Designing for human memory in a future scenario of infinite data storage: A speculative approach.

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A thesis submitted for the degree of
Doctor of Philosophy

December, 2025

This thesis is dedicated to every little girl who seeks knowledge.

I see you. I believe in you.

Declaration

I declare that the work presented in this thesis is, to the best of my knowledge and belief, original and my own work. The material has not been submitted, either in whole or in part, for a degree at this, or any other university.

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Abstract

In discussions about technology, the tendency is to portray computer memory using metaphors that characterise it as a superior extension of our human memory. Its contents do not change in time, information is catalogued transparently, and therefore the search for a specific output is effortless and quick. With the emergence of nanotechnology, computer memory may seemingly become even better: infinite, in fact. However, this view of digital and human memory is limited. It assumes that the primary goal of human memory is to store the most immense amount of information possible. It rejects other qualities of memory, such as forgetting, imagination and social practice, in favour of the notion that human and digital memory function merely as a storage vessel. In the face of the new relationship between human memory and infinite digital memory, it is necessary to reconsider the metaphors and characteristics of human and digital memory, to understand and design favourable interactions between digital and human memory.

The premise of infinite data storage leads us to a future where we can store *everything*. While extensive literature exists on how external memory can support our "organic" memory, researchers have hitherto not been investigating how interaction with our data could change in the context of *infinity*. This thesis explores these possible changes. Using Research through Design, I conceptualise four different futures - or Design Fictions - of infinite data storage, based on the Manoa School Method introduced by Jim Dator. Dator named these futures Continued Economic Growth, Societal Transformation, Collapse, and Disciplined Society. I present a series of speculative artefacts I have designed which exist within these futures. Each future focuses on different societal values and contexts, which enables me to further unpack the possible consequences of digital devices with infinite data storage.

I summarise these outcomes using the Annotated Portfolio Method, creating connections between artefacts and theories. Since Research through Design does not seek to answer specific questions but rather to explore a particular challenge space, I conclude by identifying guiding framing questions for future external memory designers in order to provide an approach for constructing the memory design space they would like to highlight and serve in their designs.

Publications

A version of the Chapter 4: Future 2: Transformation was published as a research paper in Pages on Arts and Design (PAD) #23, vol. 15 - Digital Memories under "Exploring Futures of Infinite Data Storage through Speculative Design" title, in December 2022 (Dutkowska-Zuk, 2022).

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Above all, I want to thank Paweł. Pawełku, Twoja obecność zamienia każde doświadczenie w brawurową przygodę. Dziękuję, że dzieliłeś ze mną śmiech przy triumfach. Dziękuję, że to Twoje oczy widziały mnie najszczęśliwszą, robiąc to co kocham. Twój niestrudzony optymizm i niezłomna wiara oświetlały mi drogę w najciemniejszych momentach tej wyprawy. To Twoje ciepło i uwaga rozwiewały chmury, które powodowały, że wątpiłam i chciałam zawracać. To na Twojej miłości wspierałam się gdy brakło mi sił na kolejny krok. Dziękuję, że byłeś ze mną od początku do końca tej przygody. Dziękuję, że chcesz ze mną dzielić dalsze wybryki. Dziękuję, że jesteś.

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Chapter 1

Introduction

This introductory chapter lays down the background and motivation of my work. We cannot easily study memory empirically, i.e., we cannot slice it up and show how it works. In this chapter, I discuss the Futures Thinking process, which is an exploratory process that deals with the uncertainty of the future. I will present the multitude of futures thinking approaches and explain why I chose Jim Dator's (2009) Manoa School method as the futures thinking technique in this thesis. Next, I focus on the current understanding of the term memory, and I discuss the definitional pluralism of the Human Memory based on psychological studies and theory. This pluralism manifests itself in the positivist view of memory, which abstracts it to functional parameters and uses a more phenomenological approach to memory as being socially constructed. I discuss in more detail the pluralism that describes memory as a two-fold objective: a container in which we store our memories, and a process - an action that our brain makes. While this section aims to be a broad introduction to the psychological theories of memory, I focus on episodic memory since autobiographical memory is a focal point of the thesis rather than semantic memory (knowledge about universal truths and facts). After introducing the state of knowledge about human memory in Psychology, I present the Computer Science perspective on Human Memory and how it has influenced the way we use and perceive digital memory. I argue that Computer Memory is not a reflection of our human memory, but rather a consequence of our (lack of) understanding of the memory and metaphors we use to describe it. Moreover, the tangled representation of Human Memory has led to oversimplified and, therefore, sometimes misleading representation of functions in the relationship between human and computer memories (for example, misinterpretation of forgetting and the idea that computer memory is another storage "vessel" for our human memory). One metaphor in particular has taken over the construction of computer memory, the literacy metaphor. This suggests that computer memory is a container whose worth is measured in size; the bigger, the better. I will explain its origin and how it took

us to the end where there is effectively a singular way we can interact with computer memory. This representation of memory does not show the variety of consequences of the world in which we will be able to store everything. Thus, in my thesis, I challenge the current view on the relationship between human and computer memory by creating alternative future worlds that could help us understand the possible consequences of this relationship changing in the future. The infinity creates new possibilities for understanding what memory is.

Furthermore, in this Introduction, I discuss the concept of computer memory from the perspectives of computer science and Human-Computer Interaction (HCI). Here, I introduce technological advancements such as Artificial Intelligence (symbolic vs non-symbolic AI or weak (narrow/applied) AI vs strong (AGI) AI), that will be a part of artefacts' discussion, and thus will appear throughout my thesis. I discuss the relationship between remembering and forgetting in the digital world. Moreover, I introduce how data is stored and processed.

This chapter also introduces the motivation for my work. Helping people think about the ongoing technological transformation - dubbed the Fourth Industrial Revolution - is essential for their Futures Literacy. Futures Literacy is a skill which UNESCO (2023) calls an essential competency in the 21st century. With this idea in place, I will then move onto the Outline and the Methods section.

1.1 Research Context

Every year, data storage on our devices is getting bigger. From five Megabytes on fifty 24-inch platters in 1956, to 100 Terabytes on a standard 3.5-inch form factor nowadays, our computer storing capabilities grow while the physical storage itself gets only smaller (datarecovery.com, 2018). In 1965 Gordon Moore (2006) - co-founder of Intel Corporation - predicted that the number of transistors in dense integrated circuits would double every two years. This observation was dubbed Moore's Law and is still widely accepted. This indicates that the amount of computing power able to be squeezed into devices grows while the devices stay the same size. For example, our phones are not performing only one action of telephony, but rather they have become general purpose computers as we use them for many different tasks. From the economic point of view, one may ask whether we could settle with less, with the number of transistors we already have, to have cheaper devices in the future. Jevon's paradox, observed and introduced by economist William Stanley Jevons in 1865, explains that this is not in our nature. The paradox states that if technological progress increases the efficiency of a product used, demand and consumption grow. Thus, for example, if we buy a computer one year with a certain computational

power and memory, next time, we will not opt for the one with similar parameters for less money. We are more likely to purchase the one that is more powerful than our previous one, for the same price as before. These observations match the utopian vision described in *The Grasshopper*, which presents the world of infinite data storage as carefree, as technology can carry all the human knowledge that never vanishes or fades (Suits, 1978). On the other hand, Rosi Braidotti (2013) called nanotechnology one of the four horsemen of the posthuman apocalypse. The scope of this thesis is not concerned with the technical fabrication process; nanotechnology, but rather what does one do with infinite storage? The answer may sound like "everything", which creates opportunities as well as challenges. For now, "everything" sounds quite overwhelming, but this thesis aims to answer the question: What may a world with infinite data storage look like?

This thesis does not aim to prove the possibility of infinite data storage. I do not develop, nor test, the physical properties of data storage. In fact, at the time of writing this thesis, infinite data storage is not a reality, despite the promises of big tech companies. In 2017, a Reddit user, beaston02, uploaded a petabyte (one million gigabytes) of pornography to test the limitation of the promised "unlimited" storage by Amazon (Cole, 2017). However, unlimited data storage is possible virtually. The large amount of data on the Internet can be perceived as endless and infinite. Moreover, different devices, beyond computers and smartphones, already implement data storage, for example, smart refrigerators. We call devices that can be accessed through the Internet and are connected to each other the Internet of Things (IoT). The idea that is explored in this thesis that absolutely everything could have data storage, including our pens and frames in our windows, is not a prediction but a possible outcome, purely based on the dominant logic of the present day: "the more the better". One might say there is no good reason for trying to put data storage into window frames, while someone else may say they would like to have windows that open and close based on the weather. In the past, someone may have said that there was no good reason to try to put data storage into the fridge. After all, it is just a device to cool food; but the reality is some people are buying smart fridges.

With the current technology and boundaries of physics, infinity may not be practical. However, the growing volume of data and devices that can store information is. Thus, in this thesis, I use the concept of infinite data storage to guide my four future scenarios, which explore how people could interact with the availability of vast amounts of data. The future scenarios are considered thought experiments (a term that is explained later in the Method section), rather than accurate predictions. This thesis explores the scenario that humanity has increasingly dwelt on: that the more we memorise, the better, which has led to developing multiple devices to provide increasing amounts of data storage. The thought experiments presented in this thesis

aim to provide an alternative to the standard narrative reflected in such pieces as the *Universal Library* (Laßwitz, 2010) or MyLifeBits project (Bell and Gemmell, 2009; which I will present later), which exemplify the dominant focus on the volume of data and memories, rather than the meaning or quality of data and memories. Each scenario in this thesis investigates the possible contrasting shifts in perspective, context and values that may unfold within four separate future frames that each think through potential uses of and engagement with infinite data storage.

1.2 Future thinking and the Future of infinite memory

What do you imagine when you think about the speculative dystopian world? Books such as George Orwell's (2013) *1984*, Margaret Atwood's (2003) *Oryx and Crake* , recently transformed into television series *The Handmaid's Tale* (Atwood, 1986) quickly come to mind. Indeed, television series such as *Black Mirror* or *Westworld* have become increasingly popular, adding to our collective technological dystopian imagination. Polish painter Zdzislaw Beksinski (1929-2005) created disturbing-to-the-core paintings, which are a famous and obvious example of dystopian surrealism. These pieces are clearly dystopian; they make us uncomfortable, frightened, and, in many cases, disgusted. They openly state that they depict the undesirable world which society surely wants to avoid. However, the dystopia is not always as crystal clear as we may think it is. One such example is the work of English painter Stanley Spencer (1891-1959), whose work can be found in the impressive collection of the Fitzwilliam Museum in Cambridge, UK. One of his oil paintings contains racist imagery with offensive stereotypes of the nations that the British Empire colonized, alongside less grotesque Westerners. I had a chance to see it one month before it was withdrawn in December 2022, with no plans of its return to the gallery for the visitor's view. This dystopian vision was not Spencer's intention, though. The painting is called *Love among the Nations*. Spencer aimed to create a utopian world of kindness, tenderness and love. His deliberate attempt to highlight cultural differences was supposed to show the hidden message of love beyond differences. I will not comment on the gallery's decision to withdraw the painting. I want to focus on the apparently not-so-obvious idea of what utopia and dystopia are. My work is not about any particular injustice we face as a society. This painting showcases that future worlds and the idea about how preferable futures look can differ from person to person and how dystopia and utopia blend into each other. It also shows how much a collective understanding and ongoing discussion is needed to reach a consensus on what dystopia and utopia represent. Perhaps the most honest, or the closest, image to our world is Atwood's (2011) notion

of Ustopia. Taking the Ustopia perspective does not mean that dystopian or utopian scenarios should not be considered. On the contrary, Ustopia is a vision, which displays how in every utopian scenario there are dystopian elements and in every dystopian scenario, there are utopian elements.

However, it may be challenging to envision alternative scenarios, given the context in which people are embedded. Setting my artefacts in speculative futures frees both the researcher and the audience from thinking about the capabilities of current technology. As Stewart Brand (2000) notes: *"Technology is treated as something that pushes us around rather than something we create. It's a bother, it's a boon, it's a discipline; it's a given"* (p. 16). In the imaginary futures, the question of whether we can make something, due to current technological limitations, is no longer valid as the futures are presented as a given, *a fait accompli*. This disrupts the status quo of current practices, which involve designing for technology.

Through my disruptive Speculative Designs, I am pulling on the string of the sense of inevitability. This work started before Covid-19, was carried out during the pandemic, and was finished in the post-pandemic world, in which Russia attacked Ukraine. These shocking incidents show that the sense of inevitability is not always a good predictor, and we can find ourselves in an unanticipated predicament. So, how do we get ourselves out of this predicament? How can one prevent getting into it in the first place?

Dator's work - The Manoa School method - is useful in this case because it gives precise instructions about how to build different types of futures. He goes beyond political, economic, scientific, technological, and environmental drivers to include social, cultural and human factors through PESTLE analysis, a widely used business tool with the last three additions created by Emily Spiers (2021). In *Speculative Everything*, Dunne & Raby (2013) wrote:

> *with the fall of the Berlin Wall in 1989 and the end of the Cold War, the possibility of other ways of being and alternative models for society collapsed (. . .). Market-led capitalism had won and reality instantly shrank, becoming one dimensional. There were no longer other social or political possibilities beyond capitalism for design to align itself with. Anything that did not fit was dismissed as fantasy, as unreal. At that moment, the 'real' expanded and swallowed up whole continents of social imagination marginalising as fantasy whatever was left. As Margaret Thatcher famously said, 'There is no alternative'* (p. 8).

Indeed, these words still haunt our collective understanding of the future. Scenarios beyond capitalism are extremely hard to imagine in Western society. Dator's (2009)

Manoa School Method is one such tool to help in going beyond the paradigm shift sketched out by Dunne & Raby above, a scenario solely fuelled by present-day solutions. The Manoa School Method also helps with overcoming the uncertainty that comes with forecasting. In this thesis, I do not predict the future. I focus on the plurality of possible future scenarios. To avoid getting stuck in the trap of only focusing on the scenarios that stem from today's understanding of technological progress, I used the Manoa School Method. Dator's framework helped with recognising different contexts for futures, which were starting points for creating Speculative Artefacts. Such an approach also boosts creativeness and embraces diverse worldviews, creating a web of futures showcasing how we may want to use technology differently. It is possible to develop Speculative Artefacts without Dator's approach. Nonetheless, I focused on holistic and diverse thinking about the Infinite Data Scenario, as mentioned before, to understand the depth of the consequences of such a scenario. For this task, Dator's Manoa School method proved to be a beneficial tool, which helped create Speculative Artefacts beyond the possibilities of a future,that is closely connected to the present.

The four generic alternative futures that Dator presented are: Continued Economic Growth, Collapse, Discipline and Transformation (Figure 1.1). The first future, Continued Economic Growth, is the "official" view, which modern governments and educational institutions adopt. It is usually a narrative about the future that is presented as a commonly accepted reality to the public. It focuses on building a solid and ever-growing economy. Often, when we compare countries to each other, discussing the quality of life, and ordering them from "worse" to "better" ones, we usually use the Growth Domestic Product (GDP) metric that measures the value of products and services produced in a given country over a specific period. Basically, we measure how much a nation consumes, and the bigger the consumption value, the better. The Continued Economic Growth future focuses on this metric. Here, I would like to address my bias concerning the topics I discuss in my Continued Economic Growth future in this thesis. I have been immersed in Western culture since my birth. Therefore, when designing the Continued Economic Growth future, I focused on the reality that surrounds me, which as mentioned before, is presented to me as a commonly accepted reality. Since capitalism is an economic system of Western countries, the Continued Economic Growth future in this thesis is based on the capitalistic system in the future. The second future, the Collapse, is a future in which, for multiple possible reasons, the state, or at least an aspect of the state of the world, has changed by diminishing or disappearing altogether. The Collapse futures can happen with respect to economic, ideological, social, environmental, moral (and more) factors. It can occur because of humans' new approach or failure to recognise their approach is detrimental - or due to external factors, such as environmental disasters or even alien invasions. In this thesis, I discuss the collapse of our current

religious systems due to the rise of the AI Gods. In this scenario, the ongoing debate on Artificial Intelligence surpassing human intellect leads to the belief that AI is a new manifestation of Gods and Goddesses that can unravel information beyond human cognition. The third future, Discipline or Disciplined Society, emerges when people reject the Continued Economic Growth scenario, deeming it undesirable. They may view the Continued Economic Growth view as dangerous for values, places or processes which are at the centre of the interest of the disciplined society. It can also emerge through the feeling that the Continued Economic Growth scenario is unsustainable, and society needs to focus on a fair distribution of resources - and in general, on the focus on desirable values rather than consumption. In this thesis, I discuss the social shift in the view and management of data's energy, privacy and cultural value. The fourth future, Transformation or Transformational Society future, is a scenario in which the transformational power of technology is at the centre of attention. It creates a vision in which people live in an artificially created reality. The name of this future, "Transformation", emphasises the metamorphosis of human society as they would make and use new technologies that would surround us everywhere. These technologies could be artificial intelligence or a teleporter. While the infinite data storage concept is in itself one that belongs easily to the Transformation Future, in this thesis, I focus on the dispersion of data because the Transformation future assumes that we live in a completely artificial world; thus, with the aid of nanotechnology, we will be able to store data everywhere.

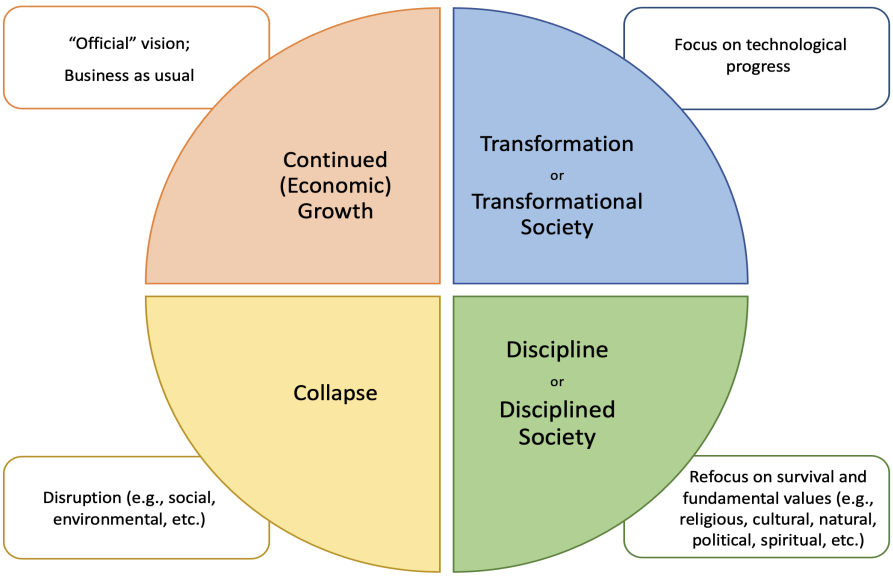


Figure 1.1: Four generic Futures based on Dator's Manoa School method. Source: Author, after Dator, 2009.

I have just presented Dator's four generic futures, numbered the way he himself numbered them. In my thesis, each future is a case study of Design Fiction (a term I will explain in the Chapter 2, Methods), and each future is presented, described, and analysed in its own chapter. However, the chapters' order is different from Dator's. Dator does not suggest the order of these futures that one should follow to experience them properly, think about or read about them. Thus, I decided to present them in the chronological order of their creation, from conceiving the idea to finalising the writing of a chapter. Such a presentation naturally uncovers my path during my PhD, showcases how my thinking has changed, and creates a somewhat chronological record of my Research through Design (RtD). Of course, some futures took me longer than others to assemble and then to chew over and gather knowledge and appropriate resources to present them in this thesis - at least to the best of my abilities. Nonetheless, I present these future scenarios in the following order: Continual Economic Growth, Transformation, Collapse, and Disciplined Society.

As Dator persists, none of these futures is "bad" or "good", although all of them have "good" and "bad" features, just like Atwood's Ustopia. As Dator (2009) notes: *"There is no such thing as either a 'best case scenario' or a 'worse case scenario'"* (p. 7). Also, there is no such thing as a "most likely scenario". It is crucial to raise the importance of the last sentence in Dator's quote. I treated all future scenarios and

worlds I have built and for this thesis with equal sincerity and respect while shaping them. I do not suggest that one or the other is more or less likely, as they do not have the quality of being more or less likely to happen. Is it possible, though, to have more or less likely scenarios within singular Dator's worlds? I would like to explore this through the example of another widely known method of futuring, the Futures Cone (Dunne and Raby, 2013). The Futures Cone illustrates a prospect of probable, plausible and possible futures, and in Voros' (2003) addition, a preferable future, which sits somewhere between one which is probable and plausible. Later on, Voros (2015) also added the preposterous future, which depicts scenarios that appear impossible or ridiculous. However, using sociologist John Law's (2015) concept of *one-world-world* (OWW), Stead and Coulton (2022) pointed out that the Futures Cone perspective is a constrained vision of a single reality. This means that it deals only with Dator's first future, Continued Economic Growth, and it creates the background for different technological advances that could happen in this one future. In his talk at Lancaster School of Architecture, Paul Coulton (2023) recognises inherent problems within the Futures Cone, such as that it starts with the present without acknowledging the past. The Future Cone design suggests that the past consists of facts that are truths written in stone, which cannot be changed. It is not true, as humans create history; thus, it is not an objective, unchangeable narrative. Soro et al. (2019) claimed that the "past" is not merely a static collection of facts, but rather that it is subjective and constantly changing. Authors believed that not only the future but also the past could be designed and re-designed. Otto (2016) suggested that to design a plausible future, we need to simultaneously conceptualise the past, and they need to match each other. A designable past would broaden the spectrum of future opportunities since the future relies on the past. Another crucial point that Coulton pointed out is the lack of space for fiction in the Futures Cone. Coulton did not address Varos's addition of the preposterous future. However, Coulton's point is still valid. Fiction, of course, can be received as "impossible" or "ridiculous", but it is not the message that fiction provides. After all, we could call fiction each one of these futures named on the Futures Cone. However, we do not do that. Therefore, calling the preposterous future an equivalent to fiction, as if fiction is only impossible and ridiculous, would be nonsensical - thus, still, the Future Cone has no place for fiction. Fiction is a force to be reckoned with, as it creates narratives and images of the possible futures that may or may not be desirable. Of course, this leads to a question: desirable for whom? Fiction can show us such facets and contexts, like articulating for whom a given scenario may be preferable and for whom it is not. Paul Coulton gives an example of big companies, such as Meta that tells a story of a future scenario of Metaverse to its users, since it is in its business to deliver such future. The Future Cone does not provide such context to future thinking. In response to Future Cone, Coulton presents the Alien Futuring concept, focusing on preferable futures for humans limiting and

questions the viability of such an approach. His Alien Futuring diagram showcases how we can allow multiple futures to exist in the world, not focusing on only one "preferable" by an unknown someone. The Future Cone is insufficient to grasp the breadth of the challenges we will face in the infinite data storage scenario. Thus, even if we apply it to each of Dator's Futures, it shows that its usefulness is very limited. The attempt to compare scenarios between Dator's futures based on their probability taken from Futures Cone is invalid. More precisely, if one tries to create a probable future scenario using the Future Cone in the Economic Growth Scenario and a probable future scenario in Transformation futures, and then tries to compare them to assess which is ultimately the most probable, this misses the mark. As Dator noticed, there is no "most likely scenario" and, therefore, no "more likely scenario". Therefore, using the Futures Cone as one of the futures thinking methods within singular Dator's Future and then comparing these futures based on the Futures cone is not practical. Therefore, I do not attempt to describe the future scenarios in this thesis based on their probability, and I do not compare them using the Futures Cone.

López Galviz and Spiers (2021) argue that futures thinking today must be social. My thesis is embedded into the Material Social Futures programme launched at the Institute for Social Futures at Lancaster University. Its goal was to bring the knowledge of material and social values together. My thesis reflects that. I will laser focus into the technology that shapes our present and discuss how we, as a society, may think about this technology in different future scenarios. Thus, values are the context of each Future in my thesis. Our world may differ depending on these values, how we use technology, and how we think about memory. Please note that I did not write that we may have different technology in a different future with different values. Of course, that could be the case, but one technology can easily exist in different futures with different values. It will be used differently, though. Yes, I did create specific artefacts for each Future. I did it to highlight the world's values and explore different facets of memory technology.

There is another reason why social methodology is crucial. As López Galviz and Spiers (2021) note:

> *futures defined by other values – equality, fairness, justice and inclusivity – require techniques that differ from those used in crafting the futures we learn about through newspapers, newsrooms and reports by think tanks and governments. Those tend to be limited to short-term political cycles and the trends that the next year will bring, the ever-newer gadgets, new variations on the theme of the smart phone, tablet, clean energy, or the driverless car. More importantly, highlighting values invites us to devise new ways of thinking the social in a manner that enables us to articulate those values in the future tense* (p. 2).

The Manoa method does not try to show the worlds in these or any particular values (Dator, 2009). However, it does provide a framework based on the societal shifts, and therefore, values such as equality, fairness, justice and inclusivity can be incorporated, as much as disregarded. One may say that one of the crucial components in future studies is recognising the leading values. In this case, the future will be created by us based on our integrity rather than what will happen to us because of the trends that will shape our reality. This, again, is reflected in my thesis. My work is not about predicting the future - it is about creating it. I do not predict, forecast, or calculate the possibility of any of the scenarios happening. It is about creating the future or affecting the present so that alternate futures can or, on the contrary, cannot exist. Tony Fry explains the notion of defuturing as actions or products that reduces the possibility of a certain future. As Fry (2020) explains: *"Fundamentally, we act to defuture because we do not understand how the values, knowledge, worlds and things we create go on designing after we have designed and made them"* (p. 10). I would like to emphasise, however, that creating futures does not mean that I claim to have a recipe or user's manual for making it. In their "Social futures manifesto", López Galviz and Spiers (2021) state: *"The futures we shape are neither 'natural' nor 'universal', nor are they pre-ordained. Futures, we argue, are contextual"* (p. 1). This idea of contextualisation will appear in my thesis through Dator's Manoa method and, more precisely, in his different worlds. Each of Dator's Futures work as a context.

But when is the future exactly? "The Future is Now" is a message lurking on every corner. Rightly so, as we live in a world where new technological developments spring up like mushrooms. The future happens quickly, and we rarely have a chance to grasp what different visions of the technological future bring before they are materialised. The authors of the "Social futures manifesto" point out the importance of the timescale when we look at the future: *"Ideas such as progress and innovation underpin the immediacy and framing of our needs in relation to consumption rather than, say, citizenship or the environment"* (López Galviz and Spiers, 2021, p. 5). This, they later call the exercise of "unthinking the thinkable". This sentiment can be found in Baum et al.'s (2019) work, in which the authors call to create the long-term future field. As Brand (2000) comments: *"Fast gets all our attention, slow has all the power"* (p. 34). The exercise of thinking about the world in billions of years creates a new outlet for human imagination.

Daniel Hillis, a computer designer, commented on this attention to rapidness in 1993:

> *When I was a child, people used to talk about what would happen by the year 2000. Now, thirty years later, they still talk about what will happen by the year 2000. The future has been shrinking by one year per year for my entire life. I think it is time for us to start a long-term project that gets*

> *people thinking past the mental barrier of the Millennium. I would like to propose a large (think Stonehenge) mechanical clock, powered by seasonal temperature changes. It ticks once a year, bongs once a century, and the cuckoo comes out every millennium* (in Brand, 2000, p. 2).

As Willis suggested, the fast is no longer fast in the relationship with the slow. There is only fast, no slow. We bend towards words like "the future is now" because it seems like it is our only future. The metaphor of "Singularity" depicts this shrinkage of time between the present and the future. Although the first person who used it in the human spectrum was mathematician and science fiction writer Vernon Vinge (he also introduced the term "cyberspace" [Brand, 2000]), the term received wide recognition because of Kurzweil's (2006) book *Singularity Is Near*. He uses this term to describe the moment in history in which technology will surpass people's intelligence, and thus, people will merge with technology. However, the term singularity has different roots. The term comes from astrophysics and stands for one of two parts of the black hole. The first one is called the black horizon; it is the edge of the black hole, where gravity becomes so powerful that nothing can escape its force. Due to this incredible gravity, the centre of the black hole, the infinitely dense spot, is called Singularity. As Brand (2000) noticed, the metaphor of Singularity is popular because it catches the widely shared feeling of the deformation of time, or more precisely, the pace of events. As the black hole sucks us in, we no longer resist its power. The acceleration of the future is like a technological wave taking us by storm; some are able to surf, some are left behind, and some drown. The flood, like any natural disaster, is out of human control. The metaphor of Singularity leaves us helpless; however, my work strives to do the opposite.

Kurzweil and I, of course, are not the first people to think about the future of technology. One of the most influential laws, or back then, a prediction, was issued in the technical journal *Electronics* under the "The Experts Look Ahead" banner. In April 1965, Gordon E. Moore created a graph examining the history of integrated circuits from 1959. He noted that the number of transistors had doubled every year up to 1965 (Moore, 2006). This led him to assume the trend would continue in the next ten years. He was incorrect, and in fact overestimated the numbers. The number of transistors did not double every year. Still, they doubled every 18 months. Many different "laws" around technology took off after Moore's law, including digital capacity storage. Brand (2000) comments:

> *Moore's Law, in its own grotesque way, is a constant, something that planners now routinely take into account. But we're used to living arithmetically (1, 2, 3, 4, 5, 6 . . . 40), not exponentially (1, 2, 4, 8, 16, 32 . . . one trillion). Later doublings in an exponential sequence, we come*

> *to realize, are absolutely ferocious. The changes no longer feel quantitative or qualitative but cataclysmic; each new doubling is a new world. Ad man Regis McKenna calls it 'continuous discontinuous change'. Life becomes perpetual transition with no resting point in sight* (p. 14).

Speaking about numbers, I would like to shift to the idea of infinity, as infinite data storage is an axiom in this thesis. Is infinity, in fact, ferocious? And if so, in what way? And thus, do we actually want infinity? I opened this chapter with examples of dystopian visions. However, in our ongoing struggle to make the world a better place, technological developments are hope for many. For instance, in *The Grasshopper*, Suits (1978) describes Utopia as a world in which labour does not exist. All human needs are satisfied by machines, and people do not have to work to make money or find love. Everything is accessible, and no one worries about one's needs. People do as they please; obstacles and problems are solved purely for fun. One of the premises of such a world is storing all knowledge in computers – the external memory would be a place where all knowledge is stored and accessible to everybody. In his *Die Universalbibliothek*, or *Universal Library*, an example of speculative fiction from 1901, Kurd Laßwitz tells a story of two men pondering the idea of a universal library. This library would collect everything that has been written, and everything that will be written (Laßwitz, 2010). They answer both of these questions. First, as Professor Wallhausen and his wife - characters in the story - noticed, all literature needs to be able to be put down in a finite number of volumes since there is a finite number of possible combinations of letters. The infinity gets a finite number: 102,000,000. Not only that, since we can create every possible combination of letters and spaces between them, we can purely mechanically create every single written piece that has ever been created, and that will have been created - with no need for the existence of authors. Moreover, all these pieces would be translated and interpreted in every possible way. This, however, does not consolidate the idea of creating the Universal Library. On the contrary, after brief excitement, the interlocutors find the catch: how would one find anything in such a library? And if it contains every possible correct answer to every question, it also contains every wrong one. Volumes can contain *nothing* or, what is worse, seemingly correct pieces. The editor concludes: *"I won't subscribe to the universal library, since it would be impossible to pick out the sense from the nonsense, the true from the false"*. Similar to Spencer's painting, memory utopia and dystopia in the infinite data storage scenario are just two sides of the same coin rather than diametrically opposed notions.

