Concluding Thoughts: Diffusing the Logic of Anniversification

As I have demonstrated in this chapter, *when* memories are resurfaced by algorithmic remembrance technologies has an impact on the way the past is encountered, construed, and remembered by users. I have been working with Taina Bucher’s (2018) claim that ‘right time’ is ‘the key temporal mode of algorithms,’ as well as the claim put forward by one of my participants, Alice, who said that when something is resurfaced is ‘not just an arbitrary date,’ which highlights the entanglement between temporality, algorithms, and memory making. I have argued that one can gain a deeper understanding of *when* algorithms come to matter in everyday life by investigating what I call the logic of anniversification, which underpins the automatic resurfacing of memories. Anniversification refers to a logic in which mundane events and everyday occurrences are pulled within the remit of the ‘anniversary’. In this framework, everyday events become something that stand out, something to be remembered and celebrated. Within this logic, every ‘memory’ that is resurfaced is potentially worthy of remembrance, celebration, engagement, and repetition. I pointed out the ways that anniversification, as a temporal framing of memories, seeks to induce engagement and participation on the platform through the use of cyclical reminders. Timing becomes therefore a crucial tool for algorithmic remembrance technologies in the resurfacing of memories. Crucially, the logic of

anniversification accentuates the ways in which temporality is socio-technically constructed, and the processes through which timing is algorithmically engineered and operationalised. In other words, the 'right time' does not merely happen, but it is made.

This chapter has also examined the various ways in which anniversification impacts people's memory-making practices. Participants pointed out that temporally framing memories as anniversaries helped shape both the way they remembered the past and how they worked on the present. They stated that the way memories resurfaced on features such as Timehop and Facebook Memories shaped the way they saw certain aspects of the past: as more real, more visceral, as something more acute, and more exact. They also pointed out that seeing memories resurface on their respective annual anniversaries gave them a sense of these memories as being more tangible, less nebulous, and vague, and more unique. Conversely, participants such as Diana noted that seeing memories resurface at such a time and in such a manner resulted in 'the emotional edges' of memories having been 'worn off.' Some participants also worried that seeing memories resurface in this manner would eventually skew their perception of one's past experiences. Moreover, some respondents, such as Miriam, pointed out how seeing anniversaries pop up had induced them to repeat the memory, whether that was to grab another coffee with a friend or book a table in a particular restaurant – in other words, to 'make it a thing' in the present.

The logic of anniversification is not only a way to frame memories temporally in order to induce increased participation on the platform; it also shapes how the past is seen and relived. The logic of anniversification has the capacity to engender new rituals and habits as well as shaping the perception of the past experiences and their level of meaningfulness. I argue that examining the logic of anniversification in terms of alignment, personalisation, habituation, and performativity provides a broader as well as deeper understanding of the social power of algorithms in everyday life.

7.0 Conclusion

What does it imply, then, Apple Memories' tagline 'you have a new memory'? What does it mean to remember with algorithms? In contemporary digital memory studies, the image of the archive has had a resurgence in attention (e.g. Hoskins, 2018). One can argue that contemporary social media platforms, apps, and other algorithmic systems, function as extensive digital archives, storing vast amounts of data about people's lives and pasts. One could also argue that memory is increasingly mediatised (Couldry and Hepp, 2017), becoming dependent on and interwoven with these platforms and systems. Yet, the emphasis on the affordances of these archival structures does not fully make sense of how algorithmic media in their current iterations intersect with people's memories and their memory practices in everyday life.

In chapter four, for instance, I argued that algorithmic systems are changing our media and memory landscapes as well as the conditions for what it means to encounter and remember the past. What I called 'algorithmic remembrance technologies' afford the potential of memory-making practices being pulled within the threshold of datafication. In this view, memory practices are rendered increasingly malleable, readable, and manageable by the work of algorithms. As a result, memory apps, platforms, and the companies creating these technologies are carving out novel forms of practices, novel means of encountering and engaging with the past. In short, carving out spaces for remembering with algorithms. Chapter five examined how these features are, in turn, used by people in everyday life. The chapter argued that people do not merely revisit the past through these technologies, but also draw on their mediated memories as a means to emplot or weave a sense of self in the present. Moreover, I pointed out that there is scope to think of processes of emplotment in more sociotechnical terms. In this view, memory features can be seen to participate in the emplotment of people's sense of self, deciding what to resurface, when, and how often. Lastly, in chapter six, I examined the temporal logic underlying the functionality of memory features. The logic of anniversification, as I call it, showcases how timing can be programmed into memory features in order to shape how users engage with their past and work on their present. In the chapter, I also showcase that timing is a crucial way through which algorithms come to matter in the social world and in everyday life, producing various routines and affects.

Remembering, therefore, refers to a multiplicity of acts and processes, both conscious and unconscious. As the analysis chapters have shown, it refers not only to the act of recalling

the past, the processes by which information or images are retrieved. Instead, when I have spoken of 'remembering', it has encapsulated processes of encountering and revisiting the past, negotiating its meaning, and making sense of it in the present. It implies issues of ordering, management, reconfiguration, and affect. In short, this thesis has worked with a notion of remembering that is complex, messy, dynamic, and profoundly social as well as technical.