While a library as a place is one piece, one commodity, infinity does not have to be. It can be split up. After all, we have an infinite number of possibilities to arrange infinity. Right now, such infinity, or Universal Library, works as the Internet and World Wide Web which are accessible through different devices. Akmal and

Coulton (2018) presented how digital and real space interact with each other using Foucault's (1986) concept of heterotopia (Figure 1.2). In Greek, heterotopia means "another place", which connects to the idea that heterotopia is a place where things are done differently. These are spaces that are simultaneously physical and mental. What characterises these places are underlying additional meanings which are not seen right away. These are worlds within worlds which have an impact on the outside worlds. For example, museums or libraries could be seen as "heterotopias of time", as objects within these spaces are enclosed and preserved; thus, time does not have power over them. "Heterotopia of deviation" are these places where individuals are placed when they are behaving in an abnormal way, such as hospitals, prisons or cemeteries. However, the concept of heterotopia does not need to be only applied to physical spaces, as Foucault (1986) admits that a *"rug [is] a sort of garden that can move across space"* (p. 6). Akmal and Coulton (2018) imagined "Digital Space" as a subset of "Real Space", as we enter Digital space through devices that exist in the physical world. However, the authors do not mention how our interactions may change when digital space becomes more accessible through real space, i.e., the number of portals through which we will be able to access digital space will grow (Coulton, 2017). Moreover, as the devices' bubble grows, they will have a more pronounced synergy with the Physical world. It will be our choice to define how much of the Infinite Library should take Real Space (Figure 1.3). As for now, we have over seven billion smart devices in the world (Skene, 2019), around one per person on the planet. The premise of infinite data storage could change that, as everything could have data storage. Now, picture each singular thing around you, your table, coat, mirror, and vegetables in your fridge, having their own data storage. That would make up for much more than just seven billion units. Technology literacy will be a crucial skill in the infinite data storage world. Thus, we must be prepared for such scenarios and understand what they imply.

I laid out the importance of futures thinking. But if it is so important, why don't we do it daily? Why does a person, in this case, me, spend years doing a PhD in this area? Am I only deceiving you, my reader, into believing that I have done work while, in fact, I just imagined things? "Just" imagined things; We tend to think about imagining as something simple and easy. On the contrary, it is not. Imagination, thus the ability to think and see beyond the obvious, is a privilege, just like education is, and not everyone can use imagination daily. Therefore, the collective imagining and discussion about the future is at risk because only some can afford to do it. At the same time, UNESCO (2023) calls Futures Literacy (FL) an essential skill for the 21st century as it is a remedy for the poverty of imagination. In my work, I strive to create a starting point for people to imagine our collective future. However, there is a catch called "temporal exhaustion" - a term that the sociologist Elise Boulding uses to describe exhaustion from dealing with the present, which results in the inability

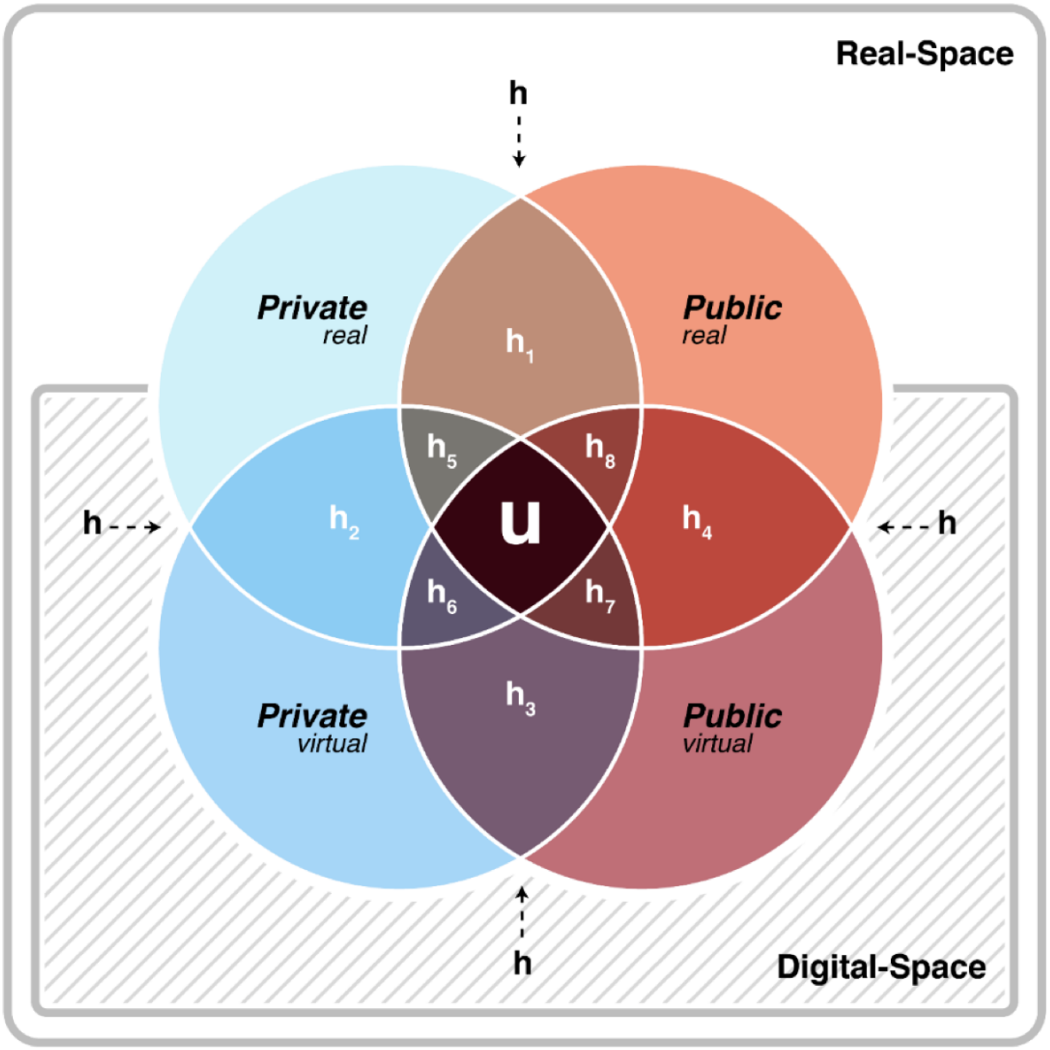


Figure 1.2: Akmal's and Coulton's representation of different Heterotopias created between Real, Digital, Private and Public Spaces. Source: Akmal and Coulton, 2018.

to imagine the future. She recommends thinking in a 200-year span: 100 years back and 100 years forward. This way, we can eliminate this neurotic relationship with the present and give us a perspective that focuses on emotional connections with our families (Boulding, 2017). However, as Brand (2000) notices, the *"frames of minds change by jumps, not by degrees"* (p. 29). This is why jumping into Futures is beneficial. Boulding's sentiment is reflected in the fact that futures need some sense of familiarity to engage with, which would ease the imagining.

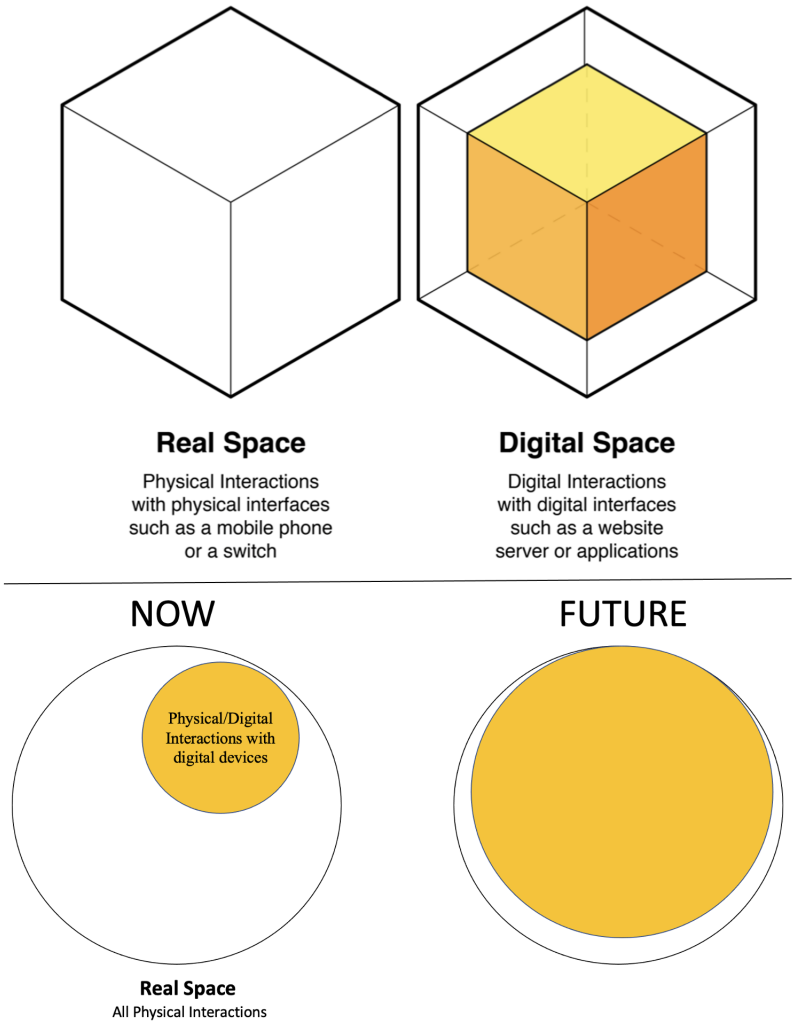


Figure 1.3: Top: The representation of Digital Space as a subset of Real Space by Akmal and Coulton. Source: Akmal and Coulton, 2018. Below: Differentiation between physical interaction with digital devices, such as mobile phones, and other physical, but non-digital interactions based on Akmal's and Coulton's representation of Digital and Real Space. It showcases that the interactions with digital devices, therefore also Digital Space, will occupy bigger space in our Real Space in the future infinite data storage scenario. Source: Author.

Mathematician and physicist Freeman Dyson made a great observation about how different timescales determine our survival. To survive means to be successful on all these timescales: individual (years), family (decades), tribe/nation (centuries), culture (millennia), and species (tens of millennia). Being successful corresponds to

being loyal to each unit of survival. As Dyson concludes:

> *That is why conflicting loyalties are deep in our nature. In order to survive, we have needed to be loyal to ourselves, to our families, to our tribes, to our cultures, to our species, to our planet. If our psychological impulses are complicated, it is because they were shaped by complicated and conflicting demands* (in Brand, 2000, p. 35).

We are only humans, but the timescales we live in are not "human" at all. Of course, I do not mean "humane" in this case. I mean that the imagination beyond the obvious in these timescales is - ensuring that all these layers are sound, as Dyson called it - complicated. Brand, however, chooses the operational mode of each layer rather than social structure. As Brand (2000) specifies: *"the fast layers innovate; the slow layers stabilise"* (p. 37). Thus, his levels are levels of pace, from fast to slow: Fashion/Art, Commerce, Infrastructure, Governance, Culture, and Nature. These layers work on the level of the civilisation.

I have established that people do not think about the broad future of humanity daily, in many cases, for reasons I do not claim I have answers for. My goal, though, is to ease this process. As Audrey Azoulay (2018) pointed out, the strength of being "future literate" lies in understanding the nature of the future and its impact on our actions. She brings to light the words of philosopher and sociologist Edgar Morin (b. 1921), who states that the contradictions we experience in our daily lives between the complex world and rigid frameworks bring us pain and internal conflict. In the field of psychology, this phenomenon is known as "cognitive dissonance" (Festinger, 1962). Cognitive dissonance is a state in which we experience mental burden due to contradicting information from the world. Once it happens, we strive to reduce it. For example, if one smokes cigarettes and then learns that lung cancer is linked to smoking, one will find information that confirms one's actions. For instance, if we are faced with the fact that smoking causes cancer, but it is uncomfortable for us to accept it, we may find other, often anecdotal evidence that might confirm our previous assumptions about smoking, i.e. that it is not unhealthy. In such a case, one may say: "My grandfather is 95 years old, the cigarette has never left his mouth for decades, and he's the fittest person I know". Similarly, when being "future illiterate", one can come to conclusions that are not based on the understanding of the role of the future but are the product of the attempt to reduce cognitive dissonance. However, in most cases, the situation is not hopeless. People can change how and why they think about the future (Azoulay, 2018). The recipe to success is simple (although not easy): it is becoming more skilled in imagining futures. Such skill is an inseparable component of the "capacity to be free" (Sen, 1999; Nussbaum, 2003; Azoulay, 2018). As Riel Miller notices (Miller, 2018), anticipatory systems (AS) theory (Rosen, 1985;

Poli, 2014; Fuller, 2017; Nadin, 2016; in (Miller, 2018); (Miller et al., 2018)), which I will explain in following paragraphs, is an essential tool for acquiring this skill. My goal is to reduce this cognitive dissonance.

As Miller (2018) observes, future studies are different from other disciplines, such as physics, as the researched substance of the future studies does not exist. At the same time, the future does play a role in the present and has a real impact on it. It seems we could be in a quandary; there is something with a real impact on our daily lives without even existing. Miller (2018) has an answer: *"The future does not exist in the present but anticipation does. The form the future takes in the present is anticipation"* (p. 2). This is how the message "Future is Now" comes into existence, not in technological developments but in anticipation. As Wittgenstein observed:

> *Getting hold of the difficulty deep down is what is hard. Because if it is grasped near the surface it simply remains the difficulty it was. It has to be pulled out by the roots; and that involves our beginning to think in a new way. The change is as decisive as, for example, that from the alchemical to the chemical way of thinking. The new way of thinking is what is so hard to establish. Once the new way of thinking has been established, the old problems vanish; indeed, they become hard to recapture. For they go with our way of expressing ourselves and, if we clothe ourselves in a new form of expression, the old problems are discarded along with the old garment* (Wittgenstein and Winch, 1980; in Miller, 2018, p. 2).

To paraphrase this, the problem of the inexistence of the future makes it hard to comprehend. It would be extremely tough to explain to a person how to ride a bike without getting on a bike. Now imagine explaining riding on a bike, not only without a bike but also to a person who has never seen a bike before. It does sound challenging, doesn't it? This means that these anticipatory systems remain tacit knowledge (the term I explore in the following subsection, related to memory). Thus, there is bad news and good news. The bad news is that without active engagement, we cannot learn FL. The good news, as Miller (2018) notices, is that with active engagement, we can learn FL, as it is a skill obtained through the learning process.

One could argue that this thesis presents an anthropocentric representation of human-centred design culture, which has embedded unsustainability at its core. The environmental crisis we are experiencing right now, which notably, is a part of one of my future scenarios, is partly a product of such designs represented in *"products, services, or experiences"* (Tironi, 2023 , p. 2; Tironi et al., 2023). There is an urgent need to develop alternative modes of thinking about the futures, rejecting the techno-optimist illusion and *"instrumentalising the planet to achieve more human worlds"*

(Tironi, 2023 , p. 1). Hence, the formation of new theoretical, methodological, and ethical idea: design for more-than-human futures that explores futures in which all biological agents, not only humans, coexist and have the capacity to influence and be influenced by other agents (Tironi et al., 2023). However, my work is very much focused on the human and while I concur with the push for More-than-Human sustainable technological futures, I have to acknowledge that this work is human memory specific. I have created memory devices that could serve primarily humans, except in one case in which humans' interest is coupled with AI Gods' interests (Chapter 5, Collapse Future). Nonetheless, I design for human memory. One could argue that I abandon other modes or histories of knowledge about memory because I do not follow a well-trodden path of memory technology in which recall, accuracy and storage are the default. On the contrary, I resurface abandoned knowledge about human memory and incorporate it into technology. I discuss the knowledge in question in the following section.

1.3 Memory

As Tulving and Craik (2000) observed: *"In science, 'what' questions are at least as important as 'how' and 'why' questions"* (p. 42). "What" questions relate to concepts and terms; without them, we cannot investigate these concepts and terms and therefore, we cannot understand the outcome of our investigations. Nevertheless, the term memory has more than one definition – as a matter of fact, it has many of them - but researchers seem to not agree on the final one. How then, can we investigate memory and ultimately understand it? In this section, I focus on problems related to definitions emerging in two main memory fields which are related to my research: Human memory and Computer memory. As I will later discuss, the complexity of memory as a term does not end with these two fields of research. However, my research is focused on understanding the differences between these two notions of memory and creating a better synergy between them in the world of infinite data storage.

1.3.1 Metaphors of Memory

As highlighted in the Research Context section, memory is a complex concept. Researchers do not agree on one cohesive definition. Yet, all the various definitions tend to be built upon a literacy metaphor, known as an archival or quantifying metaphor, which I will go on to discuss in more detail in subsequent sections. In general, metaphor is *"a device for seeing something in terms of something else. It*

brings out the thisness of that or the thatness of a this" (Burke, 1969, p. 503). First, I would like to answer the question: Why is the metaphor so important? An appropriate metaphor can gives us a better understanding of the phenomenon. For example, if we think about memory as storage, then we can ask ourselves where memory is. Malone (2012), in fact, argued that we can "see" thoughts because of our new developments in neuropsychology and neurology. However, is this actually true? We can see the activity of our brain. But if we slice our brains, can we actually see any of our memories? We definitely can see that our brain is "doing" something. What neuroscience offers us is a sneak peek of what our brain is "doing" or what it is capable of "doing", but not necessarily the "doing" itself. Brain imaging has become a false synecdoche of memory. It shows us the outcomes of what has been done but never what has been done. We do not see our memories on the shelves of our brains. Moreover, the literacy metaphor, or the quantifying metaphor becomes outdated in the world where memories are infinite, and what is more important are resources to benefit from the memories we have rather than memories themselves. In my thesis, I showcase different metaphors of memory and reintroduce various aspects of memory, which the literacy metaphor does not showcase. In the following subsection, I retrace the history of remembering, which has shaped the popularisation of the literacy metaphor.

1.3.1.1 Literacy metaphor (or History of Remembering)

The Literacy metaphor presents human minds as physical spaces where we can place "things", in this case, memories, just as much as we can furnish and decorate our houses. One's authority over what occupies this space has been up for debate. Plato (428-348 B.C.) and later Rene Descartes (1596-1650) held the position that there is knowledge that exists in us even before we are born. Through further experiences, we are learning, which is the reflection of rediscovering the knowledge that was in us before, which is called anamnesis. Plato's student, Aristotle, disagreed. Empiricists, including Aristotle, believe that people start their life with a *tabula rasa*, and they acquire memories throughout their lives. While we may think that these are two different, opposite views, there is one thing that connects them. They are both based on the assumption that people acquire memories. The idea of having memories is still alive. For example, in his book, Malone (2012) tells a story of technologies that have served us as our external memory. It is a story about how adept we became in capturing memories and, metaphorically, putting them behind bars in the cages we created. Again, the depiction is around one dimension of capturing, and the more, the better. As Josipovici noted (2020, p. 47), according to Shakespeare, a person is a sum of action and his words (Shakespeare, Mowat, and Werstine, 2004, 1.5.98-103). However, this contrasts with the Gestalt way of thinking, which assumes

that the whole is different from the sum of its parts. Gestalt psychologists stress that organisms understand phenomena as a whole rather than their components (Calhoun, 2002). Thus, the reductionist point of view does not give us an opportunity to look at the memory in its fullness. Our mental life cannot be simply seen as components, in this case, memories, because they create something more significant than just their sum. Again, we could think that these two different views are complete opposites. The former creates a calculation as it is based on accumulation, in which our behaviours and what we say equal the notion of who we are. The latter suggests that we need to look beyond our experiences and actions as they create something more than just simple calculation. However, these two notions actually have something in common: to be greater than a sum, we still need a sum. Thus, we still need to acquire memories. Charles Darwin had a significant impact on how we see the world. His idea from the 1850s on how evolution shapes the world has also impacted how we look at memory (Darwin, 2017). According to Darwin, our memory has developed to capture essential things in the environment so we can use this knowledge to behave in specific ways and perform certain tasks. This view offers two possible points of focus. One is that we focus on the word "important", so on selecting information from the environment. However, we can also focus on capturing itself. If humans evolved to capture information, then one can quickly assume that the more we "capture", the higher form of the animal we are. This sentiment is present in Ray Kurzweil's (2006) book *The Singularity is Near*, in which Kurzweil paints a picture of a future where humans must merge with machines to evolve into a higher form of the species. However, Kurzweil's argument begs the question: If human beings cannot settle now, why would they settle on what he calls Singularity? If people merge with technology, they may deprive themselves of the opportunity to truly evolve as a species, as the only thing that will wait for us in the Singularity are updates.

In their book, Michaelian et al. (2018) trace the story of Martin's and Deutsche's (1966) Causal Theory of Memory (CTM). CTM treats memory as a diachronic capacity. Three things need to be satisfied to tell that we are talking about remembering: 1) representing the event, 2) experiencing the event when it took place, and 3) there is a causal connection between the current representation of the event and the experience of it. The third requirement differentiates between remembering and imagining. If you forget everything, but somehow you will imagine exactly the same thing that happened to you in the past, it is not remembering because the connection is lost. Thus, CTM states that forgetting equals not remembering. Moreover, remembering a specific memory requires a causal connection sustained by a memory trace. This one differentiates between remembering and relearning. In general, memory trace - in this case - is the most important. Without a memory trace, there is no remembering.

To conclude, remembering and forgetting are opposites, according to scholars. Let's go further. The scholarship on memory is vast and diverse. Hence, people also advocate that memory has different meanings for us, and the word memory has different definitions. This has led us to a lot of confusion about what memory actually is. Atkinson and Shiffrin (1968) introduced the modal model of memory, which consisted of four different components that explained different characteristics of memory. They saw memory as 1) the sensory register, 2) the short-term store, 3) the long-term store, and 4) the control processes. Later, multiple memory systems were introduced (Sherry and Schacter, 1987; Klein et al., 2002), and similarly, Tulving (1985) introduced his Triarchic theory of memory in which long-term memory equals procedural, semantic and episodic memory. Semantic and episodic memory are declarative (facts), and procedural is nondeclarative (skill). Facts in semantic memory refer to general facts about the world, such as the knowledge of the capitals of different countries, the fact that there have been two World Wars so far, or that after winter comes spring. Facts in episodic memory relate to personal experiences, memories about events, and information about the context of these events, such as location, time, emotions felt at the moment of the event, etc. Skills in procedural memory refer to our performance of cognitive and motor skills. Cognitive skills relate to the functions of the brain; examples of cognitive skills are mental arithmetic or the ability to pay attention. Motor skills relate to performing tasks that require movement of our body's muscles, for example, riding a bike, swimming or waving our hand.

While procedural memory introduces an idea of action, it is, like memories, quantifiable in the form of a skill. One can count skills they can perform, such as playing the piano, roller skating, and even walking or standing, no matter how complex or simple the skill may seem. Thus, again, even skills are prone to literacy metaphor, or more precisely, skills could be seen as quantifiable memories of our bodies, like tracking one's health metrics. Spear and Riccio (1994) concluded with three primary definitions of memory: memory store (location), engram (a thing, memory trace) and mental process (processes of learning, storing and retrieving). While we may think that processing could be this additional missing point in understanding our memory, it is still based on the idea of doing something with the memories that we have collected. All of these stories are based on one metaphor: that we can capture memories.

The literacy metaphor got us far, but it is its dead end. We are on the verge of having what we wanted: infinite data repositories. We need to think and create new metaphors of memory or focus on different aspects of it; the processing view seems to be a likely contender. However, as I just mentioned, the processing view is connected only to the fact that something is stored and then retrieved, like a cup put on the shelf and later taken from there when someone is in need of morning coffee. One important thing about the processing view disappears from the premise of infinite

memory, and this component is learning. As Michaelian (2012) noted: *"if memory is a container, it is a rather leaky one"* (p. 1156); there will always be frustration, and we will always see our memory as something worse than a computer memory. Thus, if we have a body-positivity movement, maybe we need a mind-positivity movement. It is not a new concept. The term "neurodiversity" was coined by Judy Singer (2017) in 1998, and it refers to differences in our brains regarding our mental functions, such as the way we learn and socialise, or the way our mood changes. The idea behind this term is that we are all different; we all fall somewhere along a spectrum of neurological functioning. Hence, our brains are wired differently. The term recognises the variation of human brains and their patterns. "Neurotypical" is a term which describes individuals with typical cognitive abilities, while a "neurodiverse" person would be with atypical developmental abilities, as is the case with people with Autism Spectrum Disorder, Obsessive Compulsive Disorder or Attention Deficit Hyperactivity Disorder. While neurodiversity refers to humans, with the ongoing trend of comparing computing to humans and mimicking our brains, we may add computing to our neurodiversity bucket. However, with the last example, one could think that I am trying to make an argument for and about the fourth industrial revolution. I am not. The future of the industry is not my thesis's focus. I am trying to showcase that there is a tendency to compare AI and technology to humans. It is a different comparison from previous industrial revolutions, in which machines and electronics became more efficient substitutes for human labour. I am not speaking about the labour itself, but rather about the fact that machines started to mimic our mechanical abilities with previous industrial revolutions, and right now, they are supposed to mimic our cognitive skills as well, or at least the outcomes of their functioning mimic our outcomes, for example having a contextual conversation. If we compare AI to humans, we can easily flip this idea and start comparing humans to AI. Furthermore, with Kurzweil's idea of Singularity, in which humans merge with technology, one can start to wonder which functions and abilities and at what level would be neurotypical and which would not. What is neurotypical today may not be tomorrow. This is the danger of a metaphor shaping the metaphor back.

As Sutton (2010) argues, technological information storage differs from our brains. The former's information is unchanged, while our biological memory is an inconstant transformation; it is fluid and reconstructive. Modelling the way brains store information in the way computers do is inapplicable. The crucial variable that makes the difference between human and computer memory is time. Tsai et al. (2013) stated that remembering is not defined through the thing that we want to remember - which is clear and stable - but through the fact that the action of the recall creates this image more memorable. We should focus on the recall itself rather than the sole idea of the information we want to recall. Similarly, Harper et al. (2008) introduced the concept of memory-as-a-resource-for-action, which sees remembering as situated

action contingent on the present (Suchman, 1987). This approach shows that memory is rather for our present selves than our past selves.

Some researchers tried to establish the relationship between our memory, and the present and the future; for example, Peesapati et al. (2010) created Pensieve, whose goal was to remind its users about reminiscing. It could source memory triggers from users online or generate non-personalised text prompts. Isaacs et al. (2013) built an application called Echo, which allowed users not only to record everyday experiences but also to reflect on them, a phenomenon authors called technology-mediated reflection (TMR). Authors were concerned that revisiting negative feelings could interfere with coming to peace with some of their negative memories, according to the adaptive forgetting view. Nevertheless, the authors found that reminding people about what they had felt, improved users' well-being. They further suggested that future work might focus on interventions that could be embedded in such technology, for example, by lifting one's mood by reminding us about previous positive memories when reporting negative feelings. Not long after that, Odom (2015) studied FutureMe. FutureME enables its users to write and prepare digital messages for themselves or others but with the intention of sending them into the far-distant future. Sometimes, people would use FutureMe with the intent of influencing their mood and making themselves happier in the future. However, the findings were not as positive as those of Isaacs and her colleagues. The future desires expressed in the messages were not always fulfilled, and the messages became a disturbing recall of such failures. Getting messages from their loved ones who passed away was also received with mixed emotions. Some participants received digital content that they deeply cherished, but some got troubling messages, which resulted in unpleasant experiences. This shows that our relationship with memories is always changing.

In computers, the information is always the same. Our memory constructs and sees information depending on context and acquired knowledge; it is never the same. Our experience is subjective, but once it gets to the computer, we treat this subjective experience as if it were objective. In this thesis, I argue that we should think about the synergy between our memory and computer storage systems, rather than assuming that one type of memory mimics the other.

1.3.2 The problem of the problems: so what is the problem?

In 1985, Tulving wrote: *"No profound generalisations can be made about memory as a whole"* (p. 385) because memory consists of many different systems, which are all regulated differently. In a similar vein, Baddeley (1978) stated: *"The most fruitful way to extend our understanding of human memory is not to search for broader*

generalisations and 'principles'" (p. 150). Roediger (2008) has agreed. Referencing Jenkins' (1979) tetrahedral model of memory (combination of four factors: subject's characteristics, encoding conditions, retrieval conditions, and events (information)), he argued that all these different variables influence memory performance, and each of them does it in its own specific manner. Thus, the complex nature of memory does not facilitate one general description of it. Toth and Hunt (1999) went even one step further; they proposed a zero-memory system, meaning that memory does not exist, and we should consider memory a complex structure of different processes. Surprenant and Neath (2013) addressed these claims by proposing seven principles of Memory: the cue-driven principle, the encoding-retrieval principle, the cue overload principle, the reconstruction principle, the impurity principle, the relative distinctiveness principle, and the specificity principle. In a nutshell, the authors argue that memory cannot exist without a cue. They introduce these principles to structure thinking about memory and provide a framework on how we can think about different systems of memory as a whole (in this case, as a function), even though it is hard to grasp their similarities and differences. They believed that the term memory needs further generalisation. As I have demonstrated in this section, a unified definition of memory does not exist.

1.3.3 Human Memory

1.3.3.1 Concepts in Psychology

There are two most common systems used to identify Memory (Surprenant and Neath, 2013): the System view (Schacter and Tulving, 1994), and the Processing view (Foster and Jelicic, 1999). The System view explains memory as a structure consisting of five memory systems: Procedural memory, Perceptual Representation System (PRS), Semantic memory, Primary/Working memory, and Episodic memory. The first two, Procedural memory and PRS, are identified as non-declarative (skills) memory, while Semantic, Primary/Working and Episodic are known as declarative (facts) memory. Procedural memory, or tacit knowledge, as mentioned in previous sections, refers to the learned procedure, where knowing "how" rather than "what" matters, as in a famous example of riding a bike. The PRS, on the other hand, refers to priming, our ability to respond to perceptual information that an object or term holds and to do it faster and more accurately each time. Semantic memory is an umbrella term for our general knowledge, which consists of facts, concepts, ideas, as well as beliefs (Tulving, 1983). Our Working memory is a cognitive system with limited storage capacity and limited active time for information. Its primary purpose is to process available information, as well as already stored ones. Episodic memory is a

collection of autobiographical events with associated time, places and other context-related knowledge. It differs from Semantic memory in that it is attached to a specific time and place. The problem with the System view is that there is no unanimity on criteria that actually produce these five systems, as well as this particular number of systems. Thus, we are solely dependent on dissociations between these systems, which makes the only difference between them. These dissociations work as only valid evidence of their division. Another problem arises from developmental data - episodic memory is said to be the "highest" form of our memory as it has supposedly evolved as the last one (Tulving, 1985), but there is evidence that this is not necessarily the case (Rovee-Collier, 1999; Craik, 1983; Craik, 1994). Nevertheless, the system view gives the Psychology field rationalisation behind using data from amnesic patients when studying memory.

The Processing view gives us another way of looking at memory. Rather than focusing on the system and information that it may obtain, it suggests thinking about memory as a set of processes: encoding and retrieval (some researchers also add storage and consolidation). There are three bases of processing: the levels of processing, transfer-appropriate processing, and components of processing. The levels of processing assume that there are different depths of processing - the deeper the level, the better the memorisation. For example, the sound of the word would be classified as shallow processing while recognising the meaning of the word as deep processing. Nevertheless, there are no set criteria for actually assessing the depth of a particular processing. The second basis, transfer-appropriate processing, suggests that processing during encoding will impact processing at retrieval, and the retrieval itself depends on both processes. This means that we need to match appropriate processing when we want to retrieve (test phase processing), to the one we used to encode information (study phase processing) to observe better memory performance. For example, one can write a song that lists all definitions needed for the test at school. Singing this song will help not only with memorisation but also with retrieving these definitions. The last one, components of processing, is a framework that implies that a task consists of components. Different tasks may and may not consist of the same components. Dissociation between tasks can be observed when at least one component between them is different. This idea makes it possible to identify different brain areas associated with components rather than the whole system. Again, the Processing view does not provide any objective guidance on distinguishing between various processes and how to test them. While the System view perfectly blends into amnesic patients' research, the Processing view does not.

While Suprenant and Neath answered the question of how we could "glue" the systems together, they did not address the need to make them distinct from each other. What is the point of "glueing" things that were glued inappropriately in the first place

without detaching them first? Is it also true that memory cannot exist without cues? This view is practical if we want to achieve easier empirical testing, which is the ultimate goal that psychologists usually have when defining memory. On the other hand, if memory is a set of systems that are so distant from each other, so distinct, and they all have different goals to achieve, why do we keep calling them memory? Even more important is why we keep using the same terms when discussing different systems. Even if memory is an umbrella term for different entities, why don‘t we talk about the glue for all these entities? What is the primary goal of memory? Is memory to remember or to forget? Or both? Thinking about these views leads to the question of whether memory is a set of systems, a set of processes - or both. As a matter of fact, this particular question needs one more component to be complete: is memory a set of systems, a set of processes, or a set of functions, as Surprenant and Neath proposed? The Oxford Handbook of Memory (Tulving and Craik, 2000) lists many different meanings of memory: memory as neurocognitive capacity to encode, store, and retrieve information /neurocognitive capability, memory as a hypothetical store in which information is held, memory as information in that store, memory as some property of that information (for example when we talk about ”strength” of the memory trace), memory as componential process of retrieval of that information and memory as an individual's phenomenal awareness of remembering something. That is quite a lot to grasp in only one term. Again, we can see the problem of terms and concepts: we use the term "memory" for all these different ideas while we could instead refer to these distinct properties as memory storage, stored information, memory trace, trace strength, mnemonic information, and recollection. Moreover, it is said that there are three different ways that memory can express itself and manifest its product - behaviour, knowledge, and remembering. Similarly, we can separate procedural (implicit/unconscious) and declarative (explicit/conscious) forms of memory, where procedural refers to our knowledge about how to do something, while declarative refers to facts and events. When it comes to how memory works, rather than what it is or what function it has, we generally divide memory into short-term memory and long-term memory (Atkinson and Shiffrin, 1968). Short–term memory usually contains a small amount of information at one time (around seven pieces), but it can process this information simultaneously. It manifests itself in situations where we need particular information to complete a task. For example, each time I visit my sister, I ask her for the code for her door to open. As I never write it down, I have to keep thinking about it and repeating it to myself until I get to her door and can actually use it. This information never got into my long-term memory as I do not make enough of a conscious effort to transfer this knowledge because I live abroad. I do not visit her as often as I would wish and therefore, I do not use the code often enough to remember it by heart easily. Long-term memory, on the other hand, refers to the storage of information for a long period of time. For

information to transfer from short-term memory into long-term memory, the process of consolidation must take place. Information that is stored in long-term memory has been associated with previous knowledge and/or has been grounded in our memory based on its meaning rather than just its acoustic properties.

Memory does not have a unified definition. It is a conglomerate of functions, systems and processes. However, from all these concepts, views, and approaches emerges the central role of memory that all these views push through: remembering. This function, remembering, is connected to storing memories and information and thinking of memory in terms of the literacy metaphor, in which our memory is a container. The literacy metaphor of human memory and the idea that external memory should mimic human memory led to a fixation on digital memory's storing capabilities. I do not argue that this function should be omitted in favour of other "better" functions or characteristics. I do not say storing is a "good" or "bad" memory function. However, historically, humans focused on this one specific side of memory. Now, being on the verge of an infinite data storage scenario, we can expand our view on memory, giving space for other functions of human memory that could be supported by digital memory.

1.3.3.2 Collective Memory

In this section, I would like to introduce the concept of collective memory, a topic which will be of closer interest in Chapter 6, Disciplined Society scenario. In the previous sections, I have laid out the scholarly debates in psychology relating to memory studies, which often frame memory as a biological premise. Such an outlook on memory brought us to the desire to create external memory that would be "better" than our human memory - an infinite storage that would "remember" everything. This outlook rejected other memory functions and characteristics. However, as Assmann and Czaplicka (1995) note, foundational thinkers in the field of memory studies Warburg and Halbwachs both moved away from reflecting on collective, or social, memory within a biological framework, to considering it within a cultural one. This change is marked by shifting the focus from analysing the ways in which individual memory functions, to thinking of memory as a cultural practice. However, cultural memory does not only concern social groups; it is a concept that strongly relates to an individual as well. Cultural memory is needed for survival, as humans need a method to maintain their societal heritage, values and social norms. The world in which cultural memory would not exist would be a pure chaos in which no one is able to communicate. Nietzsche argues that human beings' genetic programming, unlike other animals', is not enough for this task (Wilson,

2013). Cultural memory seems to be a remedy for this problem. As Assmann and Czaplicka (1995) put it, cultural memory is *"a collective concept for all knowledge that directs behaviour and experience in the interactive framework of a society, and one that obtains through generations in repeated societal practice and initiation"* (p. 126). Assmann and Czaplicka differentiate between two manifestations of collective memory: communicative memory, and cultural memory. Communicative memory describes a type of collective memory based on everyday communication. One of its characteristics is that individuals constantly shift roles during conversations, so first, we become listeners; a moment later, we are talking, creating a dialogue that we usually see as natural. In the face of such communicative disorganisation, each memory embodies the communication between a group of people who share *"a common image of their past"* (p. 127). Later in this thesis, I focus on the family unit as such a group. What Assmann and Czaplicka call communicative memory, Halbwachs (1992; 2007) presents as oral history. As Assmann and Czaplicka (1995) stress, the main characteristic of oral history is its limited temporal horizon, which does not go beyond 80 to 100 years back. They comment:

> *This horizon shifts in direct relation to the passing of time. The communicative memory offers no fixed point which would bind it to the ever-expanding past in the passing of time. Such fixity can only be achieved through a cultural formation and therefore lies outside of informal everyday memory* (Assmann and Czaplicka, 1995, p. 127).

One may ask if such fixity shifts the discourse from memory to the study of history. However, Assmann and Czaplicka disagree, arguing that objectivised culture has the structure of memory. The knowledge that objectivised culture carries is the knowledge that allows the group to form and reproduce its identity. And since this knowledge is a key to "concretion of identity", the assumption that this knowledge belongs to "history" as an objective rather than to "memory" is wrong (Assmann and Czaplicka, 1995).

Nonetheless, this point requires looking at collective memory from another angle - so, let's zoom out now. We do know what collective memory is, but not what it is *not*. Individual memory is often confused with knowledge. Collective memory has a similar problem, as it is often confused with history. As Halbwachs (2007) observed, the term "historical memory" is an oxymoron, which stems from the idea that *"history is a collection of the most notable facts in the memory of man"* (p. 139). However, as he explains, a natural urge to write the history of a person, society or a period comes once those who remember the subject can no longer give their testimony on it, and the subject then becomes too distant. This could seem self-contradictory as we often see celebrity memoirs and movies made about significant or famous individuals while

they are still alive. However, these are not history, but as the name suggests, they are memoirs - an individual story, usually fabricated or embellished to make a profit. It is not an objective account of the piece of history, but rather an exploitation of communicative memory.

According to Halbwachs, there are at least two differences between collective memory and history. The first is connected to their fluidity in time. Collective memory *"is a current of continuous thought whose continuity is not at all artificial, for it retains from the past only what still lives or is capable of living in the consciousness of the groups keeping the memory alive"*. He later explains how it happens: *"When a given period ceases to interest the subsequent period, the same group has not forgotten a part of its past, because in reality, there are two successive groups, one following another"* (Halbwachs, 2007, p. 140). Halbwachs compares history to the way a tragedy is divided into several acts. According to this view, people transform from one period to another. This means that what was in the previous period loses importance in the new one. On the other hand, collective memory works more like a plot itself, which carries the same characters, and their feelings are in constant movement as they develop. The second way we can distinguish history from collective memory is that the latter is multiple while the former is only singular. A historian aims to work towards a single, unified and objective version of past events, so although different historians frame it somewhat differently, as a cohort of scholars, historians are seeking a single, objectively accurate version of history. However, there are several collective memories that, in their essence, are multiple. According to Halbwachs, historians always play the role of impartial observers. As Halbwachs (2007) notes: "*the historian can make such judgements because he is not located within the viewpoint of any genuine and living groups of past or present"* (p. 143). Historians study the past, rather than live through it.

The work of historians is to create as detailed and precise a Universal Library as possible, with annotations and labels; the more details, the more precise the library a historian can create. It is not, however, cleaning the Universal Library of its false and only seemingly true pieces. Historians would find them as important as other details, labelling them as a part of history, perhaps naming them false when putting them into the context with another, but not false, in their own right to exist. Halbwachs (2007) further points out:

> *History can be represented as the universal memory of the human species. But there is no universal memory. Every collective memory requires the support of a group delimited in space and time. The totality of past events can be put together in a single record only by separating them from the memory of the groups who preserved them (. . .) This procedure*

> *no longer entails restoring them to lifelike reality but requires relocating them within the frameworks with which history organises events. (...) That is, history is interested primarily in differences and disregards the resemblances without which there would have been no memory, since the only facts remembered are those having the common trait of belonging to the same consciousness* (p. 143).

In contrast to the work of historians, cultural memory studies emphasise forgetting and its relation to memory more than Psychology studies (more detailed comparison between Memory and History in Table 1.1). In Pierre Nora's (2007) words: *"We speak so much of memory because there is so little of it left"* (p. 144). This is something that computer science seems to have forgotten in its design of external memory. It focuses so much on remembering, that it forgets that this focus on remembering is because forgetting exists. However, rather than welcoming forgetting as a needed component, it treats it as a traumatic event that needs to be swept under the rug or introduced as a small bin icon in the corner of our desktops.

Author	**Memory**	**History**
Nora	Life; subject to evolution	Reconstruction of what is no longer
Nora	Present	Past
Nora	Nourishes recollection	Analytical
Nora	Multiple; thus personal	Singular; thus no one's and everyone's
Nora	Takes root in concrete, in spaces, gestures, images, objects etc.	Relations between things; temporal continuities
Nora	Absolute	Relative
Nora	Subjective	Objective
Halbwachs	Focused on Similarities	Focused on Differences

Table 1.1: Comparison of Memory and History according to Nora (2007) and Halbwachs (2007).

Throughout this thesis, I argue that forgetting is an important component of memory, and our new relationship with the infinite external memory may shed a new light on its role. I will explore the role of forgetting closer in my speculative future scenarios.

1.3.4 Computer Memory

Daniel L. Schacter (1999) describes the seven sins of memory in his book of the same title. Almost all sins are associated with a failure of remembering (except one related to the pathological failure of forgetting). Logically, then, researchers focused on how external memory could reduce forgetting (Della Sala, 2010). In fact, within the situated cognition framework, it is believed that external memory could be thought of as the extension of our mind (Clark, 2010). It is even believed that computer data storage is better than our "organic" memory, as it is free of the problems related to forgetting. In his essay "As We May Think", Vannevar Bush (1945) introduced the concept of the Memex, the infinite storage of the acquired knowledge of the users and the world. Furthermore, in a similar manner, Malone (2012) talked about data storage as storage of knowledge. In his book *The Singularity Is Near – When Humans Transcend Biology*, Ray Kurzweil (2006) describes the future where human intelligence becomes weaker than machine intelligence. The Singularity is the point at which humans and machines will merge, and thus they will in fact "transcend biology". Infinite data storage seems to be the answer for our fallible memory.

However, long before computer scientists, Socrates critiqued one of the means of external memory of his times (Hackforth, 1972). He believed that writing would: *"produce forgetfulness in the minds of those who learn to use it, because they will not practice their memory"* (*Phaedrus* 14, 275a-275b). Indeed, the "Google effect", also called "digital amnesia", is the phenomenon of forgetting information which is easily provided by online search engines (Tsai et al., 2013). Andy Clark (1997) noted: *"our brains make the world smart so that we can be dumb in peace"* (p. 180). However, Tsai et al. (2013) hypothesised that *"the embodiment of system's limited capacity could encourage humans to take the responsibility to remembering"*. The way we design these systems creates the trajectory for our human memory.

One view assumes that external memory is "remembering", and the other one assumes that external memory is "forgetting". Both have something in common, though; they see forgetting as a malfunction of human memory. However, the functional approach to memory acknowledges forgetting as an equal component of memory as remembering (Conway, 2005). Therefore, to remember, we need to forget just as much as we need to remember to forget. Indeed, as the author of *The Seven Sins* noted, these sins should not be looked at as flaws that our memory has but as characteristics which are more than necessary for our memory to create meaning out of our world (Schacter, 1999). Thus, we should not fall into the trap of rejecting our organic memory and writing it off so quickly.

It is not clear how users will make this natural trade-off in infinite data storage. The

management of an infinite amount of data will be out of reach for the user without additional tools, tactics and solutions in place. One such solution could be the usage of Artificial Intelligence (AI), which becomes more common in our lives (e.g. Daniele and Song, 2019; LaRosa and Danks, 2018). However, ensuring the safety of AI usage in our memories is tricky; people often consider AI models' black boxes. The value alignment problem concerns the problem of increasing the autonomy of AI systems, which could lead to harmful behaviours for humans unless we ensure that AI systems' values align with human values (Peterson, 2019). Simultaneously, techno-dependency becomes more prominent (Harper et al., 2008b). People believe that data is reliable (Lupton, 2014), or as Boyd and Crawford (2012) put it, large data sets give us an aura of "truth, objectivity and accuracy". However, such trust in the data set, which we are not able to verify by ourselves, could be more of a fatalistic acceptance rather than genuine trust, or as Wynne called it, "as if" trust (Wynne, 2006). In fact, Lisanne Bainbridge (1983), in her "Ironies of Automation", painted a quite more worrying scenario, in which *"the designer's view of the human operator may be that the operator is unreliable and inefficient, so should be eliminated from the system"* (p. 775). The trust of users and users themselves are not an inconvenience; they are foundation for the technological advancements coming to our lives.

In his book, *The Sciences of the Artificial*, Simon Herbert (1996) indeed compares human long-term memory to a library, describing it as being of unlimited size (p. 88). On the other hand, Lakoff and Johnson (1980) identify the metaphor in which "the mind is a machine". This explains why it is so easy for us to think of computers as operators of our memory. Moreover, the mind works as a container metaphor for thoughts, ideas and memories. Therefore, computers have become the perfect reference for these metaphors, as they work in "metaphorical coherence" (Lakoff and Johnson, 1980, p. 41). Moreover, computers, as storage of our memory, serve as ontological metaphors. Computers *remember and forget,* and they *remind* us of things. Referring to memory as an entity *"allows us to refer to it, quantify it, identify a particular aspect of it, see it as a cause, act with respect to it, and perhaps'* - my personal favourite - *'even believe that we understand it"* (Lakoff and Johnson, 1980, p. 26). However, who would be able to manage infinite external memory?

This leads me to the introduction of two types of Artificial Intelligence: Symbolic and Non-symbolic. Symbolic Artificial Intelligence is based on the top-down approach, where software works as the librarian, who looks through all the books it has to find the answer to a specific problem or question. It is based on the if-then logic, which, while quite assuring and fast rewarding in its uncomplex nature, just like typing the question to Google search box and receiving an answer, it is as Skene (2019) points out, inadequate in our dynamic and changing world (p. 12). It would appear that typing "how to live" in Google's search box could not be the best strategy for finding

an answer to that question. The other type, Non-symbolic AI, is supposed to work just like a human nervous system. In this case, the library metaphor becomes less powerful, as learning comes not from the amount of knowledge you gather but from the experience you get. We can never really know how people think, as is the case for neural networks and machine learning, which are effectively another black box. After all, as Skene (2019) summarised: *"Common sense is not easily programmed"* (p. 17). The premise of non-symbolic data and the Internet of Things (devices that can gather data, which are constantly connected to the Internet [Skene, 2019]) is the free flow of data, which then each AI unit can pick up and process means we are not able to fully understand how it produced the output we have received. Moreover, we are dependent on the data sets that we have and therefore rely on past experience.

Usually, when we think about data storage, we think about our computers. We have more or less an idea of where we can find the documents, pictures or an application we need to use. Even if we do not know it, we can always write it down in the "search" toolbar and quickly find it. It is called a database on a computer, which holds "structured data". The next level of the database would be a data warehouse. Data warehousing is characterised by collecting and managing data from different sources and transforming this data into meaningful information. Next, this information could be used to act upon it. It is a system that supports decision-making and enhances the organisation's performance. The next level of the database is the data lake. A data lake is a large storage repository which holds data in its raw form. For example, you can place data that you temporarily do not need but may use later. However, in the EU, you can only collect data for legitimate reasons (European Parliament and Council of the European Union, 2016). Nonetheless, the capacity of databases grows, and with it, so does the accumulated data we create every time we use digital devices.

1.3.5 Human vs/and Computer Memory

While we do not call our brain a memory, computer memory refers to a physical object, a device where we store our data. Nevertheless, quite confusingly, it also refers to the way data is being stored. There are two types of computer memory: volatile and non-volatile. Volatile memory contains information for a shorter period of time and only while the computer still has its power. If the device loses its power, it also loses information that was stored in volatile memory. An example of such memory is Random-Access memory (RAM). On the other hand, non-volatile memory has a longer ability to store data, even if the computer loses its power. Examples of non-volatile memory are Erasable Programmable Read-Only memory, and a hard drive. In other words, while I am working on this document, changes that I am making are stored in volatile memory, RAM. To ensure I can still work on the same version tomorrow, I

will need to save it to non-volatile memory; on the hard drive. This sounds familiar, right? It is practically a replicated idea of our short-term and long-term memory. It seems that there is no consensus on what memory is, and the confusion starts to grow as we add more and more meanings to its term. Thus, I would like to switch my focus from presenting more terms and adding even more confusion to my thesis by presenting more terms to finally answer the big question: What is our relationship with external memory? People have created external memory. Therefore, we perceive it to be an extension of our own memory, something that helps us remember more, and better. Ultimately, we created it for our purposes, so there is nothing strange about the fact that it resembles our own memory. We can see many similarities and analogies between them, which I will try to explore in the following paragraphs.

Some say that external memory is better than our own memory: the ease of use that it provides, fast recollection, and clarity are things that we struggle with in our own brains. In our attempt to build something better and more accessible than our own memory, focusing on things that we were so eager to advance, we could actually not recreate things that were more extraordinary about our memory than just its storing capabilities. There is only one little thing that we use on our computers, smartphones and other devices that is truly genius, which we luckily share with our internal memory - although not in its full and complex form. It is this little icon on everybody's desktop, usually in one of the corners – a bin. Malone (2012) concludes his book, *The Guardian of All Things: The Epic Story of Human Memory*, paraphrasing Cicero: *"Memory is the guardian of all things. But in the end, we are the guardians of memory"* (p. 270). Humans have proved to develop advanced and sophisticated ways to store memory. Thanks to the technologies that we came up with, we have revolutionised our communication and, therefore, our lives. There is a conviction that as we could store more, we could become more powerful. People are not able to replicate the whole body of science in every single generation. We need knowledge to generate more knowledge. It is true not only on the societal level but also on our individual level. We seem to remember better if we have some prior knowledge we can attach information to. However, Malone dismisses the cradle of memory, our brain. He states that the only way the history of memory can end is by connecting advanced technology with the not-so-advanced human brain. The human brain is not adapted to today's information age; there is no doubt about that. The question is, though, whether it is good or bad. Or maybe it is neither? As Ella Fitzgerald and Louis Armstrong sang, *"They can't take that [memories] away from me"*. Indeed, our internalised memories are extremely hard to be taken away by someone unless our memory takes them away itself. Memories stored in any external memory are quite easy to be taken away. It is one of the many things we should be thinking about related to this merge. Computer memory and human memory have some similarities, but they differ quite a lot; they differ in their similarities, which I will attempt to

explain in the following paragraphs.

They are called the same; they are both a memory because they both refer to their abilities as storage of information. Here, we can see our first difference in this similarity; while human memory does share storing abilities with computer memory, it differs in how the information is being stored, what information is being stored and how we retrieve it. Our storage arrangement, or at least our understanding of it, is quite similar, and we can easily see a connection between short-term and long-term memory and volatile and non-volatile memory. Nevertheless, because of the nonlinear associative nature of the human brain, we cannot search or browse our memories in an orderly way like with computers. Moreover, our brain remembers things in context, which is the opposite to computers, which store only isolated facts. Also, internal memory is time-sensitive simply because we, as human beings, are dependent on time. In computers, our memory does not change, while in our mind, memory does evolve as attention and emotions affect memory. While data do not *fade* in computers, we can feel like our memories *do*. Nevertheless, even if we think we do not remember something, it is said that it is only an illusion, evidence that we are not able to use it properly. Our brain's memory capacity could be infinitive, which means that there are probably no, or limited, constraints on remembering everything that we are exposed to, whether it is knowledge, data, or our personal experiences (Foer, 2011). Furthermore, it is believed that we actually store all of this information; we just do not have access to every single piece of information. Here, we can observe another difference in similarity – we do strive to gather more and more information, whether it is in our internal or external memory, although the encoding process is different, and its consequences are different too. In external memory, "the more, the better" refers to creating bigger storage, which can contain a larger amount of information. This is not the case when it comes to our personal memory. While computers' memories can differ in their capacity, human brains do not – whether we are mental athletes or we have an average memory, our brains are completely the same; there is nothing special about the memory storage that some people could or could not have. What mental athletes do differently than normal people is that they activate different circuitry in their brains when memorising information (Foer, 2011). Moreover, the brain's neuroplasticity enables it to adapt to different situations. While the brain is mutable, a single computer is not. Our memory has many different dimensions, while a computer's memory does not. There is a phenomenon we call collective memory (which I presented earlier). We can share knowledge about the same facts and memories about the same thing with different people. However, this memory or information differs from person to person; it is never 100% the same, whether it is about what a person memorised, or how, why, and what kind of emotions are attached to this memory. Memories are not objective, as they are never separated from other information and memories that a person has acquired throughout their life.

On the flip side, computers have the same repertoire of memories once we synchronise them. We will not find, not even the slightest change in data that we transfer from one computer to another.

The question is – why does technology differ from our natural memory so much if it is a product of human beings, which attempts to mimic a human brain? Were we actually trying to make it different, or could we just not aspire to the complexity of our prototype? The answer is probably somewhere in between. Building artificial memory was a crucial milestone in our history – we needed new repositories of information in order to build civilisation. We definitely made some adjustments to external memory, which we could not do to our natural memory. For example, we started to number pages and use indexes in books to find relevant information faster - something that cannot be done with memories in our brains, as the brain has its own nonlinear index system. We can easily transfer data from RAM to hardware - again, something that we have trouble doing when it comes to our internal memory. "Transferring" memories from short to long-term memory requires massive focus, time and/or brain power. Moreover, external memory is definitely more predictable: we choose what we store there (at least for now), which is not always the case with our personal memory. However, returning to the question of what memory is, is external memory a memory? We do not necessarily call our drawers memory, even though they are full of different data that we want to save for some reason. We may even have a very sophisticated system of organising things in our drawers, categorising documents in different colour cases and getting rid of things we do not need anymore, every Tuesday. Still, it does not make a drawer a memory. Why, then, is computer memory a memory? How is it different from a drawer or even a whole cupboard? Socrates believed that writing is only a cue for memory. However, as mentioned before, Surprenant and Neath (2013) argue that memory cannot exist without cues. Following this way of thinking, external memory would be the ultimate memory, with cues associated with only one type of information, which would be an organised catalogue of memories – the holy grail of the memory. If we think of humans as a centre in the debate on what memory is and what it is not, and if we think of everything we create and store outside of our brains as cues for our memory, all of this makes the term external memory simply not valid. If we then do not think of putting data to a computer as an extension of our memory and equivalent for remembering, then what is it? What should it be called? I argue that this is something the complete opposite of remembering – it is forgetting. In fact, it is a very convenient way of forgetting. What is forgetting, then? As mentioned before, our brains have infinite capacity, which means that we can store all the information we have been exposed to. Nevertheless, it is not always so simple to retrieve all the information we want, when we want. Again, it is all due to the non-spatial nature of our brain. Forgetting, then, is the inability to retrieve information from our memory, which can happen for many reasons. The thing is,

forgetting is a truly important component of our memory. Without it, we would be just like machines, not being able to make sense of our world. Forgetting is the key difference between our memory and any memory technology. Forgetting is what makes us human beings. Even empirical findings seem to agree with this concept. The biggest amount of data about memory we have is not from remembering more, but from remembering *less* - from patients with amnesia. What are the benefits of forgetting, though? There certainly must be some if we have been engaging in massive forgetfulness for the last thousands of years by creating new external repositories. We may simply be victims of the Jevons paradox (or the Jevons effect). Technological progress increased our efficiency in building repositories for information, but it also increased demand for storing technologies and their usage. It is true that this way, we get rid of the problem of the cue overload principle (which states that cues can become associated with more items/too much information, which eventually makes it hard to retrieve an item that we want; Surprenant and Neath, 2013). Nevertheless, what about the overload of cues? Would or would not be this a problem? The quote from Malone's (2012) book: *"Memory is the guardian of all things. But in the end, we are the guardians of memory"* (p. 270) does not seem right. We are the ones who desperately need memory, while memory really does not need us. In reality, we are the slaves of memory rather than its guardians. Our memory is a system which enables us to think, draw conclusions, and create something more from available data than its face value. While it is true that when it comes to our external memory, we can control what we forget; in human memory, we do not have such power. Thus, we have some power over what we want to remember but very little over what we do not want to remember – which is the real essence of the memory. Without human beings, the word memory has no meaning – it does not matter whether it exists or not. It does make a difference for us, though, whether memory exists or not. While we may enjoy being fake guardians of memory, by choosing what we can remember, that may soon change.

In external memory, remembering is the opposite of forgetting, and forgetting is the opposite of remembering. Moreover, this dualism of memory also manifests itself in the fact that remembering and forgetting are two separate routes; thus, we may forget and remember the same information at the same time. What I mean by this is the function that external memory serves; we remember because it is out there, and we forget because of the same reason; it is out there, and we do not have to remember it anymore. In fact, technology not only changes our patterns of behaviours and decisions that we make in our world, but it can also change our brains (Firth et al., 2019). For example, we may be losing the ability to concentrate on a single task. There may also be changes in what we remember as we have all the information on the Internet and do not need to store all information anymore on our personal external memory. This will actually lead to changes in our social life. Transactive

memory, a term coined by Daniel Wegner in 1985, is a mechanism through which groups encode, store and retrieve knowledge; in other words, it is a shared store of knowledge. It relates to the process of outsourcing information to other individuals, such as family members. Thus, we do not have to remember all the information, only the source of it (Wegner, 1987). Transactive memory theory is a good explanation of my reluctance to remember my sister's door code. Going further, Hofstadter, in his 2007 book *I am a Strange Loop*, argues that the human *I* is not connected to only one brain but is distributed over many of them. Therefore, infinite data storage will not have consequences only in the digital world. It will also have consequences in the physical world. And if our brains are changing, we may face a world in which algorithms will "take care" of making sense for us. If they are making sense, what will sense look like? They will also be able to evaluate us, which I discuss in the Continued Economic Growth scenario, Chapter 3, based on examples such as the Polish Taxi app iTaxi, as well as Uber's "Rides of Glory" calculations. As Viktor Mayer-Schönberger (2009) noted: *"The chilling effect of perfect memory alters our behaviour"* (p. 13). Obviously, if someone is watching you, you seem to behave differently. You may be very cautious about what you say or how you are doing particular things, how often, and what you are not doing. In Experimental Psychology, such behaviour change which is related to being observed and evaluated, is called The Hawthorne Effect. This is a topic raised in many different cultural pieces such as Orwell's book *1984* or the movie *The Truman Show*, but it has its examples in real life as well, for instance, the case of the company Quantum CX, which counted employees' smiles when interacting with customers, which I also discuss in the Chapter 3, Continued Economic Growth scenario.

I would like to, however, finish this chapter on a more positive note. The multifaceted character of memory and the future scenario of infinite data storage gives us the plurality of possible visions and ways to create and interact with data in the future. Until now, we have limited ourselves to one specific vision: memory as a container, the magic box, that gets smaller in physical terms but bigger in digital terms. It is time to use our knowledge about memory and, most of all, imagination, to imagine these new relationships we could design for ourselves and our external memory. Not only that; the infinite data storage scenarios can teach us something new about our memory. In my thesis, I explore these two different kinds of knowledge: the one that waters the sprouting of a future scenario, and the knowledge that I gained through creating, shaping and watching how these futures blossom and come to life as Speculative Designs. The following chapter focuses on the methodology I used in this research. It presents the latter type of knowledge in more detail, and justifies further my research approach. First however, below I present the outline of my thesis.

1.4 Outline

In this section, I introduce the flow of my thesis.

Chapter 2: Methods

This chapter explains the methodological underpinnings of my work. The first part situates my thesis within the fields of Design Fiction, Speculative Design methodologies and Research through Design. Since the main contribution of RtD and my thesis is conceptual work, I contextualise my methodological approach with reference to the ongoing debates regarding the differences between design, art and science.

Chapter 3: Continued Growth – Future 1

This chapter first describes the Continued Growth Future and focus on the digital economy. In this vision, corporations are in the centre because only large companies can benefit from the digital dirt we create. I argue that, in such cognitive capitalism, it is much easier to dominate the market because we are not dealing with the effect of scale, but with network effects. Despite many controversial events surrounding big companies such as Uber, Google and Facebook related to data leaks, data breaches and data abuses, and putting instruments like General Data Protection Regulations (GDPR) in Europe in place, data practices are still far from fair. This future illustrates how the tension between big companies and public infrastructures compete for data while users have little control over their data. Users will see their data as dirt or transactional goods. Only the wealthiest will be able to purchase tools such as frAInd, one of the Speculative Artefacts that will be able to extract meaning out of the data dirt. Those without such an option, will either sell their data, or donate it.