But what does it mean, then, to remember with algorithms? Does it mean using algorithmic systems merely as memory aids? Not quite. One could argue that we have always used technologies to capture, document, curate, and remember the past (that is if 'technology' is understood simply as a tool, i.e. *techne*). Throughout the years, technologies have affected and shaped how people experience and engage with the past as well how they share and communicate this past with others. From this perspective, the mediation of memory has always been technological to various degrees. The memory features that have been discussed here constitute, as a result, a continuance of a long and complex trajectory where technologies have always intimately figured as tools for memory. However, as this thesis argues, these algorithmic systems also constitute a rupture as well as an intensification of this trajectory. Whereas memory tools and media have always afforded the facilitation of how people capture the past, algorithmic remembrance technologies constitute active agents of memory. They actively participate in how the past is defined and what aspects of the past are resurfaced. In a sense, they are not merely active but have become *pro-active*. By datafying, analysing, and resurfacing what they consider 'memories', these algorithmic technologies are pushing a certain conceptualisation of what it means to remember and engage with the past. In short, algorithmic memory features broker a shift in how the past comes to matter in the present and how it is experienced qualitatively.

7.1 From Remembering to Resurfacing

After examining algorithmic remembrance technologies and how they are used in everyday life, the central argument of this thesis is that algorithms are facilitating an emerging *shift from remembering to resurfacing*. What is meant by this? It signals a shift from what people can and do remember, through various digital objects, to what memories algorithmic systems actively resurface and remind users of and when. As we saw in chapter six, the recursive resurfacing of the past has its own complex temporal structure and underlying logic. Instead of people engaging with the past through tools such as photo albums, diaries, or digital archives,

algorithmic remembrance technologies actively, recursively, and routinely resurface certain 'memories' to people at certain times in order to achieve certain effects. In other words, the data past that users encounter on various social media platforms, apps, and features is not simply docile memories waiting to be excavated and found by users; instead, these technologies work to mine, repackage, and push certain data to the surface, repackaging and rendering them as 'memories' in the present. Deliberately and somewhat ironically, remembering with algorithms is less about human remembering and more about the computational conditions through which this remembering is made possible. It signals the increasing centrality of the resurfacing mechanism as well as the algorithmic operations that make these mechanisms possible. For example, chapter four examined various memory features such as Facebook Memories, Snapchat Memories, Google Photos, Timehop, and Apple Memories in order to highlight this. In short, we are now seeing a widespread shift from remembering to resurfacing in the current media landscape.

I argue, in other words, that the intersections of algorithmic systems and memory practices in everyday life are best understood in terms of people's personal memories being algorithmically 'rolled-out' on social media platforms and apps.[59] Within this framework, the focus increasingly shifts from using tools to encounter the past to the algorithmic processes through which these encounters are repeatedly instantiated. As many participants noted in chapter five, being reminded of certain memories is a fundamental aspect of using memory features. The roll-out of resurfacing also has implications for what particular memories people engage with. As we have seen in chapters five and six, the resurfacing of memories is underpinned by specific computational and temporal criteria. For instance, features such as Facebook Memories seek to predominantly resurface 'happy memories' to people in the name of mental health, often sculpting so-called 'digital voids' around others (Jacobsen, 2020b). Moreover, apps such as Timehop have incorporated a 'Hide' button into their functionality, giving users the option to hide certain memories, preventing them from ever resurfacing again.

[59] This idea of 'roll-out' derives from Jamie Peck's (2010) work on neoliberalism. Understanding it as a process, Peck argued that neoliberalisation comprises a 'doubling' movement (p. 22-23): the discouragement of state structures in favour of market values on the one hand (roll back), and the processes whereby the values and principles of neoliberalism such as competition and optimisation are permeated throughout the non-economic spheres of society on the other (roll-out). By using the notion of 'roll-out', I do not argue that memory practices are becoming part of the broader processes of neoliberalism – that would exceed the scope of this project. Instead, I evoke the notion that the shift from remembering to resurfacing is rolling out the logic of algorithms in terms of how memory is understood and instantiated in everyday life.

Before continuing, it is important to clarify what exactly is meant by 'resurfacing' and how it differs from other terms such as 'reminding', both conceptually and semantically. As the word 'resurfacing' denotes, memory features constitute a drive to bring certain aspects of one's data past back to the surface, back into view, back within people's parameters of attention. As chapter four showed, many features use machine learning algorithms, promising to reach 'deep into your photo gallery', 'deep into your phone', or 'deep into your photo library' in order to bring back 'forgotten moments' and memories. In such taglines, there is a clear play with imagery of depth, which on one level suggests the use of deep learning algorithms. Yet, on another level, suggests something unmanaged, neglected, and forgotten; something which must be brought back into view. Like deep-sea divers, memory features promise to bring back to the surface aspects of the past that users might appreciate or might have forgotten. As I use the term in in the project, 'resurfacing' is an attempt to conceptualise the underlying drive and logic of *algorithmic deep diving*. That is, the drive to use algorithmic systems to dive deep into people's data past and to resurface it in order to make it matter in the present.

Resurfacing also describes the various processes by which the data past comes to inhabit users' present again. For instance, in chapter five I argue that timing is a crucial aspect for this process of resurfacing, that is, *when* the data past comes to matter in the present. The use of 'resurfacing' here stands in contrast to 'reminding', which is arguably a more commonly used term. As chapters five and six highlight, users often understood this process of memories being routinely resurfaced as kind of 'reminders', 'memory jogs', or 'memory prompts'. Reminding was often evoked by participants to make sense of the processes by which mediated memories were resurfaced and brought to bear on their present, jogging their memory. Here, the logic of resurfacing is understood as reminding as people engage with and negotiate mediated memories in the present. In chapter four, 'reminding' as a term was also seen to be used by apps, features, and tech companies in order to describe how their memory features operated. Reminding, in this context, constituted a discursive strategy that obfuscates the underlying logic of resurfacing of these technologies, making it more benign and every day, giving it a more organic feel.

It is also crucial to acknowledge that this shift from remembering to resurfacing is by no means a smooth, frictionless transition. As chapters 5 and 6 have suggested, some participants found the resurfacing of memories a helpful and beneficial feature, a mechanism to aid their memory. However, participants also raised many concerns. For instance, some participants found the resurfacing of memories boundary breaching, evoking a sense of

creepiness. Others saw the resurfacing of memories as emblematic of more entrenched issues such as data mining, access, and the right to one's data and memories. It is therefore important to point out that the shift form remembering to resurfacing will likely engender sites of tensions between users and memory technologies.

Yet, we need to specify exactly how this shift from remembering to resurfacing is emerging. The thesis argues that there are two concurrent processes or factors which are facilitating the shift from remembering to resurfacing:

1. The eventfulness of algorithmic encounters
2. The positioning of users

The first process relates to the ontology of algorithms. It suggests that contemporary memory practices can be understood increasingly as a series of affective encounters, crossroads, or 'situations' involving the coming-together of users and various algorithmic systems at specific times. The second process relates to the changing nature of 'using' platforms, features, and apps. It suggests that using algorithmic remembrance technologies becomes increasingly a matter of positioning oneself in relation to them so as to be able to receive and be affected by the memories that are resurfaced.

7.1.1 The Eventfulness of Algorithms

This notion of 'algorithms as eventful' derives from Taina Bucher's (2018) discussion of the ontology of algorithms. This particular conceptualisation implies 'a rejection of essences and permanences and an ontological shift towards a world of process and relation' (Bucher, 2018, p. 48). Emphasising algorithms as processes of becoming rather than specific reified objects, Bucher states that algorithms should not be considered mainly in relation to their mathematical properties, but rather *where, when,* and *to whom* they are. In short, they need to be considered in relation to '*what they do* as part of specific situations' (p. 49; original emphasis). As Nick Seaver (2017, p. 2) put it, a study of algorithmic systems should focus on 'their empirical profusion and practical existence in the wild.' As such, the emphasis is on the effects of algorithms in specific situations and as entangled parts of particular situated practices – in short, how and when they make things happen and to whom.

This notion of algorithms as eventful is crucial to how algorithmic remembrance technologies should be understood. These technologies are not merely databases or digital

archives hosting volumes of data about users; moreover, they do not only analyse, classify, and sort this data. Rather, they are eventful. They make things happen in particular contexts and as part of particular situated practices. As the chapter on the temporal structure of algorithmic remembrance technologies suggested, algorithms come to matter at specific points in time, resurfacing certain memories to people as opportune moments. Therefore, what counts as a mediated memory, or what is seen as a meaningful memory, is interwoven with the notion of anniversification and how timing is programmed into their functionality. Increasingly, the conditions of possibility for meaningful encounters with one's past is becoming more and more tied up with algorithmic remembrance technologies and their underlying eventfulness.

The eventfulness of algorithms also suggests that memory work and memory practices become increasingly predicated on the diverse encounters between people, socialities, and algorithmic systems – in other words, a series of 'situations'. In her book *Cruel Optimism* (2011), Lauren Berlant defines a 'situation' as:

> A state of things in which *something* that will perhaps matter is unfolding amid the usual activity of life. It is a state of animated and animating suspension that forces itself on consciousness, that produces a sense of the emergence of something in the present (p 5; original emphasis).

'Situations', as I use it in this context, refers to the exact moments or contexts where people, memory, and algorithmic systems intersect; where a variety of human and nonhuman agencies can be seen to intersect, cross, and unfold. Situations refer to the kind of encounters, intersections, or crossings where algorithmic systems resurface past data as 'memories', where people encounter these 'memories' as somehow meaningful representations of the past, where affective states and remembering is actualised, and the past is made to matter in the present. Understanding remembering with algorithms as eventful situations highlights the active role of memory features in resurfacing certain memories from the past to certain people. These algorithmic systems do not just act as the extensions or exoskeletons for people's memory practices, but are rather inextricably part of the situations in which the data past comes to matter in the present. The shift from remembering to resurfacing, therefore, is facilitated firstly by the eventfulness of algorithmic systems and the situations created by the encounters between algorithms, platforms, data, mediated memories, programmed temporalities, users, and various forms of social relations.