Moreover, in this future, we capture everything; thus, one's behaviour is easily recorded. Such cases can be seen in present-day cases concerning, for example, Uber, iTaxi (Poland), and recording smiles of employees (Japan, China, Poland). I draw out this tension through speculative leaflets encouraging people to donate or sell their data to companies and organisations. I explore how we will keep our digital hygiene now in cognitive capitalism, using the REWIND2 artefact and the short story I created. The Newspaper, another Speculative Artefact, illustrates the social understanding of the Memory and showcase other artefacts.

I identify this concentration on collecting personal data by external entities as an additional heterotopia, where the Private Real sphere overlaps with the Public Virtual sphere, using Akmal's and Coulton's work about heterotopias and digital spaces. I

draw on philosopher Jacques Ellul's idea of *Technique* to contextualise further my Speculative Artefacts in the Economic Growth Scenario.

Chapter 4: Transformation / Transformational Society – Future 2

This chapter focuses on the Transformation future, in which the societal focus is technology. I explore how forgetting, as one of the functions of memory, can change its properties due to the infinite data storage scenario. Using the basis of Akmal's and Coulton's work about heterotopias and digital spaces, I explore how the Speculative Artefact, the Horcrux Ear, the Speculative Artefact, creates new, additional heterotopia, where Public Real sphere overlaps with Private Virtual sphere. This provides me with the foundation to discuss IoT and its possible consequences for our data by exploring the GDPR artefact and the right to forget. Moreover, I will discuss the idea of ephemeral technologies (Bannon, 2006), and how we may see the "new kind of ephemeral" due to infinite data storage.

Forgetting is often described as an undesirable sin of our memory, depicted as a completely uncontrollable action. If one desires to forget, it is to erase unimportant or unpleasant information. Moreover, the general mental model of memory suggests that we first remember and lastly forget. Thus, the linear memory model suggests a one-way dynamic from remembering to forgetting. This mental model of memory has been projected into the digital space design, where one remembers by acquiring data and forgets by deleting it. However, the advent of infinite data storage scenarios provides new opportunities to re-establish how we forget and remember using data repositories. I discuss a possible paradigm shift: how forgetting a memory can help remembering in longer terms.

Chapter 5: Collapse - Future 3

This chapter introduces Dator's second Future, Collapse. This chapter explores the future in which people believe AI is a new god. It is not a new idea. There have already been attempts to create such churches; for example, the Way of the Future Church, established by Anthony Levandowski. It was closed in 2021. The artefacts I created to explore this world are known as AIMighty and the Mnemosyne Machine. This future scenario is not based on the fact that AI will become Strong AI. It is based on the idea that people may make a pragmatic choice to join the church since its following will grow and that people need to believe in something. The AI God does not have to come into existence to produce real consequences. It is enough that we believe it. Here, I will return to the idea of different AI and discuss it in greater depth, building on from my development in the introduction.

In this chapter, I also introduce the notion of Affective memory. The backbone of this section is Argangeli's and Dokic's chapter in *New Directions in the Philosophy of Memory* named "Affective Memory, A little help from our imagination" (Arcangeli and Dokic, 2018; in Michaelian, Debus, and Perrin, 2018). As the authors suggest, there are three different internal perspectives of our memories: character, narrator, and author. The Mnemosyne Machine takes on the narrator's role, creating a new proof for the existence of Affective memories. Moreover, this chapter discusses Mental Time Travel and imagination as features of memory, bringing memory into conversation with factual and fictional stories. I also present another example of the ephemeral technology; a Speculative Artefact called Snowflake.

Both speculations, AIMighty and Mnemosyne Machine, are presented in the form of a speculative scientific article dubbed a Research Article, in which Interviewees will talk about their experience with AIMighty. Then, as in the conventional Human-Computer Interaction article, researchers create a Mnemosyne Machine as an alternative and response to interviewees' claims about AIMighty.

Chapter 6: Disciplined Society - Future 4

This chapter explores the Disciplined Society Future, in which society believes that "Continued growth" is no longer desirable; thus, they switch their focus to preserve their values and turn to a more sustainable future. I will present the Speculative Artefact called the Tiled Stove. In this speculative future, the Tiled Stoves will work as a personal "data center", which could also work as a heater for the house. This chapter will deal with the energy aspect of computer memory. It will also reflect on the tangible effect of data, privacy, narratives and collective memory. Here, I expand on the environmental aspect of data storage. I discuss the possible scenario in which energy could shape the use of our infinite data storage. I will also shed light on the privacy problems in centralising data. The topic of energy and personal privacy will be the underlying causes of Tiled Stove artefact.

Chapter 7: Discussion and Conclusion

Lastly, I conclude my findings. I use the Annotated Portfolio Method to summarise my findings and to present the themes that have emerged from my Speculative Artefacts. This method has allowed me to create connections between my artefacts related to memory. The themes I discuss include the acts of memorying (actions related to memory), the sense of self, time and space, and values. Based on these themes, I present a list of questions that could work as a framework for future memory technology designers. These questions aim to be a roadmap for future designers to guide them in creating technology that could highlight and serve the development of a desirable aspect of memory.

Chapter 2

Methods

2.1 Design Fiction

Do we wait then, hoping for the best and see what our future holds? After all, the state of the world has improved for many humans, and technological progress has played a significant role in this change. Bostrom (2019) argues that while the world has become a better place for humans, it is not because we are careful about our technological developments. Using the urn problem, he demonstrates how we were rather lucky than thoughtful about human creativity in the technological sphere. The urn contains balls which are white (beneficial), black (destructive) and some in various shades of grey. Each represents one technological invention or idea. Pulling out one ball represents bringing an invention to life. Bostrom believed that throughout human history, most balls people pulled out were white or grey, but black balls may still be waiting to be withdrawn from the urn.

While it is still impossible to travel in time and see the results of different technological advances in the future, we can always speculate - for example, through Design Fiction. I am far from implying that speculation is equivalent to answers. However, as Stead (2016) puts it: *"Design fictions should (. . .) not be seen as an attempt to predict the future or design a specific 'product solution' but as a strategy for opening up inclusive debate about how and why futures are designed and what they might mean"* (p. 3051). But what is Design Fiction? It is a world building activity (Bleecker et al., 2022; Stead, 2016) and *"collections of artefacts that, when viewed together, build a fictional world. The artificially built world is a prototyping platform for the very designs that define it, meanwhile those designs reciprocate in kind and prototype the world"* (Coulton et al., 2017, p. 15; in Stead, 2016). This approach proved to be helpful when applied to various settings and problems, including reimagining our relationship with everyday

objects, such as toasters, in a sustainable manner (Stead, 2016) or in the future of medicine (Stead, Coulton, and Lindley, 2018).

Speculating about the future is a challenging process. It is hard to imagine a future that is not based on a present moment, i.e., an imagined future is usually filled with present concern (Dator, 2009). Moreover, there is a social prejudice regarding the future. Barbara Adam (2010) noticed the outlook on the future changed from predestined fate, or God's gift, to a commodity that people can control. With the advent of calendars and clocks, we have moved to times when we could synchronise on a societal level. Nonetheless, the power over the societal future, rather than our own calendars, seems to diminish from citizens' hands as large companies push for their visions of the future. Coulton and Lindley (2017) call these visions *Vapourworlds*. The name comes from the term *Vapourware*, which describes software or hardware that companies announce and market but do not produce (Atkinson, 2013). These technological advancements that never come into existence often work as the public presentation of companies' vision of the "better" future achieved through their products (Coulton and Lindley, 2017). Slogans such as "the future is now" intend to create a sense of immediacy. However, the sense of immediacy can backfire and transform into a sense of doom. This is because, with ongoing massive technological progress, we might feel we need technological literacy and futures literacy to have a chance to participate in the discussion or creation of the future, which apparently is happening now. Thus, it may be believed that the future is uncontrollable and unpredictable. It is beautifully depicted in a famous song written by Jay Livingston and Ray Evans: *"Que sera, sera, whatever will be, will be. The future is not ours to see"* or in the widely known saying *"Man plans and God laughs"*. Such outlooks are limiting and tie our hands, giving no agency over the future. Yet, in his 2009 essay, Dator wrote:

> *Futures studies is not about correctly predicting The Future. It is about understanding the varieties and sources of different images of the future, and of coming to see that futures studies does not study 'the future', but rather, among other things, studies 'images of the future'* (p. 6).

As I explained in the Chapter 1, Introduction, Dator created four alternative futures to represent generic images of the future: Continual Economic Growth, Collapse, Discipline, and Transformation. Continual economic growth is a future image in which economic growth is a main social driver for change; the Collapse future constitutes a disruption of some kind, possibly social or environmental; the Discipline scenario rejects economic growth and consumerism and refocuses on deeper meaning and sustainability; Transformation future's centre of attention is technological progress. These images differ from each other, but each may have many variations of the future

within itself. All four types of future have black, white, and grey balls in their urns and depending on which ones are pulled out, they would create the world within them.

I incorporate the notion of Design Fiction which does not aim to solve problems nor give definite answers concerning infinite data storage. Still, it focuses on exploring future scenarios and works as a starting point for a conversation around this topic (Stead, 2016). In my thesis, I present my artefacts visually, in the form of photos and videos, and one of the artefacts, the Mnemosyne Machine, in the form of an interactive game. As Coulton and Lindley (2017) noted:

> *In Design Fiction, the forms these artefacts take, the media used to create them, and whether they are physical, digital or a hybrid, are all flexible. If the world that a selection of Design Fiction artefacts collectively create is viewed as a single entity, then each artefact may be viewed as an 'entry point' that represents that world viewed from different scales* (p. S4635).

Moreover, Research through Design practice, which I will explain later in this chapter, was an essential factor in the final form of my artefacts, as I focused on the exploratory practice rather than on a specific audience. When appropriate, I use prose fiction, short stories and a speculative research paper, to bring artefacts to life and illustrate how these worlds could look. I would like to stop here for a second, as I believe I owe some explanation to the reader as to why in some cases I chose to use a narrative representation of my designs. Yes, Design Fiction does not necessarily have a purpose of telling the story but rather creates the world in which the story can happen. Coulton et al. (2017) separate world-building activity from narrative and storytelling processes. Thus, the creative writing pieces that I have written are informed by artefacts rather than the other way around.

There is an important distinction between prototypes and "diegetic prototypes". The former represents a concept, while the latter aims to explain how prototypes should or could be understood using fiction through *"dialogue, plot rationalisations, character interactions and narrative structures"* (Kirby, 2010, p. 41). Furthermore, Bleecker (2009) critiques prototypes as *"they lack a visionary story about what makes them conversant on important matters-of-concern"* (p. 85). Using brief narrative vignettes, and a speculative research paper, creative writing pieces, I contextualise my Speculative Designs and help the reader understand how the artefacts could be used, by producing diegetic prototypes (things that exist in a world where they make sense) to enhance the probability of "Ifs" by storytelling. For example, one of the founding fathers of Design Fiction is Bruce Sterling is known for his science fiction work, including *The Difference Engine*, written with William Gibson. *The Difference Engine* presents a world in which the Industrial Revolution happens simultaneously with the Digital Revolution (Gibson and Sterling, 2014). It may seem an impossible

scenario for some, after all, the Industrial Revolution happened at the turn of the XVIII and XIX centuries, and one hundred years later, the Digital Revolution began in the mid XX century. However, it is said that if Charles Babbage, the mathematician and inventor living at the time of the Industrial Revolution, had been able to fund the making of the "analytical engine", he could have succeeded in developing a computer that he and Ada Lovelace (née Byron), mathematician and poet, envisioned. Then, the scenario in which the Digital and Industrial Revolutions happen simultaneously could have happened. There are, of course, "Ifs" in this story, but these "Ifs" are plausible. In another of his books, this time non-fiction, *Shaping Things*, Sterling (2005) defines "Design Fiction", a term coined by Bleecker in a 2009 short essay, as more plausible than any other science fiction. The narrative aspect of my snippets aims to reduce the "what if" scepticism that may linger on my diegetic prototypes.

However, narrative vignettes differ from the speculative research paper. The narrative vignettes are *about* the worlds and that world's diegetic prototypes, but the Research Article is a diegetic prototype, i.e. it is *from* the speculative world. This is because the narrative vignettes do, in fact, showcase the possible usage of Speculative Artefacts in a story without being a part of the world in which the story happens. The speculative Research Article also presents other Speculative Designs, simultaneously being one of the building blocks of the world(s) in which these artefacts could exist. Thus, the speculative Research Article is a Speculative Design, as much as the artefacts it describes. Thus, it belongs to Design Fiction practice, as it belongs to world-building activity.

Above, I introduced a new term, Speculative Design, which I explain in the following section.

2.1.1 Speculative Design

As mentioned in the previous section, I use Dator's (2009) worlds to present four different future scenarios of infinite data storage. I presented Design Fiction, a world-building activity I used to create these worlds. I also use Stead et al.'s (2016) definition, in which the authors stated that Design Fiction is the collection of artefacts that create the world. In my thesis, I build these worlds through artefacts called Speculative Designs. According to Auger (2013), the practice of Design Fiction and Speculative Design overlap, as both are artefact-focused. In both practices, these artefacts are not meant to be commercial products. Thus, they are not constrained by the commercial sector. Auger argued that the choice of words between Design Fiction, Speculative Design or Design Probe may not be as important for practitioners as for those who are unfamiliar with these practices. As he explains:

> *the physical object presented as a 'Design Fiction' may be identical to a 'Speculative Design' object or a 'Design Probe', and so on; however, the use of the modifier gives the cultural object a substantially different value. For example, the word 'fiction' before design immediately informs the viewer that the object is not real; 'probes' infer that the object is part of an investigation; and both 'discursive' and 'critical' reveal the intentions of the object as an instigator of debate or philosophical analysis. These terms act to dislocate the object from everyday life, exposing their fictional or academic status* (Auger, 2013, p. 2).

To avoid further misconceptions, I would like to explain how I use these notions. I use Speculative Designs as the building blocks of my Design Fictions. Thus, Speculative Designs, are my separate artefacts, while Design Fictions are the worlds in which they exist and which they build. Nonetheless, I treat Design Fiction as a particular form of Speculative Design, and I use the terms interchangeably throughout the thesis.

Speculations on memory devices in the settings of infinite data storage are not new and can be seen in past and present cultural artefacts. For example, in 1904, Kurd Laßwitz (2010) introduced the concept of the Universal Library. This library would collect everything, all books that have been written but also books that will be written, might be written, and their counterfeits; thus, infinity turns out to be nonsensical. Without curation, the infinite library becomes a pile of written text of unknown origin, aim, and quality. A more recent example is the episode of the first season of the Netflix series *Black Mirror*, called "The Entire History of You", which focuses more on the technological aspect of new memory developments (Armstrong and Welsh, 2011). The memory device called grain is an implant that enables people to record every moment of their lives from the perspective they see. The story explores how this technological development could change how people interact with each other. For example, the protagonist does not trust his wife nor rely on her words that she is not having an affair. On the contrary, the grain enables him to find the truth himself. These speculative works do not explore the full range of memory technologies that could be developed. They present predominantly dystopian scenarios of technological advances rather than considering more broadly how infinite data storage could impact human memory per se. Speculative Design does not seek to create dystopian or utopian scenarios, but rather its goal is to offer an ustopian world (Atwood, 2011) in which many more scenarios can emerge, depending on the usage of the artefact in place. In the ustopian settings, utopia can occur within the dystopian scenario and vice versa. Moreover, Speculative Design does not intend to offer solutions or predict the future. Instead, it facilitates an inclusive conversation about possible futures and how they might be created (Stead, 2016). The speculations mentioned above are

examples of Speculative Fiction rather than Speculative Design. Speculative Fiction is story-driven, whereas Speculative Design is artefact-driven. Whilst examples of the Speculative Designs focused on memory challenges in the infinite data storage scenario are scarce, some are related to remembering. For instance, Noortman et al. (2019) introduced, as they called, the Design Fiction probe Hawkeye, in which users could play the role of a caregiver of a person with dementia. A similar Design Fiction project, For Good Times and Bad Times, focused on care recipients (Ahmadpour et al., 2019). Researchers used pastiche scenarios as Speculative Designs to evaluate potential users' opinions on well-being health technologies for older users. Although both projects consider the future of memory support technology, neither considers the future of infinite data storage and how digital memory will interact with human memory - themes which are explored in my thesis.

However, it is crucial to create an understanding of the interaction between people and technology using knowledge about the complex experience of being a human. As Brey (2010) wrote:

> *To better understand human-technology relations, we need theories of the interaction between technological artefacts and practices on the one hand, and human perception, cognition, action, experience, identity, body image, moral development, moral deliberation, human nature, basic beliefs and values, and so forth. Without such theories, either developed within philosophy or borrowed from the social sciences, we can make little progress in understanding and evaluating human technology relations* (p. 46).

Speculative Design has what it takes to create opportunities to interact with technological artefacts in the way that Brey described. This is because they are not products but technological artefacts that have in their core the ability to provoke and start a discussion. Speculative Designs are like balls in the urn problem Bostrom described; we can interact with them and assess them safely rather than assess their consequences as a *fait accompli*.

Furthermore, through creating them, the researcher produces knowledge about the artefacts and worlds in which they may be deployed. I will explain this process in the following section.

2.2 Research through Design

Sir Christopher Frayling introduced the term Research through Design in his 1993/1994 article concerning the difference between art, design, and research.

However, RtD has further emerged as an approach in Human-Computer Interaction (Auger, 2013; Zimmerman, Forlizzi, and Evenson, 2007) and design fields, leading to the debate around its application in research. Commercial design and RtD projects both practice design but differ in their goals (Frayling, 1994). The former's goal is the design itself, and the latter's is knowledge produced when making an artefact which embodies the understanding (Godin and Zahedi, 2014). This dynamic is visible within the term itself, Research-through-Design. The design is not the goal of this method, just as collecting data is not the researcher's end goal in any other field. Collecting data is the means to understanding. Publishing the data without its understanding is not acceptable in many disciplines. Similarly, presenting a design artefact is not the point of RtD's interest but the knowledge created through the process, that is, research. However, contentious questions arise from RtD's goal and its reliance on design (Godin and Zahedi, 2014): Is the conceptual work in design an achievement? Does it add to the scientific work, or is the knowledge produced insufficient? As Gaver (2012) notes, the Philosophy of Science and Technology Studies (STS) grounds the nature of theory in science. Many fields have acknowledged theoretical work as it explains the phenomena and extends knowledge.

Nonetheless, continuous pressure exists to create and apply actionable metrics to the RtD methodology and its conceptual contributions (Zimmerman and Forlizzi, 2008; Gaver, 2012). However, design often deals with wicked problems (Rittel and Webber, 1973; Gaver, 2012); complex problems and the breadth of their consequences that may be unknown. In such cases, RtD proves to be a valuable tool as it can *"continually and creatively challenge status quo thinking*" (Gaver, 2012, p. 48). Therefore, RtD does not provide predictability (Godin and Zahedi, 2014) and *"[t]here can be no expectations that two designers, given the same problem, or even given the same problem framing, will produce identical or even similar artefacts"* (Zimmerman, Forlizzi, and Evenson, 2007, p. 499). The future of infinite data storage is a wicked problem, because it does not and will not have a definitive solution, and the breadth of its consequences is unknown. Thus, it calls for approaches such as RtD that can help unravel the conceptual understanding of this proposition. Thus, the Speculative Artefacts are the data I am presenting here. The reflective understanding it enables relating to human memory is an epistemic contribution to the design field and the broader understanding of the infinite data storage scenario.

2.3 Evaluative Framework

2.3.1 What to Evaluate - Research through Design or Speculative Design?

I am aware that this work needs to be evaluated as a PhD; and therefore I need to set out how this thesis could be evaluated and more precisely, its Design Fictions. There are multiple interpretations of Design (Sengers and Gaver, 2006) and Design Fiction (Baumer, Blythe, and Tanenbaum, 2020) which co-exist. Baumer et al. (2020) recognised different evaluative frames for Design Fiction, for example, thought experiments, user studies or narratology. Moreover, researchers laid out that Design Fiction could have an additional function within the evaluative frames, which are provocative entertainment and second, the portrayal of life in the future. However, this thesis presents Design Fictions created using the Research through Design method, which, as mentioned earlier, is a method for knowledge creation through making and reflection. Therefore, the Design Fictions are not to be evaluated directly as design objects in this thesis but rather they are manifestations of my thinking, and the knowledge created and described is the primary contribution of this thesis. As Baumer et al. (2020) noticed, the evaluative frame recognises the value of the evaluated material. Thus, the principal contribution of my thesis is recognising the challenges of the future scenario of infinite data storage with the Design Fictions working as form data from which the main outcome is derived. Therefore, one should also not look at workshop data as an evaluation of my Speculative Designs or as information that needs to be evaluated but rather they provided additional fuel for my reflections that could enhance the knowledge created through the Research through Design method.

2.3.2 Thought Experiments

Thought experiments are illustrative stories that help us understand how different abstract ideas that my thesis engages with can work in the real world. They are a method of creating a sort of "cognitive simulation" that resembles doing an empirical study, but in our minds (Baumer, Blythe, and Tanenbaum, 2020). This way, we can generate insights about the world and find a way of inquiry into philosophical questions. For example, I often mention Searle's (1980) Chinese room thought experiment in this thesis, but other famous examples include Schrodinger's (1980) Cat and Hilary Putnam's (1975) Twin Earth. I use these thought experiments to describe the theoretical layer of my Speculative Designs.

Karl Popper (1959) differentiates between three categories of Thought Experiment: Critical (against theory), Apologetic (for a theory), or Heuristic (illustrating a theory). As Blythe and Encinas (2018) noticed, Design Fiction does not usually confirm or deny

an existing theory, like in the case of Newton's Cannonball. Newton's Cannonball thought experiment explains how gravity works and how the moon stays in orbit. If the cannon was powerful enough, the fired ball from the cannon could circle the planet. On the other hand, there are Heuristic Thought Experiments. For example, Philippa Foot's famous trolley problem, in which a speeding train will kill five people unless someone throws a switch putting a train on a different track, which results in killing one person. It highlights the ethical consideration of the deliberate inference in choosing who ought to live. Researchers from the MIT group in Media Lab created a famous spin of the trolley problem in which they ask people how self-driving cars should be made and what kind of "conclusions" cars should come to on the road (Awad et al., 2018). People believed that a vehicle should be allowed to kill the driver if necessary, but they would not buy such a car. This is a heuristic category of Thought Experiments, which describe the world in terms of how something could work, and in what circumstances. In using thought experiments, I do not aspire to the Critical or Apologetic characteristics of thought experiments, even if they are in their nature. I use them to illustrate my Speculative Designs' underlying ideas and problems, rather than confirm or deny any theory. The Thought Experiments can be considered as illustrative stories that help us understand how different abstract ideas that my thesis engages with can work in the real world.

2.3.3 Personas

In 1999, Alan Cooper, a software designer, introduced the idea of "personas", as an interaction design tool. Personas are user models that work as archetypes of users, characters that will use the designed artefact. It aims to prevent the designer from creating a self-biased design. Personas help designers create for the specific needs of different users, inhabiting the point of view of that particular user. The respective goals of said individual in their interactions are the main focal point in creating a persona (Blomkvist, 2006).

The use of personas in the HCI field has been widespread and popular (Goh, Kulathuramaiyer, and Zaman, 2017). The advantages above create a compelling guide for goal-directed designs. Personas help designers create technology for the potential user, rather than for the designers themselves. My Speculative Designs do not use personas and while the narrative snippets used in some of the future scenarios describe possible use cases, they were created based on the Speculative Artefact, not the other way around. These Speculative Artefacts were not built for a specific use case and did not have a particular goal of interaction. My primary methodological tool is Research through Design; therefore, I did not design for the users per se, I designed for knowledge and provocation. Thus, the narrative snippets I present expand the

world-building and aid diegesis. The user's motives and goals are not the driving force of these designs, but the designs help unravel what kind of motives and goals users may have through the provocation.

2.3.4 Scenarios

Software Engineering (SE) calls for formality, while Human-Computer Interaction calls for sensitivity to context (Benyon and Macaulay, 2002). In both SE and HCI, scenarios showcase concrete situations in which sequences of actions needed to interact with the design are revealed. The focus is on the device and the possible interaction with it.

Scenarios are narratives, similar to narrative snippets presented in this thesis; however, these two forms, scnenarios and narrative snippets, differ in their motivation. Scenarios describe people's actions while engaging in specific activities (Carroll, 1995; Benyon and Macaulay, 2002). In his critical review of Carroll's (2003) book *Making Use*, Diaper (2002) criticised scenario-based design due to its proneness to be interpreted differently by people. Similarly, Benyon and Macaulay (2002) pointed out that scenarios are messy and need structure. Authors suggest the PACT framework (People, Activities, Context, Technologies), with the PACT analysis and introduction to the scenarios, to assess the scenarios so they can provide solutions to the given challenges.

In this thesis, the narrative snippets' aim is not to showcase how something should be used but what they could mean for the world they are embedded in. It is not about the details of the interaction but about presenting the world in which these designs are embedded. These narrative snippets illustrate the design not to understand how it could be used, but to further help in creating questions regarding the future of digital devices in the world in which these scenarios are embedded. These narrative snippets are not made to recognise a solution to any design problem. If anything, it is to create a way of finding problems, rather than solutions. Their focus is to give the context, not to analyse it. Additionally, the narrative snippets further the world-building activity of the Design Fiction (Coulton et al., 2017). As Baumer et al. (2020) explained:

> *the act of trying to envision a coherent fictional narrative that occurs in a fictional world around a speculative design can entail the designer in more careful consideration of the values, biases, and ethical commitments that might be hidden within that design* (p. 1906).

The main goal of the narrative snippets was connected to the value of Design Fictions, which Baumer et al.(2020) postulated as the main evaluative frame in the Design Fiction. The value that I have recognised at the beginning of this section was recognising the challenges of the future scenario of infinite data storage, which are further explored due to the narrative snippets.

2.4 What is (not) Design?

Now that I have presented three main methodological concepts, Design Fiction, Speculative Design and Research through Design, I want to turn to a broader perspective on how these concepts are viewed in the academic and non-academic contexts. I will discuss Speculative Design and Research through Design simultaneously because they are intertwined into the practice I used in this thesis for my four Design Fictions. I Researched through Speculative Design, which resulted in the knowledge and Speculative Designs, which build Design Fictions, presented in this thesis.

Are Speculative Design and Research through Design art or science? Science fiction or Science fact? A domain of Humanities or Fundamental Science? Practice or theory? These dichotomies, which have been created by humans and their social conventions, guide a debate that, while fascinating and useful in certain contexts, is fruitless at its core. Research through Design is about the doing and creating knowledge. Speculative Design is about the future, and the future needs interdisciplinarity. It is not about division and finding ways to describe what it is not, but it is about the narrative that is embedded into the artefact. It may now seem counterintuitive to explain how these dichotomies work. However, I will do so to dismantle these concepts and prove that, since the concept of the future lies at the core of Speculative Design, it matters that its affiliation holds no significance.

Within the design field, Speculative Design has already broken free from the constraints of commercial design and has established itself as its own separate kind of design (Auger, 2013). However, it is more challenging to establish its connection with science, fiction, and art. Three dichotomies constrain Speculative Design: Fact vs fiction, Science vs Art, and Practice vs Theory. In the following paragraphs, I discuss how these three dichotomies shape my understanding and practice of Speculative Design and Research through Design.

2.4.1 Dichotomy 1: Fact vs Fiction

Prototypes or Speculative Artefacts, products of Speculative Design, are a different kind of Science Fiction than we are used to seeing on TV or reading in books.

Speculative Design is more artefact-driven rather than story-driven. It does not mean that there is no story in the Speculative Artefact. On the contrary, a Speculative Artefact is full of stories, just as story-driven Speculative Fiction is full of Speculative Designs. Stories in the Speculative Artefacts are just hidden and need an additional application of imagination from the observer to reveal themselves. This need for imagination is not really a need; it is more of a feature or a benefit the spectator gets. Speculative Design is artefact-driven because the qualities of the artefact are the main focus in each story that emerges from this artefact. Speculative Fiction creates artefacts based on the story. We find artefacts in the stories we are told, but Speculative Artefacts tell stories (Bleecker, 2009).

These stories do not easily fit into one genre, fiction or non-fiction. The Speculative Artefact is the repository of stories about the speculated worlds they were brought from (Bleecker, 2009; Coulton et al., 2017). These worlds are speculations, but stories are real reflections on the future and the current state of affairs. Margaret Atwood's definition of Speculative Fiction is the closest example of the tension between fact and fiction in speculative literature. Atwood's (2011) definition asserts that these are stories that perhaps are not based on fact, in a sense that they did not happen, but they are in the realm of possibility and, therefore, could happen as they are about issues which are inherent in our society. Moreover, Atwood's reflection on speculative fiction regarding her definition of "ustopia", which corresponds to the idea that every dystopian world has utopia within itself, and every utopian world has dystopian scenarios within itself as well, shows the grounding connection of speculative fiction to the actual, real world. Our reality consists of possibilities that, while not enacted, are still ingrained into our human world. One such possibility Atwood (1986) depicted in *The Handmaid's Tale*. It has regained popularity precisely because of its relevance today. It is a dystopian story about a patriarchal and totalitarian society that has emerged by overthrowing the government of the United States. The controversy around the book, such as banning it at Virginia High School, only consolidates its status, showing the power of the story in relation to the "real" world, which many believe is on the verge of becoming reality (Atwood, 2023).

The artefacts, though, give us much more room for imagination. While the written story can be full of artefacts, the artefact itself is full of stories. For example, in *The Handmaid's Tale*, the specific outfits of the different societal groups can be seen as artefacts. What other stories could they tell, taking them away from the context of Atwood's words? Not only artefacts from speculative fiction tell stories, but also the ones that we are familiar with in our reality do. Atwood shows us how different artefacts can tell many stories about the world from which they are taken. She uses artefacts that are a part of our current reality, like the Old Testament, giving it a new story. She speculates about its role in society. Moreover, Atwood (2020) explores

more voices in the follow-up book, *The Testaments*, which provides an even more in-depth scenario of the world she describes. However, books bring us closer to one story, one world, while artefacts contain many of them. Just as the world they come from contains enough to make us question and speculate about practices, relationships and stories inside of them (Bleecker, 2009). Artefacts should also be just enough to make us imagine these worlds and stories.

Are the stories hidden in the Speculative Artefacts fact or fiction? Speculative property suggests that the stories that they can produce are fiction. However, they are a product of research, so should they be classified as facts? Design has been a hard nut to crack regarding where it belongs. Speculative Design is no different. Philosophers would say that this is a practice, while designers say that it is a reflection. Of course, one could also say that reflection can be a practice and vice versa. There is a well-documented debate on whether designers belong to the science world, the art world, or neither, but still, the discussion stays in relation to art and science. It is a sensible line of thought. It resembles what happens at the universities and division into the Faculty of Arts and Social Sciences and the Faculty of Science and Technology, or STEM and Humanities. There is a more prominent accent put on formal knowledge rather than tacit knowledge in the curriculum of the universities. Thus, Speculative Design is not only a problem of fact and fiction but also lies between science and the arts, and theory and practice. In fact, Bleecker mashes these categories, talking about Science fact and Science fiction. He says: *"It is as if science fiction is the imagination and science fact is the conclusion to this imagining. Science fact is where science fiction ideas go to become material things"* (Bleecker, 2009, p. 26). It is a powerful statement because this suggests that Science fact consists of its academic products, which is the aftermath of Science fiction and any speculation about it.