7.1.2 The Positioning of Users

Secondly, the shift from remembering to resurfacing has been facilitated by how users specifically relate to these algorithmic technologies. As the previous section suggests, the eventfulness of algorithms and the encounters between people and algorithms should be thought of in terms of various intersecting currents of action and agencies. Rather than digging or seeking to find out the mediated memories buried deep in one's social media history, remembering with algorithms is better understood as a form of positioning or what Jane Bennett (1997, 2001) calls 'comportment'. Comportment, for Bennett, signifies the ways in which people position themselves in order to render themselves susceptible to a state of enchantment. For Bennett (1997, p. 5), a state of enchantment is achieved through a specific posture, an active positioning of oneself, which signifies an 'active engagement with objects of sensuous experience.'

As we saw in chapter five, comportment can help us understand how people specifically use algorithmic remembrance technologies in and through anticipation. As the chapter suggests, using memory features, apps, and platforms is not simply to dig into one's past, seeking to find particular mediated memory objects to enjoy or remember. Rather, remembering with algorithms often becomes equivalent to putting oneself in a position of being affected by algorithmically resurfacing memories. It becomes akin to positioning oneself in such a way as to continually encountering memories selected by memory features. As chapter five highlighted, remembering with algorithms is a form of 'anticipatory positioning': it is using memory apps because one anticipates being affected, being shocked, surprised, being encountered by the resurfacing past. As such, comportment suggests a form of positioning, a posture. It is a particular way of placing oneself in the way of algorithmic systems, becoming susceptible to their recursive resurfacing of memories.

Yet, the ways in which algorithmic remembrance technologies become increasingly active in resurfacing memories in everyday life problematises this notion of the positioning of users. Although users do adopt specific postures in order to be affected by these memories, it is also important to acknowledge the ways in which these technologies actively seek to position users as receptacles for algorithmically resurfaced memories. As such, the increasingly automatic resurfacing of memories will likely engender tensions between how users position themselves and how are they are positioned by memory technologies, apps, and features.

The shift from remembering to resurfacing is firstly facilitated by the eventfulness of algorithms and the affective encounters they produce between users, algorithms, and memory.

Secondly, it is facilitated by the ways in which people position themselves, or are positioned, in relation to algorithmic remembrance technologies. As algorithmic systems have become increasingly active in mining, selecting, and resurfacing past data as memories, the mnemonic agency of users more and more comprises reacting to what they are presented with or reminded of, rather than actively excavating those memories themselves in their own time. At a surface glance, it could be easy to equate this emphasis on the agency and dynamics of algorithmic technologies as somehow undermining people's agency in memory, suggesting a deterministic view of both algorithms as well as human remembering. Yet, as Fuller and Ren (2019, p. 142) state, situations are 'rich in variable potentialities enabled by particular conditions.' The idea of reacting does not imply passivity nor technological determinism. Rather, this mode of reacting should be understood as a form of what Espeland and Sauder (2008) describe as 'reactivity'. In their analysis on quantification and the role of metrics in society, they state that 'measurement intervenes in the social worlds it depicts. Measures are reactive; they cause people to think and act differently' (p. 412). As chapter fived showed, reacting to algorithmically surfaced memories is by no means a passive act. On the contrary, it involves negotiating and actively engaging with the memories one is presented with. In short, the eventfulness of algorithms and the positioning of users do not necessitate an inevitable, deterministic outcome. Rather, these situations are contingent and rich in potential outcomes. These encounters do not determine memory or memory practice in one way or another. These two concurrent processes I have just outlined, however, do suggest that we need to think of the intersections of human agency, algorithms, and memory in new ways. We especially need to think about the role of resurfacing in relation to how the past comes to matter in the present.

7.2 Algorithms and Distributed Cognition

As I mentioned, the concurrent processes of the eventfulness of algorithms and the positioning of users suggest that we need to rethink the balance between users and algorithms. One part of this means downplaying the often-heavy emphases on 'human' and 'social' in memory practices. One way to rethink this balance is to explore the scope for a more distributed approach to human and nonhuman agents. Arguing for a distributed understanding of cognition and cognitive systems, N. Katherine Hayles (1999, p. 290) writes in *How We Became Posthuman*:

> No longer is human will seen as the source from which emanates the mystery necessary to dominate and control the environment. Rather, the distributed cognition of the emergent human subject correlates with – in Bateson's phrase, becomes a metaphor for – the distributed cognitive system as a whole, in which thinking is done by both human and nonhuman actors.