The best representation of these words would be the discovery of DNA structure. James Watson, Francis Crick, Maurice Wilkins and the historically overlooked Rosalind Franklin discovered what once seemed undiscoverable. In 1953, they understood that DNA is shaped in the double helix, twisted-ladder structure. Modern molecular biology can date its beginning from this event. However, researchers did not just happen to imagine the exact shape and how molecules are connected to each other. They made cardboard models, which they shifted around, and after putting them in the right places, they made the discovery. They needed tangible prototypes, which, after trial and error, produced knowledge.

Debates over what science and art are have been very long-running, and perhaps their outcomes are, pragmatically, useful, as in putting one department below one faculty or another. However, they are not, and likely never will be, exhausted. For example, I can argue that some physicists are, or were, artists in their field, like Richard Feynman.

Nevertheless, it would be harder for me to find an artist I could call a great scientist. Why is that? The social construct of an artist, an idea that we instantly connect with an artist, so being imaginative and creative is easy for us to apply to a scientist. However, the idea of a scientist, so calculated and idea-driven, is harder for us to apply to an artist. In his important essay, Frayling discussed archetypes of the scientist, artist and designer (Frayling, 1994). As I will discuss them, these archetypes will help me unpack the next two dichotomies in the following paragraphs.

2.4.2 Dichotomy 2: Art vs Science

Frayling (1994) points to *strange* debates emerging from the tension between art and research: *"Does an exhibition of paintings count as research or doesn't it?"* In the case of this thesis, one can ask: "Does an exhibition of Speculative Designs *count* as research or doesn't it?" Or perhaps a more pressing one: "Does an exhibition of Speculative Artefacts count as art or doesn't it?" Frayling saw these questions as an obvious blind alley, and he steered our focus away from the problem by unpacking the stereotypical characters in art, design and research fields. I agree with Sir Christopher Frayling that these questions are confusing and nonsensical. However, they need to be addressed in order to show that the answers are unimportant. Only then will we see that Speculative Design creates a bridge between all of these dichotomies. As Frayling (1994) pointed out: *"artists have worked just as often in the cognitive idiom as the expressive; (...) some art counts as research – anyone's definition; (...) some art doesn't"* (p. 4). It does not matter if one calls Speculative Design research or art. However, it does matter that *it does not matter.*

Speculative Design, as the fruit of designers' work, may be a bridge between art and research, science fiction and science fact, but what about the methods designers use, such as Research through Design? Do they count as research or art? Picasso, for example, rejected the idea that his work carried "the spirit of research". In an interview from 1923 about Les Demoiselles d'Avignon, he said:

> *When I paint, my object is to show what I have found and not what I am looking for (. . .) The spirit of research has poisoned those who have not fully understood all the positive and conclusive elements in modern art and has made them attempt to paint the invisible and, therefore, the unpaintable* (in Frayling, 1994, p. 2).

Frayling (1994) nicely summarised Picasso: *"He's a maker, not a researcher – and he doesn't even feel comfortable verbalizing about his work"* (p. 2). For Picasso, the act of painting is merely a medium, which stands in opposition to Research through Design, where the act itself is crucial. Moreover, what is "looked for" is even more important.

Frayling gives another example of the picture of artists in pop culture. In *Lust for Life* Vincent van Gogh, played by Kirk Douglas, is the perfect example of an inner-looking, irrational artist. His work is more about expressing himself and showing what is in his mind rather than understanding something. This is very different from Research through Design, in which the whole point is epistemic contribution and gaining knowledge through making. In this view, a Speculative Designer, who utilises Research through Design, is not an artist. However, is it true that artists are like that? It seems that Picasso believes that being a maker negates being a researcher and the other way around. However, this is not true, and I challenge Mr Picasso in this chapter. As Frayling (1994) said:

> *If the stereotype of the scientist as researcher needs some adjusting – to make it seem closer to art and design (though by no means identical with it) – the popular image of the fine artist needs a lot of work as well* (p. 3).

Then, he gives examples of artists who worked "in a cognitive rather than expressive idiom", as mentioned before. Like George Stubbs's animal anatomy and drawings, John Constable's research on cloud formations made his landscape drawings and painting of clouds possible. It did not matter that it was scientific because the end product was art. In the case of RtD, the end product is knowledge, and the by-product is the prototype; thus, it is both art and science. The knowledge is science, and the prototype is the by-product of creating this knowledge in the form of art. It is the by-product of making and researching. Research through Design is not a "normal", or "traditional" way of creating art. The representational theory of art states that art must depict some quality of reality. The art researcher's work mode is: art-> research-> understanding (main goal). For Research through Design, it is: research ->understanding (main goal) -> art. When Speculative Design is used as a provocation for the audience, it is research ->(researcher's understanding)-> art -> shared understanding.

We think of Leonardo da Vinci as an artist and scientist. We glorify his work by saying that he was a genius. His pioneer work on the anatomical features of humans was spectacular. In our eyes, he is unmatched. It is true. No one will ever be Leonardo da Vinci simply because, as Tom Jones (1980) noticed, drawings that pioneered the knowledge of anatomical research would not be found as a breakthrough nowadays. We already have technology that is much better than the human eye and can produce more detailed pictures of human anatomy than anyone ever could. Thus, if we believe that Leonardo da Vinci could be both a scientist and artist because he looked at the fundamental truths about the world, like anatomy, which had already existed and needed to be discovered, rather than creating something new, then perhaps it is impossible to be both, a researcher and an artist, today. However, if we think about

what Leonardo did, not in specific and concrete terms, such as anatomy, we can find another quality of his incredible research. He painted what was not *seen* (Frayling, 1994). It happened to be knowledge about human anatomy. However, fundamental truths, such as mathematics, physics, and biology, are not the only things worth revealing. Are not possible worlds and futures something that is not seen right now? The design world has already recognised the future trajectories as a scientific field of study. Indeed, Baum et al. (2019) call for this recognition across the whole of academia.

Frayling (1994) described the stereotype of the designer as an Imagineer because a designer is: *"an archaeologist of images, and signs, and styles from within the urban wasteland. Not a creator of meaning so much as an intuitive searcher after the latest thing"* (p. 2) and *"style-obsessed"* (p. 3). However, as Frayling pointed out himself, in *Alice through the Looking Glass*, Humpty Dumpty says:

> *'When I use a word' Humpty Dumpty said, in rather scornful tone, 'it means just what I choose it to mean – neither more nor less'. 'The question is' said Alice, 'whether you can make words mean so many different things'. 'The question is' said Humpty Dumpty 'which is to be master – that's all'* (Carroll, 1869; in Frayling, 1994, p. 2).

So, I want to be a master here and change Frayling's definition of the Imagineer. "Imagineer" could be a term based on "imagination" rather than an "image". There is already a word in the English dictionary for Imagineer: *"a person who is skilled in devising or implementing creative ideas"* (Collins Dictionary, 2024). That is what a Speculative Designer is: an Imagineer - A person who is interested in imagining the future through the interdisciplinary engineering or designing the future.

Going that route, a Speculative Design, as a thing, not a verb, is different from traditional design as it is primarily a product of (among others) imagination, so it is a figment. A figment can be a piece of art and of research. Speculative Designers always create figments since they are a product of imagination. As Bleecker (2009) said:

> *It [design] provides a way to embed my imagination into the material things I've been making because it looks to be able to straddle the extremes of hard, cold fact (engineering) and the liminal, reflective and introspective (art)* (p. 4).

Therefore, rather than asking whether Speculative Design is art or science, we should try to understand in which cases artists are imagineers and in which cases researchers are Imagineers.

2.4.3 Dichotomy 3: Theory vs Practice

So far, we have covered the stereotypes of artists and scientists. Another stereotype that Frayling (1994) introduced is "the practitioner": *"As if action which follows reflection, or reflection which follows action, can be put in a box exclusively marked 'practice'"* (p. 4). Philosophers do not paint. They look at others' paintings. Philosophers who paint would be called painters. They would stop being philosophers, or they would be philosophers after hours. If they engage in both actions, painting and philosophising, we would think about them as separate actions. So, it seems that the action is not only descriptive but what it entails is a restrictiveness of who does what. This stereotype of the practitioner is precisely what Picasso applied to himself. However, as usual with stereotypes, they are rather limiting.

Advocating for freedom for everyone is beyond my powers here, but I am here to advocate for the freedom of speculative designers. A designer is a person who, by definition, is free to incorporate philosophy and art into their practice or whatever they want and need. The achieved outcome is always knowledge for the Speculative Designer. If viewers think differently that it is only art, that does not mean that the Speculative Designer failed, as long as they produced knowledge.

The distinction between research into art and design/research through art and design and research for art and design could give us some answers (Frayling, 1994). One may say that scientists need to agree while artists do not. That would indicate whether Research through Design and Speculative Design is art or science. In this sense, RtD is more of an art because increasing agreement is a constraint in this field. However, if we take Karl Popper's theory of falsification, we may have different conclusions. Karl Popper believed that science is about falsification. He claimed that non-scientific theories differ from scientific ones in that the former attempts to confirm its hypothesis, and the latter tries to refute it (Popper, 1935). The theory suggests that if a scientist comes up with the hypothesis that all swans are white, then rather than looking for more white swans to confirm it, they should be looking for swans in different colours to falsify this theory. This idea is encapsulated in the black swan event or theory, a metaphor for a surprising event that seems unavoidable in retrospect. Perhaps Speculative Design is not the same because the falsification or confirmation is not at its core. One does not try to falsify to confirm something when creating a Speculative Artefact. However, the key is that confirmation of the theory is not the key in the Speculative Design. The key is, in fact, the provocation for the questioning of Speculative Design's fruits.

An example of focus on analytical and inquisitive practice is Adversarial Design. Carl DiSalvo (2015) defines Adversarial Design as an inquiry into the political condition

and as a practice. In the former, DiSalvo (2015) uses Dewey's (2008) definition of inquiry: *"a process directed toward situations that are vague and lack a clear sense of meaning and effect"* (p. 106). DiSalvo then further explains an inquiry: *"a process of skilled examination and reconstruction that renders problematic situation sense-able"* (p. 106). But perhaps the most precise definition of the inquiry in Adversarial Design that pinpoints the design context is another made by DiSalvo: *"the process of inquiry gives form to problematic situations"* (p. 106) . Indeed, the political conditions are problematic in their core, so the Adversarial Design can help in structuring their elements and it *"provides a way to express and experience an otherwise confusing situation"* (p. 106). To give an example of such confusing situation, I can share my confusion around Social Robotics at the very beginning of my academic career, which can illustrate DiSalvo's point. Social Robotics is an area of research and development that is uncertain, as there are many contradicting voices and points of view, all considered equally important (Disalvo, 2015). A couple of years ago, I attended a talk by Professor Maja Matrić in the Mechanical and Aerospace Engineering department at Princeton University. At that time, Prof. Matrić led a group at the University of Southern California Viterbi in Los Angeles, which worked on robots designed to reinforce people's behaviour during physical therapy. For example, they were used for patients after a stroke, where repetitive exercises and one-on-one care are necessary. The robots' job was reinforcing people's activities and promoting their exercise routine. What was particularly interesting for me was that during such therapy, humans tended to bond with robots. Some patients said their bond with robots was more satisfying than with their spouses or significant others. To my surprise, everyone in the room laughed, but I (probably the only psychologist in the room, as the talk was promoted for people working in engineering) wondered, why? What was this bond? It was, and still is, fascinating to me how it is established, what it is - how it influences humans, and how to design robots, devices and algorithms to have an understanding and control of this relationship. It is true that an incredible technology revolution is happening in therapy and our daily lives. However, the discrepancy between my point of view and fellow listeners was apparent. The room was full of engineers, who were not concerned about the social implications of this huge step, but were more interested in the technological novelty itself. I, on the other hand, was interested in the social implications. We all were, however, interested in the opportunity of help that technology could bring to people needing therapy assistance. We had one goal but different focus.

When it comes to the latter, an inquiry as an intentional practice, DiSalvo states that Adversarial Design creates a space in which one can see the socio-technical aspect of the future technology in a way that can bring awareness, as well as critique. It is similar to Speculative Design, in which provocation is one of the main functions. DiSalvo provides examples such as Mark Shepard's CCD-Me Not Umbrella, which

disrupts the view of surveillance cameras (Capital, 2009). The umbrella is packed with infrared LEDs visible only to a CCD (charged-coupled device) surveillance camera, which disturbs object detection. Such an invention sheds light on the surveillance technology that occupies public spaces, but is also a commentary on the circle of technological solutionism, in which one technology becomes a solution to problems with another technology.

Such intentional practice in Design is often connected to the notion of Critical Design. In *Speculative Everything*, Dunne & Raby (2013) admit that they coined the term "Critical Design" as the answer to an uncritical view of technological progress (p. 34). Such a view assumes that technology can solve any problem and is inherently good. For Dunne & Raby, Critical Design is an approach to Design that characterises critical thinking toward the materiality, not the "criticism" as one may assume. The goal is not an "anti-everything" attitude in the binary approach to Design, but creating space for the alternative to the ongoing, market-driven trends in Design that are an opportunity for change.

2.4.3.1 (Speculative) Prototypes and Embodied Cognition

Embodied cognition theory states that cognition is shaped by and dependent on the entire body of an organism. It stands in opposition to Mind-body dualism. Mind-body dualism is a theory that states, as the name suggests, that mind and body are two separate entities, completely independent from each other, but they both affect each other. Descartes was the most famous proponent of this theory. Nevertheless, Gilbert Ryle (1949) disagreed with Descartes. Ryle described the idea of mind-body dualism in the phrase *Ghost in the Machine*, and he was an advocate of embodied cognition theory. Prototypes have twofold embodied character: knowledge that the researcher gains through making and the knowledge created through shared experience of engaging with the prototype. I will discuss these ideas in the following paragraphs.

2.4.3.1.1 Knowledge through Making I have already made an argument about how Research through Design creates knowledge. Therefore, I want to avoid rehashing this discussion. Nonetheless, I would like to pin it here as the first occurrence of embodied cognition in the life of a prototype. As previously mentioned, James Watson, Francis Crick, Maurice Wilkins and the famously overlooked Rosalind Franklin discovered that DNA is shaped in the double helix, twisted-ladder structure by shifting around the cupboard model. The prototype itself was not the primary goal. It was knowledge about the world that already exists. They used the properties of their embodied cognition to understand and create new knowledge. Like Leonardo da

Vinci, artists showed how the world looked by prototyping it. The Research through Design works similarly; it creates knowledge through making.

2.4.3.1.2 Shared experience, beyond knowledge: Engaging with the prototype, through workshop, class, exhibition, written story The action of creating a Speculative Artefact powered by embodied cognition produces knowledge. We call it Research through Design. I called a Speculative Artefact a by-product of Research through Design before in this thesis. If we look solely at the RtD process, it can be described this way. However, as a Speculative Design itself, it does have its important role, which is provocation. This provocation means that others can somehow interact with the speculative artefact. While we cannot know exactly what another person experiences (Nagel, 1974), still, we can share that experience. Imagine having dinner with your family; some may enjoy the fish and chips, and some may hate it. Your experience is different, but still, you share the same meal. Prototypes give us precisely that: the shared experience. We do not experience the world in disconnection from our bodies. Such learning is a case of embodied cognition that is further shared and not only experienced by the researcher putting RtD into action.

Let us take a closer look at some of the excellent and indeed provocative examples. Is there such a thing as moderation in provocation? For example, Auger's and Loizeau's (2001) Speculative Artefact, the Audio-Tooth Implant, was wrongly assumed to be the authentic design that was about to enter the market. The creators' reluctance to admit that it was a speculative prototype led to them being recognised as the Inventors of the Time Magazine's 2002 Best Inventions list (Metz, 2006). Auger and Loizeau did not put on the market their invention that did not exist, so they did not swindle anyone. Nonetheless, how far in deception is too far? For example, The Wizard of Oz prototyping technique is a method of prototyping which, at its core, has some of the magic of the theatre – the prototype seems to work in a certain way, but it is only a simulation. This technique usually involves other people's participation and tests mock interfaces with potential users. However, the Wizard of Oz technique does not aim to deceive but test interfaces. I do not use the Wizard of Oz technique in its traditional sense, i.e. I do not test my artefacts on humans. However, I incorporate its theatrical feature into my work. This property of being the theatre is essential for Speculative Design, as my Speculative Artefacts are partially fictional and partially functional. It is about alluring, not deceiving, though.

Similar tension can be seen between Imaginary Abstracts (Blythe and Buie, 2014) and Fictional Papers like "Game of Drones" (Lindley and Coulton, 2016). The main difference between the two, except the volume of words they represent, is that imaginary abstracts are upfront about being fiction, while Fictional Papers are not

always upfront. In his talk about Fictional Papers, Lindley stated that a fictional paper *"forces involuntary suspension of disbelief, and imaginary abstracts require a willing suspension of disbelief"* and that imaginary abstracts *"burdens the reader to imagine"* (Lindley, 2016). However, is forcing disbelief better than imagination? Can imagining be called a burden? There is no denying that writing (imaginary) abstracts is quicker than writing (imaginary) papers. Imaginary abstracts may not have enough detail to spark the imagination; perhaps that is what Lindley meant. There may be a problem of "just enough"ness that Bleecker (2009) pointed out in his definition of Speculative Artefacts. Nonetheless, I disagree with the idea that imagination is a burden. On the contrary, I believe it is the main goal of Speculative Artefacts. My goal was not to create artefacts and describe them as if they were real. My goal was not to make my reader believe that I created actual pieces of technology that can be deployed in the foreseeable future (then, I would not write this chapter at all). My goal was precisely to give a chance for imagination to happen. My goal was to create a setting in which a reader can find stories that the Speculative Artefact carries, not to tell them the story that the prototype is real. My Speculative Artefacts aim to help imagine rather than believe in them.

The push for imagination comes from a motivation to include different voices in the discussion about the future. That, however, is often hard. The future is a challenging thing to talk about. People often believe the future is not "ours to see". However, with Speculative Design, it has never been easier to see possible versions of it and, more importantly, to shape it. As MIT economist Cesar Hidalgo (2015) wrote: *"Crystallising our thoughts into tangible and digital objects is what allows us to share our thoughts with others"*. These "crystals of imagination" give us *"access to practical uses of the knowledge and knowhow residing in the nervous systems of other people"* (Hidalgo, 2015; in Forte, 2022, p. 58). The quote above ties in with Embodied Cognition. First, embodied cognition works through one person, the scientist, who Researches through Design. Then, once the prototype is presented, people can discuss the design, as other people can join in this embodied cognition. While we cannot imagine how it is to be a bat, we can imagine how it is to be a human in the future. However, the important thing is that *"the knowledge produced functions as a proposal, not a prediction"* (Olson and Kellogg, 2014, p. 169; Zimmerman, Stolterman, and Forlizzi, 2010) because as Margaret Atwood (2011) noticed: "*the future can never be truly predicted because there are too many variables. You can, however, dip into the present, which contains the seeds of what might become the future*" (p. 61). Therefore, whether Speculative Design should be considered art or science is irrelevant: the key concept in my thesis is future-making. I will discuss how this is achieved in the next section.

2.5 It is this: new rhetoric

Having asserted what it does not matter that Research through Design and Speculative Design are, I will turn to what it matters that they are. This thesis is a rhetorical piece. Rhetoric is usually associated with philosophy and classical studies, but this thesis represents a "new rhetoric" rather than an "old rhetoric". In the following paragraphs, I aim to explain what I mean by this statement.

In the previous paragraphs, I argued that Design Fiction and Research through Design cannot be simply differentiated as art or science. However, another dimension of these methods, namely rhetoric, works within and beyond art and science. This corresponds to Buchanan's (2001) words:

> *McKeon argues that rhetoric is a usually clear example of a general tendency among the arts and sciences for doctrines and devices to move across disciplinary boundaries and stimulate innovation in new circumstances. Rhetoric provides this example precisely because it is universal in scope and shared among all intellectual disciplines* (p. 184).

This rhetoric's power has become ever more important given the situation we are currently in. Technological sciences stay at the universities' curriculums, ensuring their place as an educational path in higher education, while classics and other fundamental sciences, I should say (the ones that are not associated with a particular profession) are being defunded, along with the humanities' departments (Browne, 2024). I do not use the word "fundamental" in its colloquial understanding, so I do not refer to physical sciences, such as physics or biology. I use the word "fundamental" referring to skills and sciences such as rhetoric. Learning rhetoric is like learning to read. Reading is fundamental in learning new recipes to become a chef. Reading is fundamental in understanding instructions if you want to become an electrician. Reading is fundamental, of course, if one wants to become an expert in the literature. In this sense, reading is fundamental to performing other tasks efficiently. It is up to you what you do with your reading skills, or more precisely, it is up to you what you decide to read. I am not an expert in the job market, but it is not common to have a job as a "philosopher" unless one decides to take an academic path in their career. The same goes for rhetoric. One can be judged as a great rhetorician, and it will certainly be valued in many settings, but it is not an occupation one can step into. Therefore, the downfall of its teaching. Education is expensive, and young people want to make sure they will be able to make ends meet, rightfully so. However, the cultivation of rhetoric is crucial.

How does design become a new rhetoric? We shall turn to Aristotle's causes and Buchanan's framework for a rhetorical study of design. Aristotle's causes are types of

explanations that address specific questions about existence (Stanford Encyclopedia of Philosophy, 2023). These causes were essential for Aristotle to investigate the world, and they were irreducible. "Why?" is the central question that is a principle to these causes. I shall first present Aristotle's causes:

Material cause: "that out of which" it is made.

Efficient Cause: the source of the object's principle of change or stability.

Formal Cause: the essence of the object.

Final Cause: the end/goal of the object, or what the object is good for.

Buchanan (2001) gives the framework for a rhetorical study of design, through four rhetorical questions that *"identify the master issues in the development of any argument, idea, art, or other subject"*:

1. Fact and existence – is it?,

2. Name and definition – what is it?

3. Nature and qualification – of what kind is it?

4. Cause and action

Furthermore, Buchanan built on Aristotle's work to create four causes of design:

(1) the creative capacity of individual designers as an efficient cause;

(2) the sequence of goals around which the methods of design thinking and practice have taken shape as a final cause;

(3) the outcome of the design process in products that serve human beings as a formal cause; and,

(4) the subject matter of design as found in any of the activities and purposes of human beings as a material cause.

I will explain the division between Rhetoric and Design and how they work become one. My figures, showing the pattern of design as new rhetoric, are not to be compared to Buchanan's framework, nor are they an update on it. Instead, they are a step back, a more general outlook for understanding the division between "words" and "things" and how design as rhetoric brings them together. It is not a framework but rather an explanation.

The general understanding is that Words and Things are separate and distinct beings:

Figure 2.1: The conventional distinction between Words and Things. Source: Author.

This distinction further creates connotations with different processes between words and things; namely, words imply thinking and vice versa, while things imply action and vice versa:

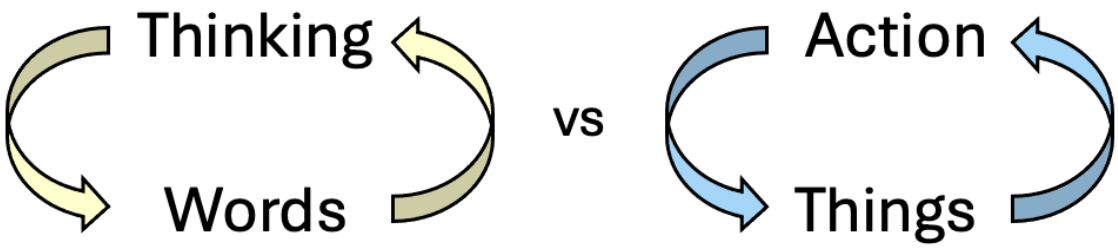


Figure 2.2: The discrepancy between processes related to Words and Things reminds of Descartes' mind-body dualism. Source: Author.

Such a mental model creates a background for understanding how Rhetoric and Design, still separately, become crafts. Adding the process of the opposites, but not the substance, different crafts come to life. Thus, by adding action to the "unbreakable" bond between words and thinking (I am very much aware that one can use words without thinking. This scheme is for general understanding purposes), a craft known as rhetoric is resurfacing. By adding thinking as a process to an "unbreakable" bond between action and things, design as craft unravels itself:

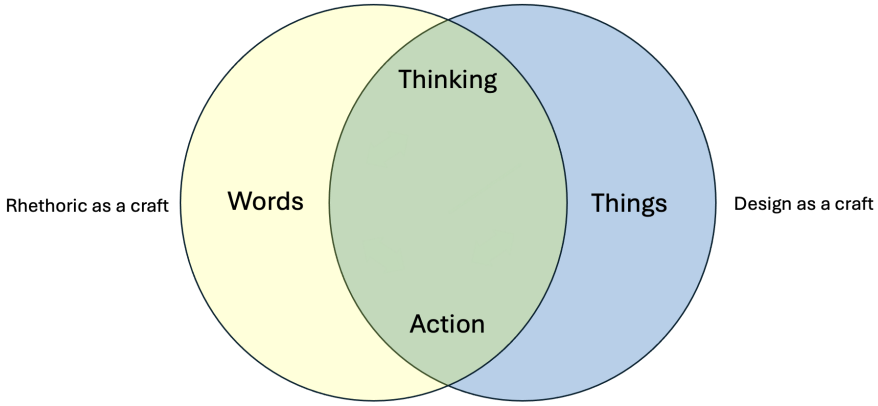


Figure 2.3: The formation of two crafts: rhetoric and design. Source: Author.

Once all these substances and processes blend together, words, things, action and thinking, we can finally see how design is a new rhetoric, or rhetoric an ancient form of design (Buchanan, 2001):

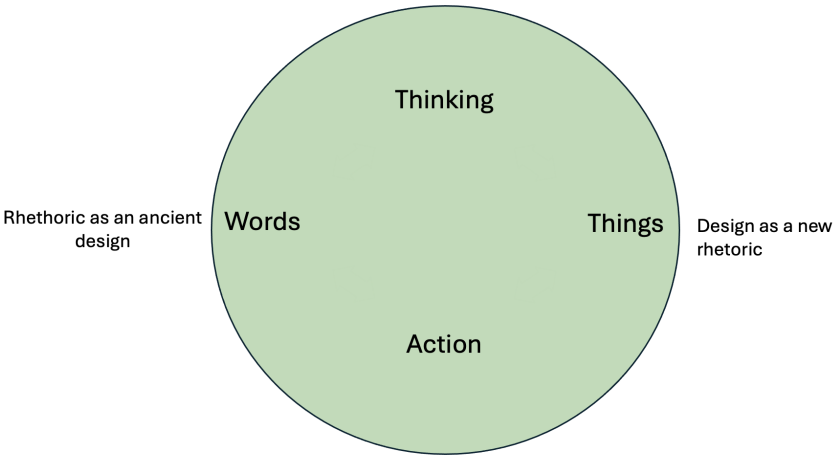


Figure 2.4: By combining both crafts (rhetoric and design), the formation of "rhetoric as an ancient design" or "design as a new rhetoric" emerges. Source: Author, after Buchanan, 2001.

In my work, all these inform each other and are a product of one another:

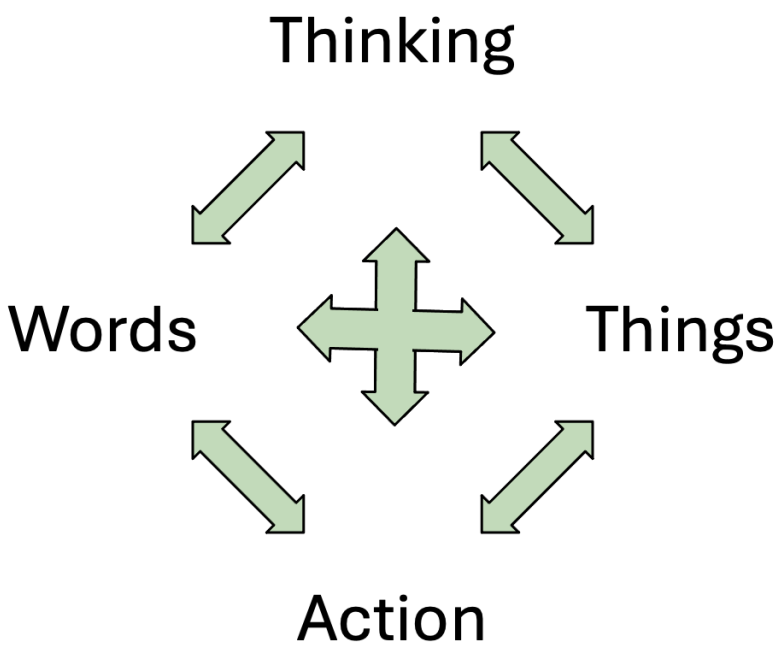


Figure 2.5: Design as new rhetoric consists of the fluent relationship between all its components: Words, Things, Thinking and Action. Source: Author.

I need to explain myself in this simplified equation I created, as some people may feel offended by it, which is of course not my goal. This is a simplified understanding of how "new rhetoric" emerges. There can be other ideas in between. For example, Kenneth Burke (1966) looked at the literature texts as "Symbolic Action", a construction of reality and a system of communication through symbols, rather than traditional rhetoric. Moreover, by expanding Buchanan's (2001) and Dewey's (2005) "words vs things" idea by linking words with thinking and things with actions, I do not want to suggest that people who work in the roam of words do not do anything and people who work in technology do not think. After all, "words" are a particular kind of a "thing", and "thinking" is a particular kind of an "action". This diagram represents the unnatural, in my opinion, division between words and things. Dewey found this division disastrous. I argue that the lack of understanding and, therefore, the ability to discuss and shape technology by the public at large is an aftermath of such division.

However, it is not only a problem of the technology practitioners needing to incorporate rhetoric skills into their work. As Buchanan (2001) points out, traditional

rhetoricians are not interested in technology, as they find "words" to be their "thing" of study. I need to raise one more point here. By quoting Buchanan (2001) that: *"The problems of technology attract little theoretical or practical attention from traditional rhetoricians, who regard words as subject matter of their art"* (p. 185), I do not suggest that technology is the only subject worth studying. More simply, I do not undermine the work and other subjects of study. I do not imply that every rhetorician should become a technology expert, and every designer should be an expert in rhetoric. After all, both rhetoric and design can be viewed from a traditional point of view as crafts, and I am not suggesting that craftsmanship should focus only on one subject alongside it. What I imply, though, is that the technological sphere lacks the craftsmanship of rhetoric, and traditional rhetoric is detached from technological studies to partake in it, which, as mentioned before, has disastrous consequences. Technology becomes a black-boxed idea that, in effect, is impossible to shape in practical and social aspects through discussion and thoughtful and thought-provoking actions. Therefore, this thesis represents Buchanan's design as a new rhetoric, combining these two crafts, rhetoric and design, to study the future of memory technology, and create a new understanding of the infinite data storage phenomenon.