Remembering with algorithms similarly accentuates memory practices in terms of distributed cognitive systems and cognitive functions. It highlights the ways in which memory and remembering are distributed amongst human and nonhuman agencies, including memory features, apps, and social media platforms. The shift from remembering to resurfacing undermines, or at least problematises, the supremacy of the human and the social in emerging modes of memory practices. As Hayles (2017, p. 26) argues in her book *Unthought*, 'both technical and biological systems engage in meaning-making within their relevant instantiated/embodied/-embedded contexts.' In the context of this thesis, remembering with algorithms can be seen as done by both human and nonhuman actors, and what we consider a 'meaningful memory' must therefore be considered in relation to both biological and technical actors.

That being said, there is still a heavy emphasis on human agency in contemporary memory studies. Lee Humphreys (2018, p. 73), for example, proposes the notion of 'remembrancing' in order to focus our attention on 'the active, social, and reflexive processes of memory.' Drawing on Annette Kuhn's term 'memory work', Humphreys (2018, pp. 73-74) seeks to highlight the way people 'purposefully and strategically create media traces to help them remember events and experiences in their lives within particular narratives of the self, the social context, and the broader cultural environments.' Remembrancing, in Humphreys' view, signifies not only the cognitive aspects of memory work, but also its somatic dimension (p. 74). By this she means that remembering is fundamentally an embodied process, a point that is also convincingly argued by others such as Paul Connerton (1989). The emphasis here is on the active, conscious *human* processes of remembering the past, where people engage with and interrogate mediated memories such as digital images in light of certain narratives of self. Of course, a more distributed understanding of memory practices does not mean ignoring the role of human reflexivity. Indeed, chapter five has sought to expound on the ways people actively use and engage with algorithmic remembrance technologies and the memories they routinely resurface. Yet, the thesis has also tried to problematise a too clear distinction between the human and the nonhuman, arguing that algorithmic systems participate in the emplotment of selves as well.

José van Dijck (2007), in her book *Mediated Memories in the Digital Age*, proposed the notion of 'mediated memories' for some of the same reasons as Lee Humphreys: to emphasise the reflexive and embodied processes involved in our engagement with media technologies. As van Dijck states, mediated memories refer to the 'activities and objects we produce and appropriate by means of media technologies, for creating and re-creating a sense of past, present, and future of ourselves in relation to others' (2007, p. 74). Yet, crucially, van Dijck argues that mediated memories cannot be located 'strictly in the brain' nor in wider culture, but rather exists 'in both concurrently' (p. 28). As she states, mediated memories are 'manifestations of a complex interaction between brain, material objects, and the cultural matrix from which they arise' (p. 28). This notion of mediated memories as an amalgamation of several elements or factors, or as a quantifiable field of frequencies as I argued in chapter four, has been explored throughout this thesis.

In some ways, the argument of this thesis echoes van Dijck's claim about the complex interactions underpinning mediated memories. Yet, it has also sought to go beyond this claim. By arguing for a shift from remembering to resurfacing, I have sought to argue that remembering with algorithms increasingly constitutes a series of 'situations' or encounters, where people, memory, and algorithms intersect and cross. It refers to the complex intersections of various human and nonhuman agencies, all actively participating in the way the past is constructed, interpreted, understood, shared, and brought to bear upon the present. The shift from remembering to resurfacing is also facilitated, I argue, by the ways people comport or position themselves in relation to contemporary algorithmic remembrance technologies. In this framework, remembering with algorithms is partly a posture through which users render themselves susceptible to resurfaced memories and to the affective states that such memories engender. The shift I have suggested here does not seek to undermine human agency in memory work. On the contrary, by theorising a shift from remembering to resurfacing the thesis seeks to reconceptualise its position in remembering, highlighting the ways memory work rather comprises multiple intersecting agencies actively participating in its processes. Moreover, the shift from remembering to resurfacing seeks to extend our understanding of the power and politics of algorithms and how they come to matter in the social world, shaping how memory is conceived and instantiated in everyday life.

7.3 Why Resurfacing? Surveillance Capitalism, Nudge, and Captivating Algorithms

Finally, having outlined the processes that are precipitating the shift from remembering to resurfacing, we must now scrutinize the political underpinnings and potential implications of this emerging shift. This means revisiting some ideas already discussed at the start of chapter four. Throughout the fieldwork period, participants often asked why apps and platforms were so incessant in their resurfacing of past memories whilst there did not seem to be any advertisements or explicit monetary motives attached to them. It is an interesting question. In other words, users found it odd that there were seemingly no immediate financial motives attached to these resurfacing memories. Was it then merely a sign of a platform's good will? As chapter four suggests, even if they do not seem immediately monetised, it does not mean that algorithmic remembrance technologies are innocent tools, simply providing users with the means of revisiting their data past. They have been created and issued forth by app developers, software engineers, data companies, and multi-national social media platforms with financial interests. Algorithmic remembrance technologies exist within a variegated landscape that is financially and culturally underpinned by a logic of participation and data extraction. In chapter four, I argued that memory features, apps, and platforms must be viewed within a broader framework of surveillance capitalism (Srnicek, 2017), a metaprocess where increasing aspects of society, culture, and everyday life are rendered amenable to data extraction in order to produce value. These aspects are caught up in what José van Dijck (2013) has called 'the ecosystem of connectivity', where data is constantly produced, extracted, translated into ads and recommendations, and ultimately turned into value and revenue for companies and shareholders. Within the framework of surveillance capitalism, data, quite literally, has become the new gold. Data about people's encounters with the past is no exception.

In what ways, then, does surveillance capitalism operate and how does it relate to algorithmic remembrance technologies? Nick Seaver's (2018) work on recommender systems is one salient indicator of how surveillance capitalism emerges and is diffused in society. Seaver (2018) argues that modern recommender systems contained within platforms such as Netflix and Amazon may not be so 'modern' as sometimes assumed. Seaver shows there is a notable parallel between the logics of recommender systems and that of Indigenous American animal traps. Just as traps were tools that had to 'persuade its prey to play the role scripted for it in its design,' recommender systems similarly constitute 'devices designed to alter the behaviour of their prey, in order to catch them' (p. 425). More broadly, Seaver suggests that there is a certain logic that both defines and pervades the entire software industry, which he

calls ‘vernacular captology’ (p. 425). Vernacular captology highlights the ways in which the capture of data, the capture of people’s attention as well as their habits and routines figure as the bedrock and springboard on which modern platforms and media industries operate.

The algorithmic remembrance technologies that have been discussed and examined in this project can be understood as mundane examples of such ‘vernacular captology’ in action. In Seaver’s view, recommender systems imagine users as prey to be captured, drawing on their data in order to know them more intimately. The bait is whatever is recommended: a new Netflix series, a book other shoppers ‘like me’ bought on Amazon, and so on. But this captological equation is written slightly different with algorithmic remembrance technologies. With these, the prey remains the user, but the bait is no longer a specific product as we find on Netflix or Amazon. Instead, the bait is the user themselves or, more specifically, their variegated data past: ‘here is a memory of *you* from *your* past!’ Unlike Indigenous animal traps, it is not enough to only capture once. For this bait to be effective, it must be made continually visible; it must perpetually feature in users’ parameters of attention, and it must be an effective ‘technicity of attention’ (Bucher, 2012a). Vernacular captology implies that users must be continually captured and hooked for it to be of value to the hunter. Attention must be repeatedly and algorithmically steered in certain (desirable) directions. This is why the resurfacing mechanism, or what the interview participants conceived as memory reminders or memory jogs, is so crucial for how these technologies operate. Namely, the shift from remembering to resurfacing entails that the mechanism of resurfacing memories becomes more and more prominent to contemporary modes of digital memory work. This is because it helps to ensure the continuous capture of users and their attention.[60]

Drawing on Seaver’s (2018) idea of captology, it is apparent that the resurfacing mechanism is a trap of sorts. As discussed in chapters five and six, resurfaced memories have the potential to capture peoples’ attention whilst also producing in them a more intimate relationship to their data past. Moreover, they can shape how people work on the present. They have the potential to boost people’s stickiness and engagement on certain platforms or apps, even making it easier and more desirable to share and communicate mediated memories with others. They also make it easier for users to re-circulate pasta data rather than to create wholly new content, as chapter four suggested. In short, algorithmic remembrance technologies seek to add to their services’ stickiness ‘with this larger profit motive in mind’ (Prey and Smit, 2018, p.

[60] For a deeper investigation into the ways contemporary platforms and algorithmic systems seek to ‘hook’ users into enduring usage, see Wendy Chun’s (2016) *Habitual New Media* and Nir Eyal’s (2014) *Hooked*.

214). The resurfacing mechanism is a crucial ingredient for captivating users by attempting to 'alter the behaviour of their prey, in order to catch them' (Seaver, 2018, p. 425). In a sense, the tagline 'here's a new memory' can be understood as the trap waving its bait at the user. Yet, it is important here, Seaver suggests, that we do not see traps simply as brief moments of violence, but rather as something gradual, something which can seem luring or even natural. Traps can figure as so-called 'agents of environmentalization' (Seaver, 2018, p. 432), where they can almost seamlessly blend into whatever environment they are embedded, becoming indiscernible from the digital infrastructures in which they exist. The resurfacing mechanism can therefore be figured as a trap but also as an agent that convinces, that attracts, that is routinised – in short, an agent that 'nudges'.

Nudges are exemplary of the captological logic of algorithmic systems and a prime example of 'vernacular captology'. The concept of 'nudge', originally proposed by Thaler and Sunstein (2008) in their book *Nudge: Improving Decisions About Health, Wealth and Happiness*, describes how mundane cues, incentives, and cognitive biases can be utilised to shape human choices and behavioural patterns in certain (positive) directions. For example, users can be nudged towards healthier living by wearable technologies such as Fitbits or smart watches (e.g. Lupton, 2013; Schull, 2016). Nudges, as described by Thaler and Sunstein, are a powerful mechanism for not only shaping behavioural patterns, but also for producing and inculcating certain desirable habits and routines.[61] Remembering with algorithms, the shift from remembering to resurfacing, also seems conditioned by the logic of nudges. Through the continual resurfacing of well-timed memories, users are induced to form habitual relationships to their data past, to the algorithmically resurfacing data past. The 'roll-out' of memory in the age of algorithms denotes an ever-pervading nudge towards participation, towards sharing, towards producing. Engaging with mediated memories becomes implicated in this logic of nudge and, in turn, algorithmic remembrance technologies are able to 'creep more deeply into the texture of our lives' (van Dijck, 2013, p. 55).