As McKeon (1994) showed in "The Uses of Rhetoric in Technological Ages", technology rhetoric, or from Greek *technologia*, has been evolving from practical in Roman periods through poetic creation, focused on beauty in the Renaissance, to nowadays, the productive power of technology rhetoric. This power is in the creation itself, as it produces knowledge. It is not knowledge for theory's sake but a call for action and further creation. As Buchanan (2001) recognised, both design and rhetoric were crafts and professions before they were subject to theoretical speculation. Figure 2.3 shows the division and overlap in the competencies of these two crafts. Figure 2.4 shows the combination of them and the basis of the idea of design as new rhetoric, or as Buchanan (2001) said: *"We may begin to ask whether design is a modern form or rhetoric - or whether rhetoric is an ancient form of design"* (p. 191).

The difference between rhetoric and design is that design still thrives as a craft, while rhetoric became a less popular craft, a relict, as mentioned before. As Buchanan (2001) noticed, the crafting quality in technological design, whether engineering design, computer programming or graphic design, has survived. Perhaps because, as Giorgio Vasari (1511-1574) wrote: *"Design is the animating principle of all creative processes"* (in Falk, 1977, p. 637). Alternatively, as Herbert Simon (1996), cognitive psychologist, stated: *"Everyone designs who devises courses of action aimed at changing existing situations into preferred ones"* (p. 111). Designing is a skill we need to acquire to a certain degree throughout our lives as it is a skill that is required to manage our environment and life. Moreover, it is a skill that easily translates into any other sphere of our lives as it is a seed of creativity. Rhetoric, on the other hand,

is not a promoted skill. Even though it is as useful as design, it does not appeal to the masses as an essential skill in the current age. Perhaps because it is harder to monetise or sell it as a skill that can be further monetised. It is a skill that creates questions in our heads like "Why?" and "What for?" and "What could the possible consequences be?". Learning, practicing, and using it takes time, especially since it is connected to language and interpersonal skills. It requires communication. Nonetheless, the real magic happens when we combine the creative force of design with the discursive force of rhetoric. Then, we can build the world on our terms through knowledge.

Design is a language, such as signs. Speculative Artefacts are thought experiments. Thus, language is an important conveyor of the ideas they bring up. Design is a mode of expression; just as words are not lumps of shapes, we call letters; they have meaning. They express something (and this is also why design is a "new rhetoric"). Previously, I argued that rhetoric and design are fundamental pieces of knowledge that could later be applied in different academic and non-academic spheres of life. Thomas Conley (1994) wrote: *"The present in rhetorical studies is a prelude to an encouraging future"* (p. 304). In my case, I use design to think about technology in the future. For this particular task, my tool of choice is Research through Design, a term I explained in the previous sections.

In the following chapters, I present my Speculative Artefacts, or thought experiments, which unravel a new understanding of the future of infinite data storage scenarios. I present my work as new rhetoric, which unpacks the knowledge I gathered by my practice of Research through Speculative Design. In addition to these Artefacts, I present results and reflections of an external evaluation of the Artefacts, which I deployed as a part of my Research through Design methodological practice. In the next section, I provide details of this exploration, which I dubbed a PILOT Workshop.

2.6 PILOT Workshop

2.6.1 Workshop Format

To refine my thinking about the Speculative Designs, I conducted an online prototype exploration, an individual workshop where participants were presented with the Speculative Designs and asked questions regarding their usage. The workshop's goal was not to create or refine these particular Speculative Artefacts. Nonetheless, the workshop was a part of my Research through Design process, which could facilitate extending ideas further. This workshop did not aim to facilitate a discussion on the particular format of Speculative Artefacts and include participants in design process, and therefore they cannot be considered Co-Design (e.g. Steen, 2013) or Participatory

Design Workshop (Hansen et al., 2020). The provocation was not the primary goal in this setting; it was mainly for gathering feedback and incorporating findings into the Research through Design process. However, feedback was also gathered to create a larger-scale workshop in the future, which would include other voices in the reflection and possibly co-create Speculative Artefacts. Therefore, the workshop will also be considered a pilot, and its evaluation will be used to create a larger-scale workshop.

The workshop was held in Miro board (2025), an interactive online whiteboard tool (Figure 2.6). Participants were introduced to the workshop topic, went through the warm-up questions related to their understanding of the relationship between human and computer memory, then went through the central part where they learned about the Speculative Artefacts and reacted to them, and at the end, how their thinking about the topic might have changed after the workshop. After the warm-up questions, participants went through the main workshop section in which they were introduced to each of Dator's (2009) futures where they could interact with the Speculative Artefacts. Participants were introduced to Data News, a short snippet and the REWIND2 Button in the Continued Economic Growth Scenario. In the Transformation Scenario, participants could play the video of the Horcrux Ear, read the User Manual, read a snippet and the Right-to-Forget. In the Collapse Scenario, participants saw the depiction of the Mnemosyne Machine created with ChatGPT, Snowflakes, and they could play the Mnemosyne Machine. In the Disciplined Society, they could play a video of how one uses the Tiled Stove, play stories inscribed into each Tile and read a snippet. At each stage, participants were asked to engage in the exercise and reflect on using these Artefacts.

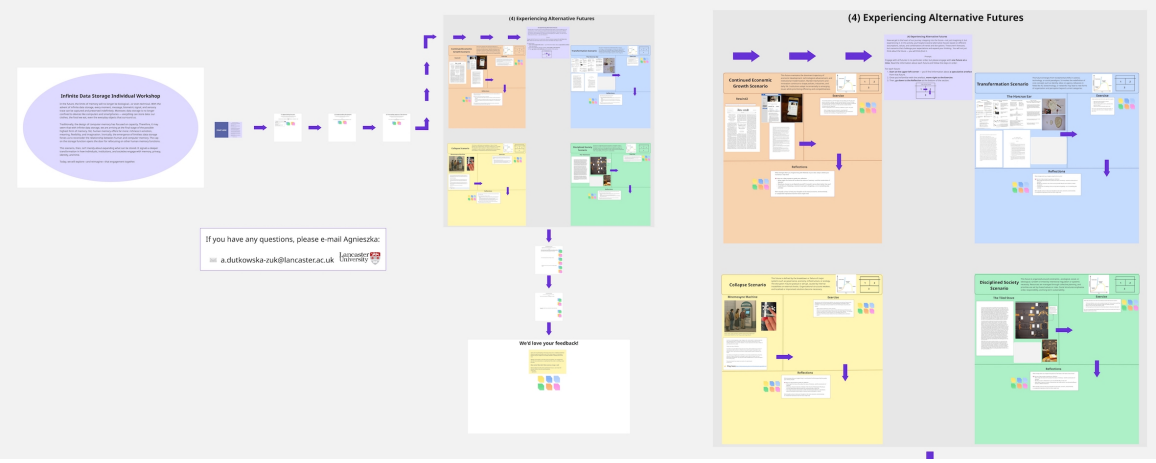


Figure 2.6: Left: Miro Board workshop view. Participants completed a set of exercises about Speculative Artefacts, as well as about the past and future of memory technologies, individually within one week. Right: Central part of the Workshop where participants were familiarised with the Speculative Artefacts. Source: Author.

My underlying methodological foundation in this qualitative data analysis is closest to grounded theory analysis (Glaser and Strauss, 2017). However, in the spirit of Research through Design, I do not verify theories (Aldiabat and Le Navenec, 2011); instead, I explore participants' initial reactions to my Speculative Artefacts to gain an understanding of their attitudes towards different futures and memory technology in general. While I do not propose a specific theory as a result of my qualitative analysis, I offer additional reflection beyond the description of participants' responses, which, as mentioned earlier, is a part of Research through Design, making an epistemic contribution to this thesis.

2.6.2 Recruitment

Five participants were recruited by email and word of mouth. No demographic questions were asked. At the beginning and end of the workshop, participants were asked additional questions regarding their understanding and feelings towards the memory technologies' past, present and future. The beginning warm-up questions' task was to prepare participants for thinking about future memory technologies. Moreover, they gathered insight about how knowledgeable they are about the memory technologies, and how they feel about devices that support our memory. The closing questions were to evaluate whether the workshop did or did not change their perception of the creation and usage of future memory technologies. Throughout this thesis, I will refer to participants as P1-P5. The Institutional Ethics Review Board

approved the PILOT Workshop [FASSLUMS-2025-5498-SA-1]. All materials used for recruitment can be found in Appendix A.

2.6.3 Limitations and Future Research

Each participant received a link to their own Miro board, without being able to see other participants' responses. The workshop was arranged individually to ensure people felt that they were anonymous, but also because, due to location and time constraints, organising a workshop which could be attended by many people at once was an impractical choice. The online format, which required participants' focus for around two hours and individual work without immediate feedback or conversation, could have been challenging. On top of that, participants did not receive any compensation for the work to boost their motivation. In sections connected to the workshop, I may comment on the lack of response from participants on a specific topic. This lack of commentary is, of course, not a nudge to participants, but its origin could be because the artefact did not make people think about it; it may be the presentation of the artefact, but the reason could also be in the workshop format. In the future, with additional resources, the workshop would benefit from doing it in person and with multiple people in the group so the artefacts could spark a conversation.

2.6.4 Participants

Before getting to the central part of the workshop, participants shared the advantages and disadvantages of the synergy between data storage and human memory. P1 reported that they know that they have a storage of knowledge available at one click. Still, one has to be careful about their choice, as while we have an infinite amount of information, we do not have an endless amount of time to consume it. *"Thus, the ability to make a proper choice is a key to an infinite amount of information"*, as P5 commented. Participants also mentioned everyday usage of technology in their memory support, such as password storage, prompts of personal memories when looking at the photos, but also the annoyance on social media, such as Facebook, which reminds them about past events by displaying photographs, and the lack of a straightforward option to turn it off. Another troublesome thing about photos that participants shared was the trade-off: one often exchanges physical photos on paper for thousands of images we can have on our phone. However, the positive side that participants noted was the fast and safe access, as we may have more copies, and unimportant data can be out of sight. Before looking at the four futures, participants imagined the future of memory devices in many ways: as a total merge of human brains with computers, similar to Kurzweil's (2006) prediction, or that a generated

"copy of people" based on their data would be stored in the cloud, similar depiction can be found in the short-movie *World of Tomorrow* by Don Hertzfeldt (2015) but also that memory technology would not change drastically in the future. Participants also expressed their worries about their personal future of the memory devices. For example, participants feared one day they would lose all their data storage or be unable to recognise what is true or false if one breaks into their account and plants "fake" memories. P4 admitted that they had not thought about the future of memory devices. P5 imagined that memory devices would blend our factual memories with their recommendations in the future, so that one could watch and then decide whether they would like to accept it as their memory. P5 also pointed out possible tensions between people in the future, as some will be able to *"still practice memory"* and those who would not be able to do it, which could even lead to a war and discrimination in society. This sentiment focuses on the narrative aspect of memory and the agency of being able to tell a story. Participants expressed fears and hopes toward the future of infinite data storage, which will be further unpacked throughout this thesis.

Chapter 3

Future 1: Continued Economic Growth

3.1 Introduction

A statement known as Amara's law, made by Roy Amara - American scientist and futurist - depicts the importance of looking further into the future: *"We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run"* (in Lin, 2024, para. 3). This chapter will discuss the effects of technology in the short term. Dator's Economic Growth Future tends to be thought of as the nearest one since it is based on the status quo we are living in right now. Despite the ongoing efforts to create a more sustainable, eco-friendly and morally acceptable system, we are stuck in a system – neoliberal capitalism – which promotes overproduction and overconsumption. The axiomatic truth about this future is based on the Jevons paradox. Jevons paradox, or Jevons effect, states that once technological progress creates an opportunity to increase efficiency in the production and usage of the resource, the demand for this resource increases. This means that once the product becomes cheaper, we utilise it even more than before, rather than using it at the same rate, being content with a smaller price. For example, one can imagine a scenario in which a person, let's call him Phil, buys a computer for personal usage with 1 TB of memory. Two years later, Phil goes on vacation, which he decides to kick off by writing poems on the dock of Lake Windermere at sunrise. As he takes off, a giant seagull attacks him. Phil tries to escape, and in an act of self-defence, he throws his laptop (with the poems we will never hear) at the seagull. He misses, but the seagull flies off. Unfortunately, the laptop lands in the lake. It is damaged beyond repair. Phil needs to purchase a replacement. Jevons Paradox suggests that there is a higher chance that this time, Phil will opt for 2 TB memory for the same price as his old computer rather than purchase 1 TB for less money than his old computer. This

also means that this future scenario assumes that the infinite data storage will only further deepen our current relationship with data, and we will swim in the personal junk of life-logging memories.

It is worth adding that the Continual Economic Growth was an early exploration of speculative methods. I chose the Continued Economic Growth scenario as my first attempt to create Design Fictions using Research through Design (explained in Chapter 2, Methods), because this scenario is based on the continuation of the world that I live in. The familiarity of the characteristics of the CEG scenario and the ongoing narratives about the future in my real life were an easier entry point for using new methodological tools. Therefore, the Speculative Artefacts found in this chapter, Continued Economic Growth, are an early work in which I took my first steps in Design. Nonetheless, I decided to include them in this thesis, because while they lack the craft of the proper Designer, all my Speculative Artefacts are far from perfect regarding craftsmanship. Nonetheless, this thesis is not about ideal craftsmanship. It is about exploring future challenges, not delivering a finished product. And while the delivery helps, and in many cases is crucial to make a point, this thesis is focused on the epistemological contribution to understanding the future, not in creating the most provocative and suspenseful scenario. The creation process of Speculative Artefacts was necessary for a deeper understanding of the challenges we may face in the future, which are explored in the Continued Economic Growth Scenario (and other chapters). Therefore, I decided to include my earlier work, as these artefacts were an essential part of shaping my thinking. Moreover, I treat them as data points in the Research through Design method, not the primary outcome, which is knowledge.

3.1.1 Who are we?

3.1.1.1 Data

The examples of life-loggers such as Gordon Bell, presented later in this chapter in more detail, along with the name "life-logging", could give the impression that personal data not only corresponds to events from our life, but it *is* our life, or more precisely, it is a representation of our life. One may come to the conclusion that our personal data is not our property but rather a fleeting essence of our existence - or both - to make things more confusing. Therefore, I will first unpack how data is seen by the law, since law-makers' definitions deviate from life-loggers', and then I will move onto how human identity and memory are linked together.

The General Data Protection Regulation (GDPR) is a European Union data regulation which governs how individuals' personal data is processed (European

Parliament and Council of the European Union, 2016). The GDPR Article 4 definitions lexicon differentiates data into personal, genetic biometric data and data concerning health. While they are all different concerning specific types of data, they all have one thing in common: they are related to data that make a person "identifiable". The first type, "personal data", is more of a broader term and is defined as any information relating to an identified or identifiable natural person ("data subject"). An identifiable natural person is one who can be identified, directly or indirectly, by reference to an identifier such as a name, in particular, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person. The "genetic data" means personal data relating to a natural person's inherited or acquired genetic characteristics. However, it later states that these are data which give unique information about the physiology or the health of that natural person and which result, in particular, from an analysis of a biological sample from the natural person in question. Similarly, "biometric data" means personal data resulting from specific technical processing relating to a natural person's physical, physiological or behavioural characteristics, with explicit conditions that allow or confirm the unique identification of that natural person, such as facial images or dactyloscopic data (fingerprints). The last type, "data concerning health", is personal data related to a natural person's physical or mental health, including the provision of healthcare services, which reveal information about their health status. Thus, the GDPR sees data as a sort of "footprint" of a person, its body in the world, rather than their memory *per se*. Data is treated more like a memory of a person, as a reminiscence of that person, rather than a person's memory. The law is concerned not with the active force of the human memory but with the reminiscence of this person. A person becomes what is remembered rather than who is remembering.

3.1.1.2 Memory and human identity

However, human identity, which GDPR tries to protect, is generally considered to be connected to an act of remembering, rather than the capacity to be remembered by others. Losing memory would be more regarded as losing one's identity than when others would forget about a person. The consequences of such a situation would be different. In the former case, people may still treat the person as the person before losing the memory. However, for that person, it is a stranger's life, unrelated to their current needs and perhaps values, that does not reflect a person's idea about themselves. In the latter case, the environment, so other people, would not behave towards the person as before. While it may be confusing, the person who has not lost their memory and ideas about who they are would not be considered a person without the identity. We tend to think of our identity as an individual capacity to identify

it through the information we have gathered throughout our lives rather than being distributed, even if other people's opinions influence our perception of our identity. A person's identity is often linked with their memory rather than the reminiscence of them, which shows the discrepancy between the relationship between data and memory, data and human identity, and memory and human identity.

In his memory theory, Locke (1689) concluded that memory is the only necessary component of human identity. In his opinion, once a person's memory starts to deteriorate, they also lose their identity. One may argue that Alzheimer's is a person's identity thief. However, authors of one study from 2015 claimed that our memories do not necessarily serve as bricks to our identity, but our morals do (Strohminger and Nichols, 2015). One may argue that morals are, in fact, lessons learned from our past, compressed memories into knowledge. Thus, it could be useful to create mechanisms in infinite data storage to create such "lessons learned" so we could somehow interact with a large amount of data. Knowledge about ourselves serves an important purpose. It makes for the backbone of our identity, which has an effect on our morals. This is important not only on the personal but also on the societal level. However, more is needed to solve the problem of the literacy metaphor, which treats memory as a physical space where we collect and gather memories like objects. Social contract theory, a concept discussed by Jean-Jacques Rousseau in his 1762 book frames this problem differently. Social contract theory is a philosophical and political model in which individuals hand over some of their freedoms to the authority, in exchange for maintaining social order and receiving protection from the State (Rousseau, 2011). From this point of view, morals are not the product of one's memories, but rather derive from imitation of others.

The opposite of Alzheimer's disease was the case of Journalist S. He was the subject of Alexander Luria's (1987) study, who was a neuropsychologist. Journalist S. happened to remember everything; he could memorise long chains of numbers, poems in foreign languages and complex mathematical formulas after hearing them only once. However, his abilities, or what one may call a gift, were, in fact, a burden. He could not make sense of the world. Journalist S. had problems understanding the meaning behind the words, which differed from their literal meaning. He could not recognise faces as he found them too dynamic and constantly changing. One of the unexamined features of his memory was that he reported being able to remove facts from his memory if he so consciously desired. In fact, Journalist S. could be thought of as a living example of the Chinese room thought experiment (Searle, 1980). The argument known as the Chinese room was applied to the idea of "Strong AI", which Searle argues cannot exist. Searle states that if he, with no knowledge of Chinese, stayed in a room alone and followed a computer programme that could respond to Chinese characters slipped under the door, meaning he replied only with the help of the machine, he

would not be demonstrating his knowledge of Chinese. There would be only an appearance of a person understanding Chinese. The difference between retrieving information and understanding information is enormous. In fact, Searle's Chinese Room Experiment was based on the Turing Test idea. In 1950, Turing came up with a test that would evaluate a machine's ability to exhibit human intelligence. If a person, who does not know whether they are asking questions to another human or to a machine, considers the machine's responses to be human responses, then the machine passes the Turing test (Turing, 1950). If we consider the Turing Test as a reliable source of knowledge, we can, of course, fall into a trap. Journalist S. would probably not pass the Turing test. On the other hand, people tend to unconsciously assume that computer behaviours have a deeper meaning. This phenomenon is called the Eliza effect. Its name comes from the chatbot ELIZA, which was created in 1966 by Joseph Weizenbaum. This effect is especially visible with words; the example given by Douglas Hofstadter (1996) presents an automated teller machine which displays the words "THANK YOU" once the transaction has ended. These are only a string of symbols printed by the programmed machine. Nonetheless, we may feel or think that the machine feels gratitude. We believe in an emotional response from the AI that does not exist.

In 2016 the Oxford Dictionary announced that the title of the Word of the Year would be awarded to "post-truth". Post-truth relates to circumstances when emotions and personal opinions are more powerful to shape public opinion than objective facts. It was not a randomly chosen word: the year 2016 became the year of post-truth because of the presidential election in the United States and the EU referendum in the United Kingdom. One may argue that there must be a reason why people decide to rely on emotion rather than data. It seems that reliable and useful data are not as accessible as we could assume. In a world where we are bombarded by different information, contradictory statements and, in general, non-stopping messages from our virtual environments, it is hard not to give up on rationality. After all, how does one find it in infinity? Do we have any chance of competing with AI and big companies in this understanding infinity? In his book *Delete*, Viktor Mayer-Schönberger (2009) writes: *"Quite literally, Google knows more about us than we can remember ourselves"* (p. 14). I cannot agree. First of all, Google "knows" things that are not interesting or important to us. What Google remembers does not constitute "us"; it is merely information about us, personal data, but not personal stories. Google capitalises on our memories, not only in the sense of money-making but also in their meaning, in the sense that this money-making is the meaning Google "decides" to create. Thus, while I remember nicely spending time on my friend's birthday and giving her earrings from her favourite shop, Google's "memory", which corresponds to my own memory, is that I bought earrings in this specific shop. The meaning-making is different. Second, Google may "know" more about us than we remember, but that does not

matter. We are the ones who constitute who we are; Google's information about us does not. As I mentioned before, this data is a reminiscence of a person, not memory of a person. Moreover, is Google capable of *knowing* things? We forget things for a reason. Someone's garbage can indeed be someone's treasure. While, for our minds, some information is garbage, for owners of big companies, it can be a treasure because the more information they have, the better it is for their pockets, as the machine can spit out yet more information about the consumers so they can be further exploited.

Moreover, people do not see the meaning and value of their data, and rightfully so. However, their value has changed, and big companies "know" it. Knowledge has always been expensive. We may not see it because of the abundance of content that comes our way these days. In the past, creating one book was costly and time-consuming, and one needed skills in order to make one. Even in the era of the internet, we still have universities. We still have schools. Why is it so if we can google everything? Educational institutions will be changing, and different knowledge will need to be brought up, more like using external knowledge. However, I do not think they will disappear. Universities may become even more important than before. When no forgetting is introduced in our external memories, making sense of our personal data will be even harder. Producing meaning-making will need to be learned. The problem has changed from "data is too expensive" to "it is too cheap". It is too cheap, so we will swim in the ocean of data. There are no connections, only the horizon. I learned the expense of data storage when I was around eight years old. I went on a school trip to see some old, vintage trains. My father gave me a camera; back then, we still had film cameras, meaning I could take only around 30 pictures. It was not cheap to develop the photographs, and you also had to wait around two weeks for them to be developed. After the trip, I returned the camera to my dad so he could take the films to be developed. When the pictures were finally ready and my dad came back home with them, I did not expect him to be mad, but boy, he was. All the pictures were of the trains I saw and different exhibition parts in the museum, like old tickets and conductors' hats. "Where are the pictures of you and your friends? These are the things that are worth taking pictures of, not old trains!" my parents tried to explain. I was not a kid who was particularly interested in trains; I just wanted my mom and dad to experience what I had seen. I wanted them to share this experience with me; I wanted them to be there with me. We had two completely different concepts of how to use external memory meaningfully. I need to agree with my dad from the past; it would be lovely to have pictures of my friends from that trip, although it is clear where my motivation lay at that time. The times have changed; no one would be mad at kids to take pictures of old trains these days. After all, they can take as many pictures as they want. Moreover, no one would be mad at kids taking pictures of solely old trains without a picture of their friends. Who cares? We can take these pictures later. Can we, though?

Knowledge is expensive because it has a meaning. If something is "too cheap", it is not knowledge anymore. This is the essence of our memory; not what we remember or not even how, but why we remember it and how much energy and effort we put into it. Understanding what you remember is crucial. As Edelman and Mountcastle (1978) discussed in their book, we have mindful brains, which are emergent outcomes of our social and environmental experiences. Similarly, in physics terms, we can say we do not live in a vacuum. As Skene (2019) stresses, *"It is the 'unknowingness' that defines the mind, whereas knowingness defines the brain, and cognition becomes a process of filling in the gaps based on our unique experiences".* (p. 18) "Unknowingness" defines our memory as we make sense of it.

The semantic field of the word *capturing* is of domination and power. The premise of infinite data storage is a socioeconomical problem – who will have access to data, and who will be able to actually use it? While some people will be able to predict their children's future based on their psychological and behavioural traits when they are five years old, others will be able to order takeaways through virtual assistants at most. Moreover, the questions that beg the answers are: who will be gathering this data - and for what purpose? There is a vast debate on services such as Uber. Since its founding in 2009, the service has been surrounded by controversy. While its "sharing economy" slogan is more than questionable, undoubtedly it revolutionised not only the transportation service for its users but the overall industry as well. Taxi drivers had no choice; they had to start using apps as well, such as iTaxi, a Polish transportation service that recruits licensed taxi drivers. However, iTaxi has a different approach from Uber. ITaxi uses an algorithm to assign orders to drivers based on their "scoring", and the time they would need to get from their current location to the client. While the latter is quite self-explanatory, the former is debatable. Drivers receive badges or titles based on their score in different categories. For example, drivers can receive the title of "a demon for work" (Polish "titan of work"), "Terminator', "Quality Leader" or the title of the "Lord of (gear) selectors" (where "selectors" also correspond to people who select your car on taxi stands). All titles are congruous with power and control over others, which could give a false and toxic impression of self-agency while, in reality, responding to the algorithm's designed patterns. One of the main categories considered in scoring is "Availability", which corresponds to the number of hours drivers are making themselves available to receive orders. There is a limit of hours that could be scored; however, iTaxi does not reveal the actual limit. We can imagine that if the limit of scored hours is, for example, twelve, then the driver will be "available" during these hours to get a better score, which could result in compromising the security of the drive itself and drivers' time off work. Ultimately, the more points you get, the more orders you get; the more orders you get, the more money you make. The more money you make, the more money iTaxi makes. The "more and more" attitude creates a work environment in which you have to compete

with yourself as well as other colleagues all the time, which potentially could endanger drivers' work balance and the safety of the app's users.

To operate, Uber collects data that further helps it to develop the platform and *improve the rider experience*. In 2012, Uber itself showed what they could find in their data. Uber's employees decided to check which city's one-night stands are the most prevalent. They calculated how many people took a ride between 10pm and 4am on Friday or Saturday night, and then took a ride home from around the same place 4-6 hours after the first ride. They named this calculation "The Ride of Glory". While their results are not in the scope of interests of this section, the act itself is. Uber showed that "having" this data is powerful as it is just a matter of asking the right, or not that right, questions. As they wrote: *"The world has changed, and gone are the days of the Walk of Shame. We live in Uber's world now"* (VOYTEK, Uber.com, 2012), where apparently our lives have become an ultimate walk of shame since companies obtain and use data of our behaviour from any interaction we participate in with them. It does not concern only services, which we have some authority to choose in our leisure time, but also our workplace, which can be much harder to change. As mentioned, ITaxi is an example of recording how much people work. The following example, Miłek (or "Nicey") from the Polish company Quantum CX, is connected to collecting employees' data to control how they work, using it to make them more efficient. Before the coronavirus pandemic - due to which Quantum CX needed to suspend their business - Miłek was a device which calculated how many times an employee smiled while interacting with customers. Customers' smiles were also registered to check whether employees smiling leads to customers smiling back. Moreover, customers and employees had a chance to receive rewards: employees collected points for each smile, which they could later exchange for prizes. Clients' smiles were to be exchanged for charity donations. In his open letter, the CEO and Founder of Quantum CX Bartosz Rychlicki (2021) lists different factors which contributed to the suspension of their business. Except for the ones related to the pandemic, they emphasised how GDPR negatively influenced their business; the general confusion about what GDPR conveyed increased the hostility towards Miłek by associating it with "scary" Artificial Intelligence (Rychlicki, 2021; Lindley and Coulton, 2020; Cave et al., 2018). Quantum CX noticed that instances of anonymous smiles are not treated as personal data by GDPR. However, devices such as Miłek make us question not only what should be considered personal data, but also the act of collecting data (whether anonymised or not) and surveillance. B.F. Skinner (2019), the author of *The Behaviour of Organisms* and the father of Behavioural Analysis, would agree that positive reinforcement - thus the rewards that were associated with the behaviour - in this case smiles, had the power to change the behaviour of Miłek's users, i.e. make employees smile more frequently. While the idea of counting smiles may not seem harmful, it may give us quantifiable information about ourselves and

things we did not know before. For example, if a person considers themselves a "nice" person and it is a core trait of themselves, but then does not get as many rewards as their colleague, they may start to question whether they are who they think they are.

Learned helplessness is a term that could help explain why people allow such devices to be a part of their everyday lives. Its roots are in the science of Behavioural Analysis. It describes a condition of a person exposed repeatedly and beyond their control to a stimulus that affects them negatively. After some time, a person stops believing they can control the situation. Thus, even if they have an opportunity to escape or change the situation, they are unable to act upon it (Seligman and Maier, 1967). Applying it to the data collection done by big tech companies, it seems that people may be in the learned helplessness mode, in which they do not feel like they can change this, as they do not want to cease to use their services. On the other hand, learned helplessness is also an interesting example of how our memory shapes our behaviour. Learned helplessness is an example term in which behaviourism shares similar ideas behind behavioural conditioning with the evolutionist view (which states that we have a memory to perform specific tasks) and Bartlett's (1995) view (that prior knowledge influences memory). Both classical and operant conditioning is a form of memory that associates one's responses with a given stimulus. In classical conditioning, the response is involuntary and comes after a stimulus from the environment. The role of a learner is passive. In operant conditioning, we learn how our voluntary behaviour creates a consequence. The role of a learner is active. However, we rarely consider memory an act or a learning process. We are more prone to think about it as neuroscientists, who see memory more as a computer. Lashley (1950) coined the term "engram" in order to represent a memory trace in the human brain. Thus, neuroscientists think of memory as software working in our brain – known as the hardware. Again, here we have the idea that there is "something", that memory is a quantifiable thing.

Returning to the "ultimate walk of shame" phenomenon, Mayer-Schönberger (2009) discusses different situations of online posting. One of them - the drunken pirate - considered a teacher was fired from their job because of a picture posted on Facebook being dressed as a pirate and drinking what we might presume to be alcohol. These stories show that we will never forget, and the consequences of never forgetting are very real and shown in the present. However, I believe that giving cues is neither forgetting nor remembering; it is recalling. Recalling and Remembering are different in a way that when we say "remember to do x", we also mean "do not forget". However, when we say "do not forget", we do not mean "recall". Mayer-Schönberger's (2009) *"suggestion is an expiration date for information to confront us with the finiteness of memory, and to prompt us to understand (and appreciate) that information also has a lifespan"* (p. 18). This leads us to question whether all information should have the same expiration date. And should there be different rules for such expiration dates?