[61] Working in the field of behavioural economics, Thaler and Sunstein (2008) envisaged nudges as a force for good in society, engineering people's choice architecture towards better and healthier decisions in subtle ways. From a more critical data studies perspective, nudge theory has been critiqued as yet another form of techno-surveillance. Drawing on Foucault's idea of environmentality, Mark Andrejevic (2020, p. 105) argues:

> Recently popularized versions of 'nudge' theory… are a pop-culture distillation of milieu-based governance in which 'action is brought to bear on the rules of the game rather than on the players… in which there is an environment type of intervention instead of the internal subjugation of individuals.'

I want to argue that the shift from remembering to resurfacing, whilst being enabled by the eventfulness of algorithms and the positioning of users, is also underpinned by a particular economy or captology of participation. The shift is propelled by an underlying drive to capture users' attention, transforming it into modes of participation, habits, and routines, ultimately turning it into value and revenue for the app or platform. This particular economy or captology constitutes a landscape where one is constantly nudged towards engaging with the past through the mechanism of resurfacing and memory features more generally; where one is continually encouraged to share these memories with others and to document and work on the present as a resurfaceable future past. In other words, it can be conceptualised as a form of 'participatory normativity' (Jacobsen, 2020a), where sharing and participating becomes the norm to comply with. As such, the shift from remembering to resurfacing can be seen to have political and economic implications. It is by no means a neutral shift; it is imbued with a certain politics, the capacity to act and to shape the actors operating within in its framework. As such, remembering with algorithms can be seen as a trap. But as Nick Seaver (2018, p. 432) reminds us, traps are not simply the 'unilateral application of technical force,' but rather, 'a fundamentally uncertain effort to relate to others which thereby produces a world.' Traps make worlds. The shift from remembering to resurfacing, this thesis ultimately argues, has the capacity and the potential to shape users, their perceptions of the past and others, their everyday memory practices, and the understanding of what it means to remember in the age of algorithms. The Apple Memories' tagline 'You have a new memory' suggests how remembering with algorithms has the potential to produce new representations and realities of the past, of the self, of others, and of the wider social world.

7.4 Future Work

This thesis has sought to make sense of some broader trends in the way people relate to memory and algorithmic systems in everyday life, but it also raises multiple questions which are in need of further examination. One of the first questions prompted by the thesis is the nature and definition of what a memory is in the age of algorithms. In this thesis, drawing on the work of Jose van Dijck, I have proposed an amalgamated conceptualisation of memory, that is, memory as amalgamations of brain, body, sociality, culture, and technology. I have argued that seeking to somehow locate or fix memory in one of these factors fails to account for the ways in which memory always seems to operate in the interstices of things. That being said, there is a need

for further research that critically engages with this question of what a memory is in the age of algorithms in more depth.

Secondly, the thesis also raises questions regarding the relationship between data and memory, especially as facilitated and mediated by social media platforms. Data has been mostly absent from this thesis as I have examined the ways in which memories come to matter in everyday life as part of particular socio-technical situations. Yet, there is still a need to examine the ways in which social media platforms such as Facebook define and conceptualise memory through mining user data and producing 'meaningful' patterns from this data. As a platform that heavily relies on mining and trading users' data, Facebook is a particular apt avenue for future research into the intersections of platforms, data, and memory.

Thirdly, there is also a need for a deeper examination of the impact of metrics on the conceptualisation and lived experience of memory. As suggested in chapter 6, metric systems such as Timehop's 'Streak' and Facebook 'likes' seemed to have an affective impact on the way participants experience and view their digital pasts. The sociological literature on numbers and the social power of metrics is already well developed, but there is scope to develop this relationship between (social media) metrics and memory in future research.

Fourthly, and lastly, there is scope to explore the potential relationship between neoliberalisation and the ways in which memory technologies conceptualise, manage, and resurface memories in everyday life. Throughout the data analysis period, I noted that the way social media platforms and other memory technologies approached the question of memory has several overlaps with characteristics develop in the neoliberalism literature. Indeed, there is scope to explore social media platforms as perpetuating what Philip Mirovski (2013) calls 'everyday neoliberalism' through their reconceptualisation of memory in terms of optimisation, competition, and memory as a form of enterprise.

Appendix: Interview Guides

In this appendix, I provide the final iteration of the interview guides for the remote interviews as well as the focus groups. As stated in the methodology chapter, the interview guides were constantly reworked and adapted to the data emerging from the interviews and focus groups. In the focus group section below, I also provide an outline of the start of the group interview, which technologies were discussed, and so on.