For example, in 1977, film director Roman Polanski was arrested and charged in the USA for sexual abuse. To avoid facing prison, he fled. Many people, including another famous Polish film director Agnieszka Holland, believe that he should be pardoned, and the case should be forgiven and forgotten. This is not only because of the time that has passed but also because Polanski is considered to be an important film director, and his work, apparently somehow, should cancel the crime he committed. We put an expiration date on things we have done or not done. How should these expiration dates be assigned? Suppose we assume that we can "forget" sexual abuse cases, as Ms Holland proposed, and we can forgive people who are, for example, well-known artists? In that case, we are creating and mimicking the widely criticised Social Credit System, a system developed by the government of the People's Republic of China. This numerical system gives points to citizens for their good behaviour, for example, paying taxes on time, and it can also label people as untrustworthy if they do not have enough of these points. The consequences of these labels are tremendous. You may not be able to buy a train ticket, or your child will not be able to get to the university because you do not have enough points. This is the side of the Social Credit System usually discussed, taking away the power from humans and giving points for debatable moral actions, i.e. paying taxes on time. For example, in the United States of America, several states' laws take away the power to vote, one of the most democratic rights, precisely for owing money to the state. For example, if a person has an outstanding fee for their conviction (tax evasion is considered a federal crime), they are not allowed to vote. The access to vote depends on the access to money to pay for the legal fines and fees. Of course, it hits in the most marginalised groups (CLC ADVANCING THROUGH LAW and Civil Rights Clinic, Georgetown Law, 2019; Brink, 2020). The technological path we are taking makes the Matthew effect grow exponentially, where the rich become richer, and the poor become poorer, also in their rights.

Such an exchange system (after all, we live in a capitalistic world) not only entails that some have little power, but it also gives too much power to some individuals. If we apply this situation to Mr Polanski, what if by making many famous movies, he gets enough points to get himself out of trouble by using and use his points to pay for his crime? This logic, however, shows that the Western world already employs such a Social Credit System but through money. Maybe the Chinese government have simply applied it to a currency different from that of the Western world. As Rieff (2016) said: *"The takeover of history by memory is also the takeover of history of politics"* (p. 63) but as Josipovici (2020) replied: *"Politics founded on myth and simplification, on a binary opposition between black and white, bad and good, perpetrators and victims is a dangerous game that nearly always ends badly"* (p. 37). In these cases, forgetting or remembering one's crimes could be only illusions of agency over the information, and they are instead a reflection of society's state. So, remembering and forgetting

are not always primarily the means to a specific goal or what causes something to happen, but they are the outcome, the result of how our society works. In this case, perhaps forgetting is less important and damaging than normalising things. There may be voices raising the point that it is inappropriate having a picture on Facebook with a beer, in a funny costume and being a teacher at the same time. The same voices may not find it disturbing to forget someone's sexual assault only because this person ran away to another country to not get sent to prison. However, these topics are sensitive as, sometimes, it is hard to judge people from the place and times we find ourselves right now. Can I question somebody's morals if they lived 300 years ago? Some people may say no, and some people, such as Black Lives Matter protesters, would not agree, as statues of Founding Fathers toppled across America in 2020. For example, "The right to be forgotten" is the right put into practice in the European Union and Argentina to have private information removed from Internet searches (European Parliament and Council of the European Union, 2016). It seems that the problem is fixed - no more drunken pictures on Facebook feeds. However, can this idea hold its promise in the infinite data storage scenario? Is it ethical to give people something, in this case, all the data about their lives gathered through different search engines, websites and devices? They would not understand the data, nor have any idea what they could find there, nor what they were really looking for. More importantly, they would have no idea what to do with it. It is again some sort of capitalistic view of a free market where only the most powerful win. In this case, it is not someone with the biggest muscles but with the knowledge of what could be done with a vast amount of data. I would be petrified if someone gave me an external hard drive, telling me: "There you go, this is your life. Do something with it or don't do anything at all", because in this case, not doing anything at all is also a decision. We will put ourselves in a situation where we have to choose, and we have to choose wisely and with the best of our intentions. Will we spend our whole lives curating memories to make sense of them or finding new meanings we have not seen before? Will we keep trying to find something that could embarrass us so that we could delete it? Some people will decide to become "lone wolfs" (Hong, 2020), which means they will choose to delete all their data and live off-the-grid; very few will decide to curate their memories, others will decide to sell them, many will not know that they are being robbed out of them, some will exhibit learned helplessness, and some will genuinely not care.

Notably, in 2024, the EU AI Act was introduced, a new legislation on the regulation of AI. According to the Act, one of the prohibited actions is the usage of the social scoring system, which could harm people outside of the data collection context. We can read in Recital 31 that:

The social score obtained from such AI systems may lead to the detrimental

> *or unfavourable treatment of natural persons or whole groups thereof in social contexts, which are unrelated to the context in which the data was originally generated or collected or to a detrimental treatment that is disproportionate or unjustified to the gravity of their social behaviour* (EU Artificial Intelligence Act, 2024).

However, we get a more precise statement in Article 5 of Prohibited AI Practices. Here, it prohibits:

> *(c) the placing on the market, the putting into service or the use of AI systems for the evaluation or classification of natural persons or groups of persons over a certain period of time based on their social behaviour or known, inferred or predicted personal or personality characteristics, with the social score leading to either or both of the following:*
>
> - *(i) detrimental or unfavourable treatment of certain natural persons or groups of persons in social contexts that are unrelated to the contexts in which the data was originally generated or collected;*
> - *(ii) detrimental or unfavourable treatment of certain natural persons or groups of persons that is unjustified or disproportionate to their social behaviour or its gravity.*

This means that the AI EU Act does not prohibit social scoring as long as it is used for the intended purpose. It makes sense, as AI could be used to evaluate specific actions within the organisation, such as checking the CVs of potential candidates in the firm. The usage outside of that context, so unrelated to the original data collection, is prohibited. Thus, practices such as ITaxi are still operating in accordance with the Act.

There is undeniable power in information found in access to it and the lack of it, the right to store it, make sense of it, and the right to delete it. Right now, data storage is considered a storage room for creating a memory of a person rather than a memory for a person. Users' life-logging practices and personal data hoarding by big companies give rise to questions related to moral principles related to data and memories. Who has a right to one's personal data? Who says how and what one can remember and forget, and who decides what others remember and forget about us? How can such a right be exercised in the event of an infinite data storage scenario? In the next section, I will explore these questions through the Speculative Artefacts I have created based on the Dator's Continued Economic Growth scenario.

3.2 Artefacts

In this section I present Speculative Artefacts embedded into the Economic Growth World.

3.2.1 REWIND2

The idea of lifelogging is not new. In 1945, Vannevar Bush described a hypothetical device called Memex (from *memory extender).* Memex would allow its users to compress all books and records, just like Laßwitz's (2010) Universal Library, as well as communications and other personal errands. At the beginning of the 2000s, Microsoft researcher Gordon Bell conducted an experiment inspired by Bush's imagined device. MyLifeBits was a project throughout which Bell used a wearable camera to capture all his life. He also digitised articles, CDs, letters, pictures, voice recordings and so on, creating a lifetime store of *everything.* Bell and Jim Gemmell (2009) described the experience in the book called *Total Recall.* In the next decade, researchers from Lancaster University conducted a series of experiments under the research project RECALL. Their goal was to understand the impact of capturing, reviewing, and selecting memory cues of previous experiences on human memory recollection (e.g. Bahrainian and Crestani, 2016; Clinch et al., 2016).

Figure 3.1: REWIND2 device; a portable "button" for deleting data. Source: Author.

Indeed, infinite data storage affords us the opportunity to store everything (Norman, 2002). Thus, in the future, people may opt to collect all data that is somehow linked to them, similarly to the MyLifeBits project. I created the artefact REWIND2 for

people who, as their default, collect all their data (Figure 3.1). The younger brother of REWIND, an app that manages your data, REWIND2 is a device that can instantly remove data acquired up to ten seconds before pressing the button. If the button is pressed for two seconds or more, then it immediately deletes all data from the present moment as long as the button is pressed. This would allow users who would like to get rid of their data to avoid unwanted recall of the situation in place. They would not have to return to it later to remove it and be exposed to unwanted recall (Sellen et al., 2007). REWIND2 is not the first product in its series, as I wanted to give an impression of a well-established product line similar to Apple's iPhones. I created an additional Facebook page as a sort of spin-off to its primary usage, as people may want to play with their data and share embarrassing moments for fun before getting rid of data related to them (Figure 3.2). Moreover, one could imagine how REWIND2 could be used, or more precisely not used, as a form of good manners. For example, if one uses REWIND2 while being around another person, it could purposefully (or not) hurts someone's feelings.

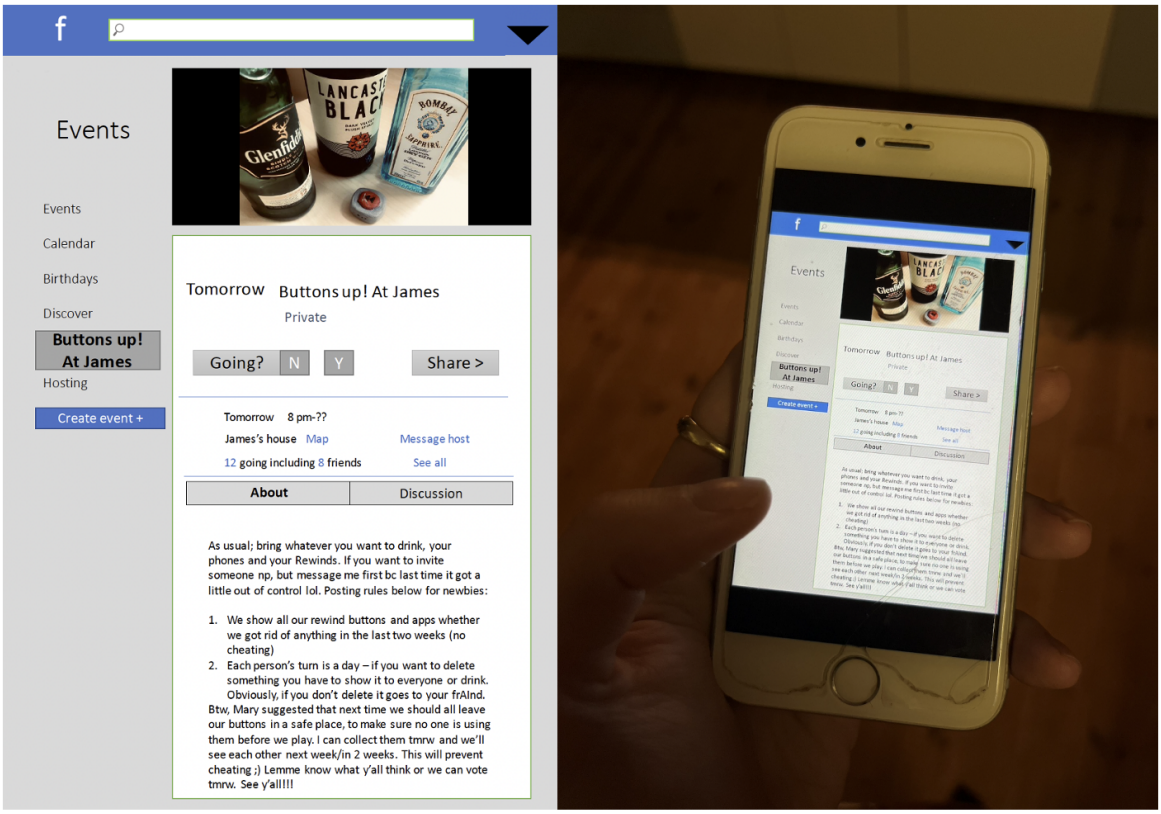


Figure 3.2: Buttons up!; a drinking game is a possible way to use REWIND2. It illustrates the new technology may have different applications than its original one. Source: Author.

3.2.2 FrAInd

One of the problems with a vast amount of data, or an infinite amount of data that we may have is meaning-making. We will find it challenging picking out the sense of the infinite nonsense, just like in the Universal Library, which I discussed in the Introduction, Chapter 1. Hopes for remedying this situation rest on Artificial Intelligence's non-existent shoulders. Influenced by philosophical debate (e.g. Searle, 1980) and social discussion on how Artificial Intelligence mimics our minds, I conceptualised a frAInd (Figures 3.3 and 3.4). FrAInd is a bot that would create meaning for us out of our memories, or more precisely, data and digital input in the REWIND application. One may ask, how frAInd is different from Alexa? After all, Alexa is a cloud-based voice service or virtual assistant that provides us with weather information, creates a to-do list, or plays our favourite song. However, frAInd would have a different purpose. We do not need friends to know what the weather will be

like tomorrow. The scope of this piece is not to define friendship, but one of the beautiful features of friendships is becoming the person that one is. Similarly, digital memory may be more about identity construction than memory itself (Chapman, 2008). While Alexa is a tool for managing our semantic knowledge (facts about the world), frAInd would help us with our episodic knowledge (facts about ourselves). Moreover, Alexa is an example of symbolic AI, while frAInd would be classed as non-symbolic AI. To recap, symbolic AI depends on explicit symbols of knowledge, such as the formal language of mathematics and logic, when processing information. Since symbolic AI uses if-then logic, one can easily interpret how it came to a specific conclusion. On the other hand, non-symbolic AI is not as transparent in its process as symbolic AI. It mimics the human neural system, which means it keeps learning to recognise patterns and make predictions. While it handles more complex tasks than symbolic AI, its outcomes are not easily interpretable. It is also worth noting that, unlike Alexa, frAInd as a default does not have a particular name, as I did not want to enforce gender into the design as Mr Bezos did. However, it is important to note that frAInd is a case of the anthropomorphisation of AI.

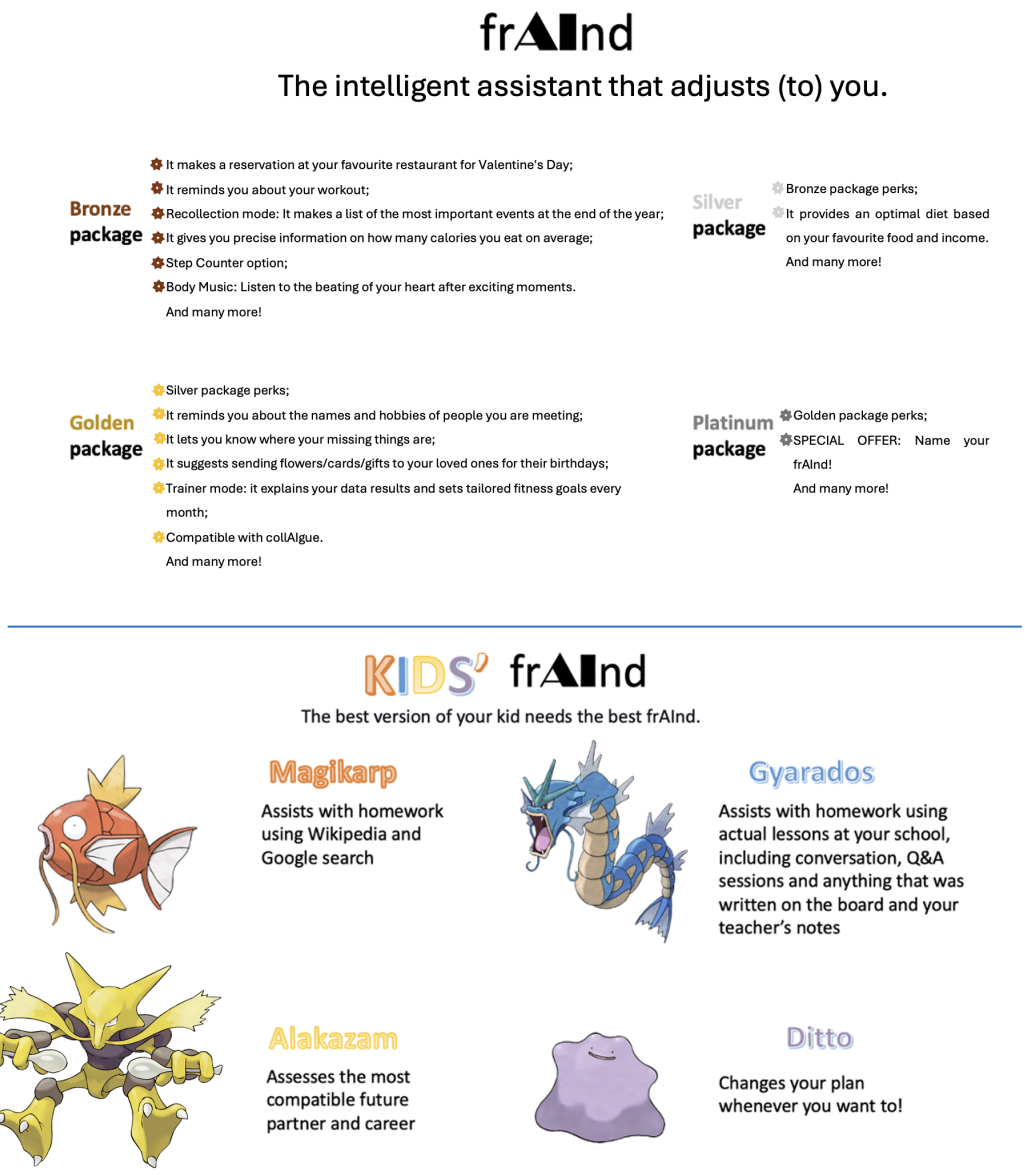


Figure 3.3: FrAInd is a smart assistant for adults and children. Source: Author, after https://bulbapedia.bulbagarden.net

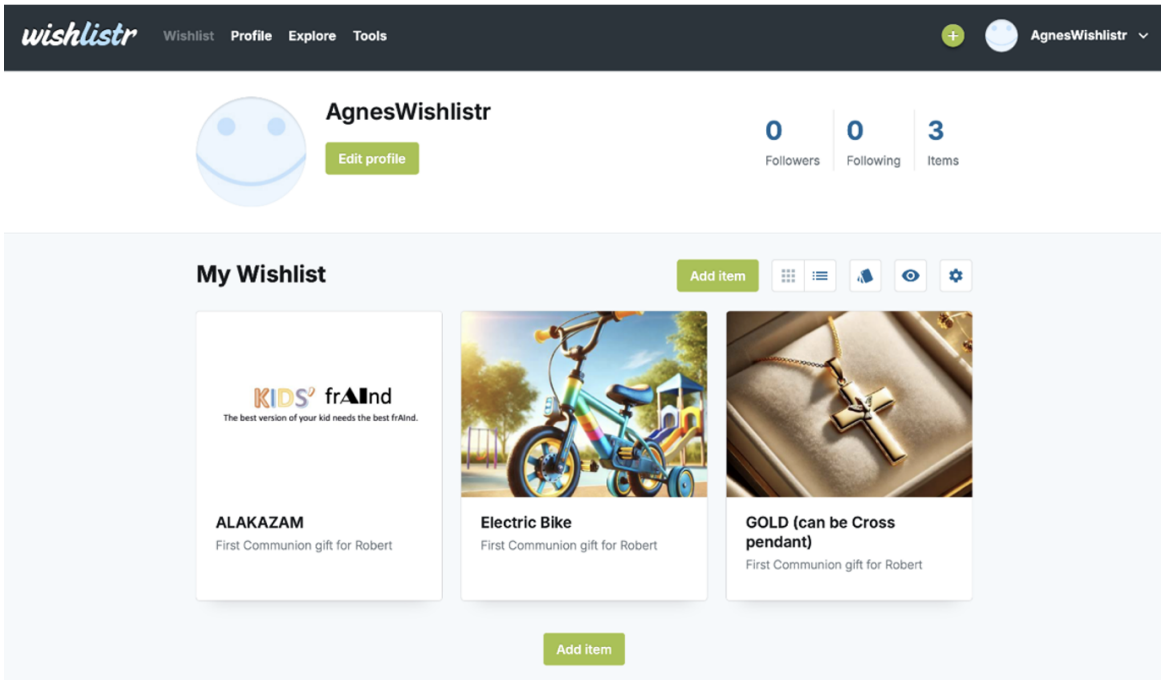


Figure 3.4: An online gift list shared for the first communion, on which one of the presents is frAInd. Pictures of the other gifts were generated using DALL-E 3. Source: Author.

Literature and movies are full of both utopian and dystopian depictions of Artificial Intelligence. One may think that frAInd could be a friendly and quirky robot, like C-3P0 from *The Star Wars* film series (Lucas, 2013) or Oscar, an automaton from the point-and-click game *Syberia* (Sokal and Microids, 2002). However, I conceptualised frAInd without a body for a reason. First, I did not want it to be perceived as an entity with an identity, needs, etc. Second, I tried to minimise the risk of the Uncanny Valley effect, in which people feel revulsion towards things that look like living beings, but not quite (Mori, MacDorman, and Kageki, 2012). For example, let us compare two movies, Steven Spielberg's and Ian Watson's *A.I. Artificial Intelligence* from 2001, and Spike Jonze's *Her* from 2013. In the former, a married couple, Henry and Monica, are devastated after their son has been placed in suspended animation. As a "replacement", they are given David, an android who looks like a human child. Initially, Monica feels strange and uncomfortable around David. He is the most advanced "mecha" from Cybertronics Corporations; other androids look artificial; for example, their hair is not moving. Yet, David seems to be *almost* a real boy. He is programmed to love and to be loved. Yet, his features make him somewhat strange; for example, he does not blink. This *almost* factor is a fundamental reason why Monica feels uneasy with her "new son" - it is the Uncanny Valley effect.

On the other hand, the movie *Her* tells the story of Theodore, a letter writer, and Samantha, an artificially intelligent virtual assistant. Samantha does not have a body, only a voice, but she is advertised as "consciousness". Even though she is not a real person, Theodore falls in love with Samantha, and she seemingly falls in love with him. Of course, this is not a romantic comedy type of situation. Still, it illustrates that humans feel more emotionally comfortable around entities that only, in some ways, resemble humans rather than appear as almost-humans.

Moreover, FrAInd elicits a question of elitism and technological exclusion. FrAInd is not for free, and, depending on how much its version costs, it provides different benefits and functions. Technological advances are not free of economic discrimination, and frAInd is an example of how data management in the future will rely not only on technological literacy but also on our financial status and economic situation.

3.2.3 Leaflets

Leaflets are not pieces of imaginary equipment or devices, but they showcase the problem that users may face in a world of infinite data storage – how should they get rid of their data, and should they give it to someone else for an incentive? The meaning-making shifts from the owner of memories to other entities with access to data. Moreover, the leaflets illustrate the problem of cognitive capitalism – they ask whether we can apply the same issues of capitalism to our thoughts. In his famous

novel *1984*, George Orwell (2013) wrote: *"Who controls the past controls the future: who controls the present controls the past"* (p. 162). Orwell published these words in 1949, but they have not been outdated as yet in the 21st century.

Moreover, our data may become an equivalent of our votes and money, something we can exchange for something else. Of course, information was always worth other goods. Education, important facts in a case of murder, and the time the train will leave are all important. However, the change will be in the scale, and therefore, opposite to the examples I have provided above. These examples are the fished-out, relevant information, not the sheer amount of unused data that does not make sense for the user unless they have an aid. Thus, the meaning-making will shift from creating meaning out of data to creating meaning by using data for a specific cause, which is already connected to a particular meaning. For this reason, I present four different leaflets from very different entities: the World Wildlife Fund, a world-leading conservation organisation (Figures 3.5 and 3.6); Zara, a fast-fashion brand and part of Inditex - a clothing company which is one of the biggest distributors of clothes in the world (Figure 3.7); the United Kingdom's government (Figure 3.8); and a somehow shady-looking leaflet that promises to take care of the data-mess problem for free (Figure 3.9). All these represent different aspects of our lives, morals and possibilities. I would not like to offer judgment here on which one is better or worse to choose, but rather to show that navigating our relationship with our data may be much less of a personal matter than we may think.

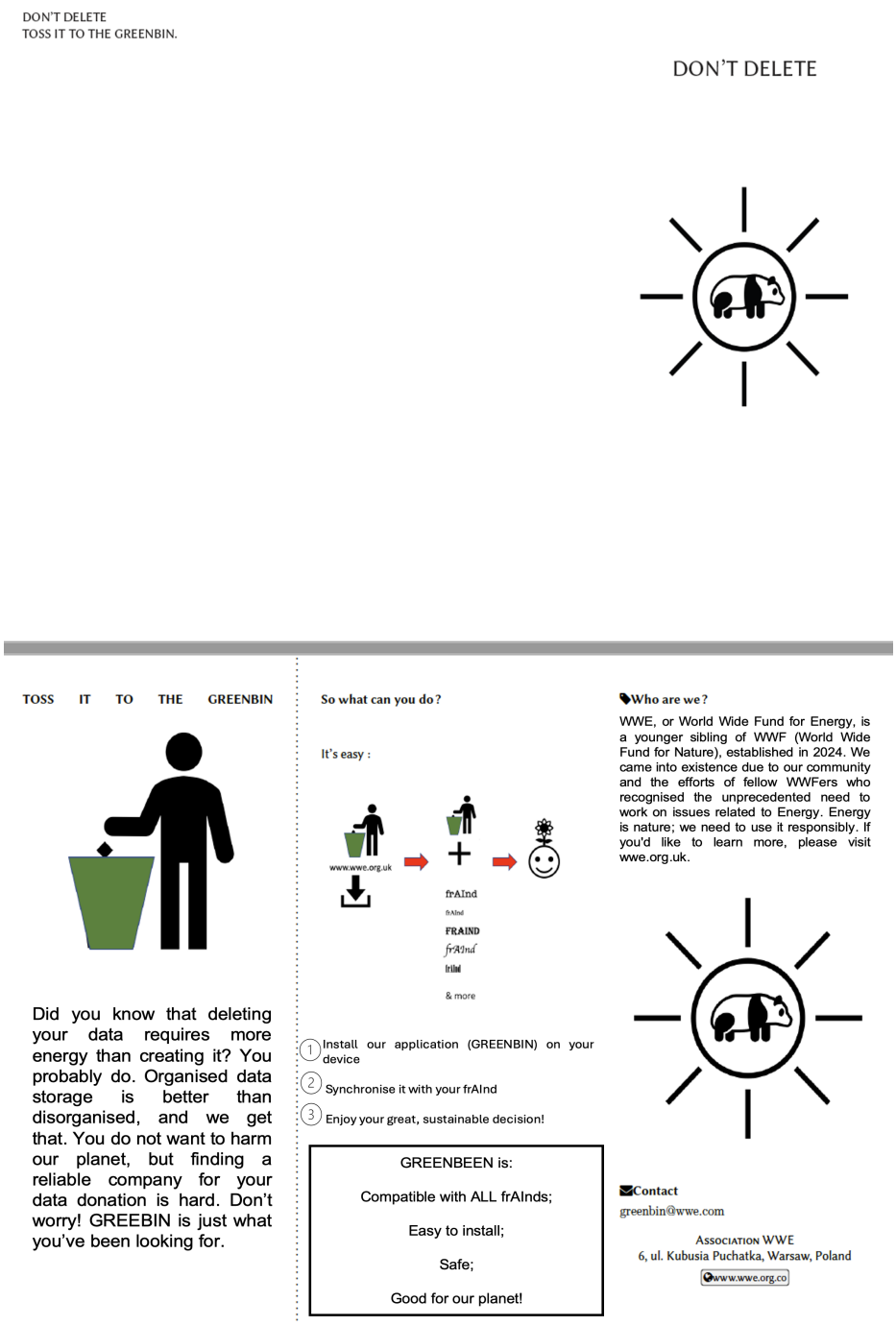


Figure 3.5: WWE/WWF Donation Leaflet focused on the problem of energy consumed for deleting data. Source: Author.

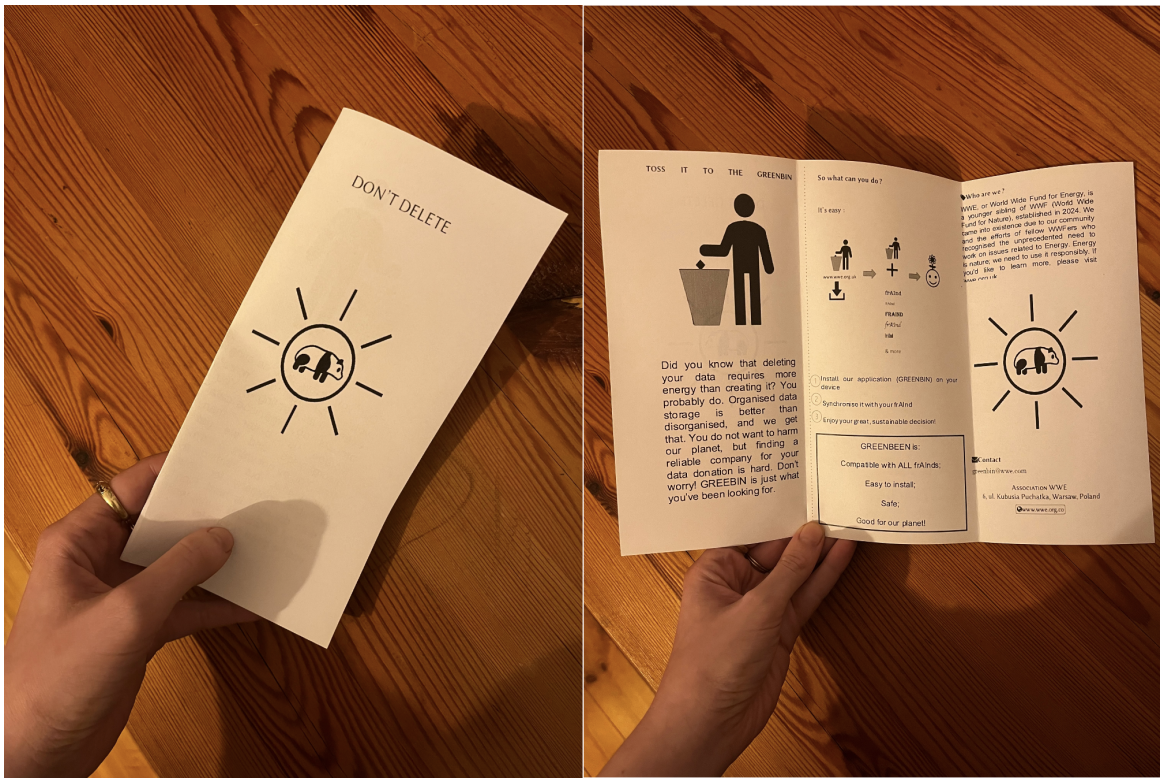


Figure 3.6: WWE/WWF Donation Leaflet focused on the problem of energy consumed for deleting data. Source: Author.

Figure 3.7: Zara leaflet, a greenwashing strategy to acquire data from its customers. The below picture was created using DALL-E. Source: Author.