Interviews

- Intro: reiterate the information sheet and explain the project [remember to check recording]

1. When did you start using Timehop?
    a. How long have you been using it?
2. How did you find out about it?
3. How do you normally use the app? / Take me through how you normally use Timehop
    a. Is Timehop part of your daily routine?
    b. Does the 'streak' have any effect on how you use the app?
    c. Do you get notifications from Timehop?
        i. If so, does getting notifications effect how you use the app?
    d. What about the pop culture references?
4. What do you particularly like about using the app? / How have you found using Timehop during this time? / what experiences have you had of using the app?
    a. Is there anything you particularly like about using the app?
    b. Is there anything you particularly dislike?
    c. What about how it collates and categorises your memories from different platforms?
5. How do you find being reminded of these memories (*or* photos, moments, events, times)?
    a. How does it make you feel? / how do you react? / how do you experience it?
        i. Can you describe it in more detail?

    b. Are there any memories you particularly like being reminded of?
        i. Can you give me an example?
    c. Any you particularly don't like?
        i. Have you come across any you would preferred to have avoided?
6. Has using Timehop changed how you react to these memories? / do these memories feel different when using Timehop as opposed to not using it?
    a. If any, which ones? /could you please elaborate?
    b. Do you live differently knowing that you will be reminded by Timehop in the future?
    c. The fact that these memories become 'anniversaries', has that changed how you react to them? (how memories are framed)
    d. What do you think about the timing of the Timehop memories?
7. Do you ever share memories you are reminded of?
    a. Have you ever shared memories?
    b. In your opinion, what photos/memories do you feel are appropriate / suitable / fitting / relevant for sharing with others? / in your opinion, when is it okay to share memories? / what memories are not suitable for sharing?)
        i. If so, when?
8. Has using the app had any effects on how you interact with / see other people, friends or family? / has Timehop had any effects on your relationship with others?
    a. If so, how has it?
    b. If not, in your opinion, is Timehop primarily meant as a personal tool to remember?
9. (Have you recently come across Timehop's new feature 'Hide-a-Memory'?)
    a. If so, what is your opinion of this new feature that they have rolled out?
    b. Do you ever find yourself wanting to 'hide a memory' on Timehop?
        i. If so, why? / could you give me an example?
10. Do you use any other memory apps or features?
    a. If so, which ones?
    b. Take me through how you normally use them?
    c. How have you found using them?
        i. Has it been the same as using Timehop or has it been different?
11. Before we finish, what has Timehop meant for you?

12. Before we finish (our time has run out), do you mind answering some demographic questions which will be helpful when I do my analysis?
    a. What age range are you in? (under 21, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80)
    b. What is your occupation?
    c. What country do you live in?
13. We've come to the end. Is there anything else you would like to add before we finish?

Focus Groups

1. Introduction (approx. 3 min)

At the beginning, welcome everyone and make sure that everyone has filled out the consent form and is aware of the information sheet. Briefly explain the project and what will be discussed in this focus group. Stress that people do not have to have used any of the features that will be discussed, but rather I am interested in their views on how these technologies affect our memory practices [remember to make sure the recording is working as it should – do a check].

2. Explain the functionality of the features (approx. 5 min)

The presentation includes screenshots of the features explaining their functionalities (if any participants know how the features, encourage them to participate in explaining it to their peers for group interaction). The features put forward in the focus group interview are:

- Facebook Memories
- Apple Memories

With each one, as whether they know the feature and if so, whether they can explain it to their peers (practice explaining these features one by one in a way that does not use jargon or too technical terms). Practically, Apple Memories is best demonstrated and explained through the phone (show them how it works), whereas Facebook Memories are arguably best showcased on the laptop (bring both to the interview). Participants will be encouraged to ask questions about something they do not understand or wish to know more about, and

it is likely that the group discussion will start here, rather than being a ‘separate’ stage altogether. Stage 2 and 3 will most likely flow into each other.

3. Group discussion (approx. 50 min)

This is the bulk of the interview and this is where the majority of the data will be generated. The participants should, at this point, be familiar with the features we will discuss and should hopefully have formed some ideas or opinions about them. Prepare questions beforehand (questions also derived from the other interview data set), but focus mostly on getting the ball rolling with the group interactions. In order to generate data that is comparable to the other data set, many of the questions are similar. The questions prepared beforehand are:

1. What do you think of these features? / Any thoughts on what we have just seen? / Anything that strikes you about these features?
    - Anything you particularly like or dislike about these features?
    - What do you think about how they collate and curate online memories?
2. Would you consider using these features yourself? If yes/no, why?
3. What sorts of things do you use to access memories at the moment?
4. Do you think you would remember something differently using these features as opposed any other way of documenting/remembering the past?
    - Say, writing a diary, having photo album, reminiscing with a friend or family member, etc.?
5. How do you find these features reminding people of their memories?
    - How would you experience that?
    - Would you find it helpful, neutral, or problematic?
    - Would there be any memories you would particularly nice/problematic to be reminded of?
6. What do you think about the fact that these memories are called ‘anniversaries’?
    - Would that change how you remembered something? If so, how?
7. What do you think of the ‘timing’ of these memory reminders?
    - Do you think it matters when you are being reminded of some memories?
8. If using these features, would you ever want share these memories with others?

9. We’ve come to the end. Is there anything else you would like to add before we finish?

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