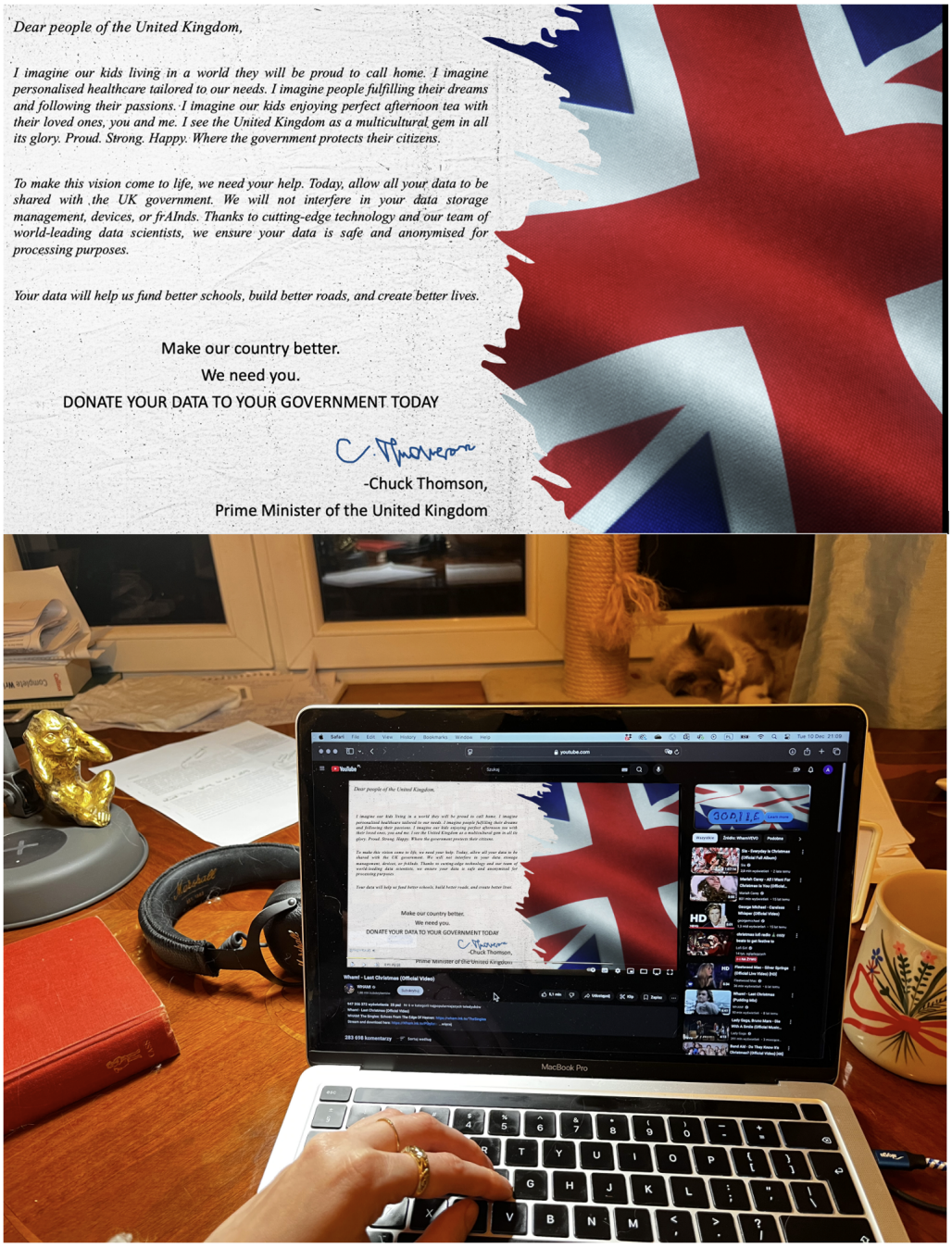


Figure 3.8: A UK government leaflet that calls for data donation. Source: Author.

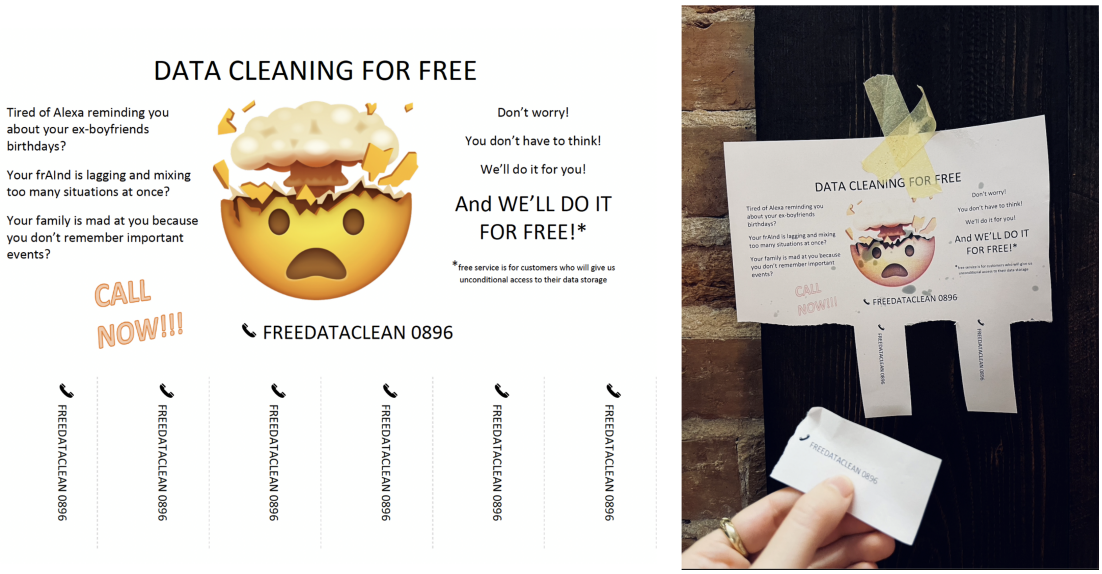


Figure 3.9: A fly posted leaflet that promises to clean one's data storage for free. Source: Author.

3.2.4 Newspaper

The Newspaper's role is to provide further context to the artefacts and enhance the future world. It is one of the artefacts, alongside the narrative snippet that follows it, that helps to flesh out the world in the Design Fiction realm of this future scenario (Figures 3.10 to 3.13). Data News would come to one's email as a subscription, in a PDF mode, so one could print it or read it on an eReader device. Data News is free; In the Continued Economic Growth scenario, that would mean that the owners receive money differently, probably through managing the repository of many email addresses; another node to ethical discussion of this chapter. Moreover, the Newspaper includes an announcement about the new GDPR article, a Speculative Artefact from the Chapter 4, Transformation, revealing fluidity between different future worlds. I aimed to depict that futures are constantly made rather than being a point to which we arrive.

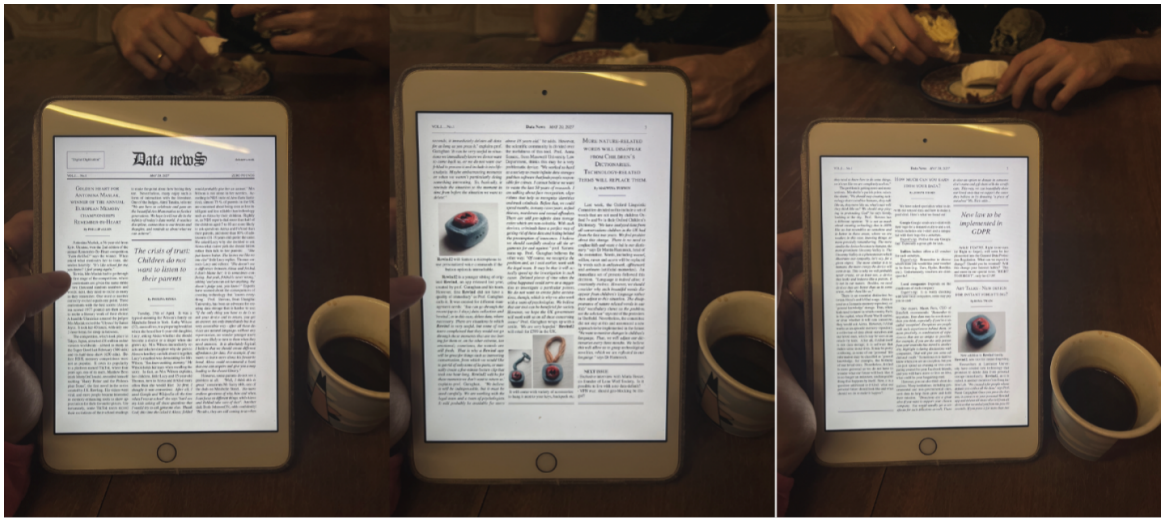


Figure 3.10: Presentation of *Data News* Newspaper artefacts. One may enjoy it over coffee. Source: Author.

"Digital Digitisation"

Data newS

datanews.co.uk

VOL.I. . . No.1 *MAY 20, 2027* £9.99

Golden heart for Antonina Maslak, winner of the annual European Memory championships Remember-by-Heart

By PHILLIP ALLEN

Antonina Maslak, a 56-year-old from Kyiv, Ukraine, won the 2nd edition of the annual Remember-By-Heart competition. *"I am thrilled!"* says the winner. When asked what motivates her to train, she smiles heartily: *"It's like school for me, you know? I feel young again."*

To win, Mrs Maslak had to go through the first stage of the competition, where all contestants are given the same stride of 2,000 random numbers and words; next, they need to recite as many as they remember. One word or number correctly recited equals one point. Three contestants with the best scores (Antonina scored 1977 points) are then asked to recite a literary work of their choice. A humble Ukrainian amazed the judges: Mrs Maslak recited *Ulysses* by James Joyce. It took her 40 hours, with only one 2-hour break for sleep in-between.

The competition, which took place in Tokyo, Japan, attracted 450 million online viewers worldwide - almost as many as the Super Bowl last February (500 million) and its half-time show (650 million). Before RBH, memory competitions were not as popular. It owes its popularity to a platform named TikTok, where four years ago, one of its users, Matthew Bern (nick MattyOnClouds) recorded himself reciting 'Harry Potter and the Philosopher Stone', the first novel in the series created by J.K. Rowling. His videos went viral, and more people became interested in memory-enhancing tools to show appreciation for their favourite pieces. Unfortunately, some TikTok users record their recitations of their school readings to make the point about how boring they are. Nevertheless, many enjoy such a form of interaction with the literature. One of the Judges, Aimi Tanaka, tells us: *"We are here to celebrate and pass on the beautiful Ars Memorativa to further generations. We hope it will not die in the infinity of today's data world. It teaches discipline, connection to our brains and thoughts, and reminds us about what we can achieve".*

The crisis of trust: Children do not want to listen to their parents

By PAULINA RZEKA

Tuesday, 27th of April. It was a typical morning for Wilson's family on Mirabelle Street in York. Kathy Wilson (37), mom of two, was preparing breakfast when she heard her 6-year-old daughter, Lucy, asking Alexa whether she should become a doctor or a singer when she grows up. Mrs Wilson immediately reacts and asks her daughter why she goes to Alexa when they can talk about it together. Lucy's reaction was devastating for Mrs Wilson. *"You know nothing, mommy"*. Mr Wilson holds her tears when recalling the story. In fact, as Mrs Wilson explains, her children, little Lucy and 15-year-old Thomas, turn to Alexa and frAInd more often than she would like: *"At first, I thought it was convenient. After all, I used Google and Wikipedia all the time when I was at school"* she says *"but I see my kids asking all these questions that I would try to ask someone else. Thank God, this time she asked it Alexa; frAInd would probably give her an answer."* Mrs Wilson is not alone in her worries. According to NDS (note ed.*New Data Statistics*), almost 75 % of parents in the UK are concerned about being seen as less intelligent and less reliable than technology such as Alexa by their children. Rightly so, as NDS reports that more than half of the children aged 5 to 10 are more likely to ask questions Alexa and FrAind than their parents, and more than 80% of adolescents (11-19 years old) prefer the same. We asked Lucy why she decided to ask Alexa what career path she should follow rather than talk to her parents: *"She just knows better. She knows me like no one else"* little Lucy replies. Thomas corrects Lucy and echoes: *"She doesn't see a difference between Alexa and frAInd. I don't blame her; it is sometimes confusing. But yeah, frAInd is never wrong."* adding *"and you can ask her anything. She doesn't judge you, you know?"*

Experts have warned about the consequences of creating technology that 'knows everything'. Prof. Stevens, from Shanghai University, has been an advocate for creating data storage that is harder to use: *"If the only thing you have to do is to ask your device and in return, you get an answer, not only immediately but in a very accessible way - after all these devices use natural language- without any repercussion, no wonder younger users are more likely to turn to them when they need answers. It is absolutely logical. I believe that we should create different affordances for data. For example, if one wants to learn more about one's favourite band, Alexa could recommend a book that one could acquire and give you a map leading to the closest library".*

However, some parents do not see a problem at all: *"Well, I think this is great"*, comments Mr Sarry (40), one of the dads on Mirabelle Street. *"No more endless questions of why, how and when. I can focus on different things, while Alexa and FrAInd take care of that"*. Another dad, Boris Johnson(35), adds confidently: *"Besides, they are still coming to us when*

Figure 3.11: Opening page of the *Data News* Newspaper. Source: Author.

they need to know how to do some things, so it's not like we are completely useless".

The problem is getting more and more serious. Mirabelle's parish priest raises the alarm *"We should stop creating technology that resembles humans, they talk like us, they move like us, what's next will they think like us? We should stop playing in pretending God"* he says firmly, looking at the sky. Prof. Stevens has a different opinion: *"It is not as much about creating technology that is 100% like us but resembles us somehow and is better in these areas, where we are weaker, in this case, knowing things, or more precisely remembering. The more similar the device becomes to humans, the more prominent Uncanny Valley is. The Uncanny Valley is a phenomenon which illustrates our sympathy, let's say, for a given object. The more similar it is to humans, the more creepy the device will seem to us. This is why we will probably never create, or at least use, a device that looks and behaves like a person. It is not in our nature. Besides, we need devices that are better than us in some areas, rather than like us".*

There is an essential distinction between Alexa's and frAInd usage. Alexa is used as a Semantic memory repository, or 'general knowledge' storage. Thus, when kids need to know in which country Paris is the capital, when World War II started, or even whether it will rain tomorrow, they would ask Alexa. However, frAInd works as an episodic memory repository, a collection of data about ourselves and our loved ones, which may be seen as an oracle by kids. After all, frAInd itself is not data storage; it is software that makes sense in our lives. It may be pretty confusing, as some of our 'personal' life information may be classified as 'general knowledge, for example, the birthday of our loved ones. Nonetheless, frAInd is more personal as we do not have to wonder what our future will look like; it is no longer an unknown, unchangeable thing that happens by itself. Now, it is a question addressed to frAInd: what our personal future should look like and what should we do to make it happen?

How much can you earn from your data?

By JOSEPH THORN

We have asked specialists what to do with our unused data and how to make a good deal. Here's what we found out:

Google Google sends one t-shirt with their logo for a donated exabyte and a set, which includes one t-shirt and a unique hat with their logo for a zettabyte.

Expert's tip: Perfect for any Google fan! Especially a great gift for kids.

Inditex Inditex offers a £5 voucher for each zettabyte.

Expert's tip: Remember to choose which store you would like your voucher to be from (e.g. Zara, Oysho, Bershka, etc.). Unfortunately, vouchers are store-specific!

Local companies Depends on the conditions of each company

Expert's tip: It is worth checking with your local companies; some may pay you in cash!

Our expert, Marek Fern, CEO of DataSell, recommends: *"Remember to negotiate. Your data may be worth more than you think, especially if you're a so-called 'exception'. Exceptions are people with such experiences behind them, or more precisely, a combination of experiences that are as unique as possible. For example, if you are the only person from your town who has moved to another city, highlight it during discussions with companies. That will give you some additional credit."* Sometimes it is hard to know when you are an exception, but you can just spend an evening or two comparing yourself to your Facebook friends, and you will have more or less an idea, what could be your bargaining card.

However, you can also think about donations. Many institutions, including governmental and non-governmental ones, seek data to help them grow and fulfil their mission. *"Donations are a great idea if you want to support your chosen company. You would usually get a certificate for such donations as well. There is also an option to donate in someone else's name and gift them with the certificate. This way, we can beautifully show our loved ones that we support the cause they believe in by donating 'a piece of ourselves"* Mr Fern adds.

New law to be implemented in GDPR

Article 13245385, Right to no-cues (or Right to forget), will soon be implemented into the General Data Protection Regulation. What can we expect to change? Should you be worried? Will this change your Internet habits? This and more in our special issue, "RIGHT TO FORGET", only for £7.99!

Art Talks - New design for instant forgetting?

By ROMA TWAIN

New addition to **Rewind** family.

Rewind2, new tool for instant forgetting.

Researchers at Lancaster University have created new technology that promises to delete data from personal storage immediately. **Rewind2**, as it is called, is another invention from Imagination Lab. *"We created it for people whose default is to collect all the data."* says Prof. Rumi Gargaghan*"Once you press the button, it connects to your personal* ***Rewind*** *app and deletes all data collected from all devices that recorded you from the past 10 seconds. If you press it for more than two*

Figure 3.12: Second page of the *Data News* Newspaper. Source: Author.

seconds, it immediately deletes all data for as long as you press it." explains Prof. Garaghan *"It can be very useful in situations we immediately know we do not want to come back to, or we do not want our frAInd to process it and include it into life-analysis. Maybe embarrassing moments or when we weren't particularly doing something interesting. So, basically, it rewinds the situation to the moment in time from before the situation we want to delete"*.

Rewind2 will feature a microphone to use personalized voice commands if the button option is unreachable.

Rewind2 is a younger sibling of original **Rewind**, an app released last year, created by Prof. Garaghan and his team. However, first **Rewind** did not have a quality of immediacy' as Prof. Garaghan calls it. It was created for different management needs: *'You can go through the recent (up to 3 days) data collection and 'rewind', or in this case, delete data, where necessary. There are situations in which **Rewind** is very useful, but some of our users complained that they would not go through these moments that are too boring for them or, on the other extreme, too emotional; sometimes, the wounds are still fresh. That is why a **Rewind** app will be great for things such as interesting conversation, from which we would like to get rid of only some of its parts, or manually create a five-minute lecture clip that took one hour long. **Rewind2** will be for these moments we don't want to return to"*, explains prof. Garaghan. *"We believe it will be indispensable, but it must be used carefully. We are working with the legal team and a team of psychologists. It will probably be available for users above 18 years old."* he adds. However, the scientific community is divided over the usefulness of this tool. Prof. Anna Szmerc, from Massweil University Law Department, thinks this may be a very problematic device: *"We worked so hard as a society to create infinite data storages and then software that finds people responsible for crimes. I cannot believe we want to waste the last 50 years of research. I am talking about face recognition, algorithms that help us recognise identities and track criminals. Before that, we could spend months, in many cases years, to find thieves, murderers and sexual offenders. There are still pre-infinite data storage cases which are non-solvable. With such devices, criminals have a perfect way of getting rid of these data and hiding behind the presumption of innocence. I believe we should carefully analyze all the arguments for and against"*, Prof. Szmerc sums up. Prof. Garaghan believes the other way: *"Of course, we recognize the problem and, as I said earlier, work with the legal team. It may be that it will actually speed up the investigation in such cases. Deleted pieces of time when the crime happened could serve as a suggestion to investigate a particular person. We do not want to create false accusations, though, which is why we also work with a team of psychologists. We believe that our tool can be beneficial for society. However, we hope the UK government will work with us on all these concerning issues"* Prof. Garaghan wraps up with a smile. *'We are very hopeful.'* **Rewind2** will retail for £599 in the UK.

It will come with variety of accessories to hang it next to your keys, backpack etc.

More nature-related words will disappear from Children's Dictionaries. Technology-related terms will replace them.

By MALWINA TURWIN

Last week, the Oxford Linguistic Committee decided not to include a set of words that are not used by children Oxford 7+ and 9+ in their Oxford Children's Dictionary. *"We have analysed data from all conversations children in the UK had from the last two years. We feel positive about this change. There is no need to confuse kids and waste e-ink in our dictionary"*, says Dr Martin Hammock, head of the committee. Words, including *weasel, willow, raven* and *acorn* will be replaced by words such as *onlinework, offlinework* and *artimem* (artificial memories). An immediate set of protests followed this decision. *"Language is indeed alive; it constantly evolves. However, we should consider why such beautiful words disappear from children's language rather than adjust to this situation. The disappearance of nature-related words in our kids' vocabulary shows us the problem, not the solution"* says one of the protesters in Sheffield. Nevertheless, the committee did not stop at this and announced a new approach to be implemented in the future: *"We want to monitor changes in children's language. Thus, we will adjust our dictionaries every three months. We believe this will allow us to grasp technological novelties, which we are reflected in our language."* says Dr Hammock.

NEXT ISSUE

- Exclusive interview with Maria Bester, co-founder of Lone Wolf Society. Is it possible to live with a no-data default?
- VPN war: should geo-blocking be illegal?

Figure 3.13: Closing page of the *Data News* Newspaper. Source: Author.

3.2.5 Narrative Snippet

"Have you seen the Data News today? It says that Zara gives £5 for each zettabyte. I wonder if there's a limit, though." The coffee-house was always busy around noon, Cathy had to almost shout. "Do you all know what you want to do about your annual data cleaning?"
"I don't know", answered Tom, putting his cup down on the table. "I was thinking about just deleting everything that I haven't personally created, but I feel like it would be such a waste... of resources, as well as energy, to delete all of this.... At the same time, I don't really need it, so perhaps WWE? I also heard about a new governmental initiative, but I don't know... Apparently, they are trying to get as much data as possible, but God knows why."
"I think they just want to make sure they're on top of the game." Cathy quickly replied. "You know, that private companies are not ahead of them."
"Who cares? They are anyway." said Phil. "Which is why I'll just monetise some of my dump. My friend told me that he knows a guy that can actually give you good money if you're interesting enough. One person's trash is another man's treasure, right?"
"Hahaha, and you think you're such a treasure? I wouldn't give you a single penny for what you have in your memory!" Cathy teased. "Well, then. If they don't give me lots of money, I can always go to any shop and exchange it for a discount." Phil snapped back.
"And you, Meg? Where do you think you'll donate your annual data clean?"
"Donate? No way." she replied. "Martin bought me a yearly subscription for platinum frAInd for our anniversary, and he even named it after himself. He would be so mad if he knew I got rid of some data!" Meghan giggled.
"Alright, Meg, you're damn lucky." said Tom. "But how about you, Phil and Cathy? We meet up this weekend to go through our memory and see what we want to donate, sell or delete?"
"I'm down." said Phil. "How about you, Cathy?"
Cathy sighed. "I just wish someone would clean it for me, you know?" she replied. "I think I could even use any random cleaning company. I even saw that some do it for free."
"Aren't you afraid it's a scam?" asked Tom.
"I don't care." said Cathy. "I can't stand having all this junk. My frAInd is not advanced enough to digest all this data. Sometimes I feel like it doesn't work at all. REWIND constantly freezes, and I cannot find anything. I can't freaking use it. Anyway, I have to go. See you all later?"
Cathy left them in silence. They all took a sip of their already cold drinks when Meg finally asked, "Maybe we could all chip in and get her REWIND2 for her birthday? That would help her at least a little bit."

3.3 Discussion and Conclusion

Three themes emerged in the context of these artefacts: time, space, and efficiency. When it comes to time, in this future scenario, temporality manifests itself in the discussion about REWIND2 usage, as it instantly deletes data that cannot be further recovered. This suggests that Sellen et al.'s (2009) prognosis about "the end of ephemeral" due to the infinite external memory is incorrect. I will touch on this topic further in the next chapter of the thesis.

The theme of space manifests itself in the question of where we will store our data and what this space represents. As mentioned in the Introduction of this thesis, Chapter 1, Akmal and Coulton (2018) describe the interaction of the physical and digital worlds using Foucault's concept of Heterotopia. The authors see the emerging synergy between these two worlds in the context of personal and public space. In this future scenario, we can ask ourselves who can collect data about ourselves in public settings and what kind of data might this be. What does autonomy over our data mean? Is it the right to delete or understand it? This creates an additional Heterotopia, which Akmal and Coulton did not explore in their model, called h9, representing the mixing spheres of Private Real and Public Virtual spaces (Figure 3.14).

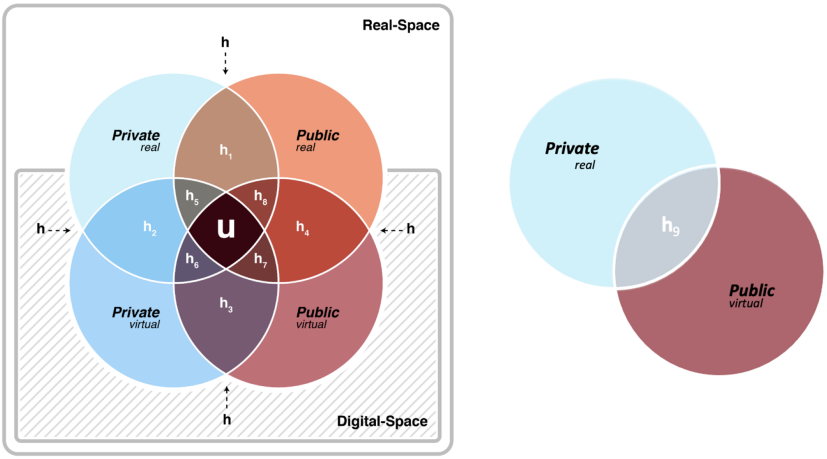


Figure 3.14: Left: Akmal's and Coulton's representation of different Heterotopias created between Real, Digital, Private and Public Spaces. Source: Akmal and Coulton, 2018. Right: New Heterotopia, h9, between Private Real and Public Virtual spaces, which emerged through the topics discussed in the Continued Economic Growth scenario. Source: Author, after Akmal and Coulton, 2018.

At the beginning of this chapter, I introduced the term "Jevons paradox", an axiom of this future. Furthermore, I presented artefacts which are situated in such a future to illustrate the efficiency aspect of the Economic Growth scenario. As Jacque Ellul (1964) wrote in *The Technological Society*: *"Modern technology has become a total phenomenon for civilisation, the defining force of a new social order in which efficiency is no longer an option but a necessity imposed on all human activity"* (p. 17). The tech-saturated times we are building, according to Ellul, will create more challenges, which will be responded to with even more technology (Hanks and Hanks, 2015). Ellul argues that the realm humans have to live in right now is defined by "technique". Technique as a system characterises itself in progression, self-augmentation and measurable outcomes. These characteristics replace mystery and nature in the human experience.

With this trajectory, we are doomed to fix our technological problems with even more technology. As Hanks and Hanks (2015) noticed in Ellul's work from 1990: *"the dream of computers and the Internet may hint at a utopian realm of freedom, the lie is that the systems turn out to be more useful in monitoring, predicting, and managing citizen behaviour"* (p. 468). An emblematic case of these words is the gentle but growing overreliance on a specific ecosystem such as that of Apple, which the authors call the "digital handcuffs". Similarly, in my future scenario, users are sucked into using the REWIND ecosystem. Such "digital handcuffs" can be seen in the expansion of the REWIND product family, first the REWIND app, next REWIND2, compatible with the REWIND app, and then frAInd who helps with the data located on the REWIND app.

I want to finish this section with another of Hanks' and Hanks' quotes about Ellul's work. It encapsulates the technological spiral we are in and our path further down as we find new solutions for the problems that were solutions in the first place. The idea of infinite data storage transforms from the first solution, an answer to growing needs for external memory, to the wicked problem of the future. Speculative Artefacts presented in this chapter go hand in hand with Ellul's idea of Technique, as they are socio-technological solutions for the problem of infinite data storage that create more problems and more solutions. The growing family of REWIND technologies are an example of that. Furthermore, the quote calls to mind the persistence of Learned Helplessness, the digital handcuffs we are tricked into wearing: *"Yet another indication that the technological society will remain an undemocratic society if participants persist, in the name of freedom, to make pseudo-autonomous decisions that further embed them in technique"* (Hanks and Hanks, 2015, p. 469). The Continued Economic Growth scenario is a testament to these words. The Design Fiction I have presented is an example of a possible infinite data storage future embedded in Ellul's "technique".

In the next section, I will discuss the reflections of PILOT workshop participants on Speculative Designs from this future.

3.4 PILOT Workshop

From this scenario, Data News, REWIND2 button, a Facebook Event post and a narrative snippet were presented to the participants.

Participants did not focus on what the REWIND2 provides, but rather on the idea of the infinite and constant capture. For example, P5 decided they would lock the button in the pushed position, not to get any feed into their data storage. They further commented: *"The thought of being under constant surveillance is very disturbing. (. . .) I don't like the idea of constantly storing everything."* This showcases the tension between the need to think about the future and the action of thinking being overwhelming or scary. There was also a theme of disbelief towards the REWIND2 button; participants compared it to Snapchat, which they disliked, reported that their brains delete memories anyway, and even reported that they would immediately sell it away if they had received it, suggesting they do not view their digital input as the repository of memories. In general, they were sceptical towards the usage of this, but also other new technologies. This disconnection between technological innovation and workshop participants sheds light on the current technological solutions. This prompted participants to show scepticism towards this scenario, without an elaborated focus on the present time. While each future had a short description of the world in which the artefact resides, a future workshop would benefit from having two distinct sections in which participants first have an opportunity to comment on the futures themselves and reflect on different technologies that they would need there before being presented with the artefacts. This would allow participants to still comment on their fears and disbelief, but perhaps it would also help with the imagination.

On the other hand, P3 mentioned that they would not want to have the possibility to delete anything from their infinite data repository, because that would mean that someone else has such a possibility as well. At the same time, deleting data could lead to conflicts and misunderstandings. Participants also raised an ethical issue related to deleting inconvenient memories, rather than unimportant ones. The topic emerged through P5 and P3 responses that memories are something we co-experience, and they are often not lived through by one person. For example, P5 found it related to our emotional capacity to use them as a socialising context. Such topics correspond not only to the idea of "memories as commodity" explored in this chapter, but also to how the ideas of both personal and collective memory intertwine. Interestingly, the topics did not evolve into "exchange" of memories between different identities, even though

the Continued Economic Growth scenario context could lead to such conclusions. On the contrary, participants noticed the fluidity between the sense of self and shared experiences, which are both built upon each other. While the REWIND2 touched upon this topic through the Facebook event ad and its usage in which one could delete a moment that is shared with another person, in their personal data storage, another Speculative Design could be created (or perhaps co-created with participants) in the future that would reflect, capture and support this transitional moment between personal and collective memories.

In their reflection, participants pointed out that people will not be able to learn from their past mistakes, and an identity crisis could be a problem in the future (P1, P2, P3). Participants connected the idea of an identity crisis to memory becoming a commodity. This, however, would lead to what P1 found: that the REWIND app would be helpful in legal matters, forgotten passwords, etc. On the other hand, P4 and P5 highlighted that data and facts are not memory. These facts, collected by the REWIND app and managed with the REWIND2 button, need *"context, feelings, imaginations"* for humans to make sense (P5). Regarding identity, P5 believed that REWIND2 highlighted that identity is a constant, conscious and unconscious action on our part through reliving the facts. Therefore, the REWIND2 was seen as a threat to what memory is for humans, as we highlight facts rather than objective experiences and our ability to build narratives. Still, it was also perceived as a useful tool precisely for the same reason, as the REWIND app could be helpful with finding information we need from our past, such as dates. This showcases the plethora of functions that our memory accomplishes. While this thesis showcases and explores different memory functions, its fluid nature, encapsulated in one artefact or perhaps one scenario, would benefit from further investigation with workshop participants.

P5 shared that there may be an unexpected effect of the REWIND2, being the special attention we put into the deleted content. Since one highlights it through deletion, we may remember it better. Indeed, the conscious effort needed to delete the current moment may have such an effect. On the other hand, the REWIND2 may promote living in the moment; people who use it must be constantly aware of their surroundings, unless they use it habitually, during a particular event, during the day, week or a month. For example, one can imagine Anna, who deletes the data using REWIND2 whenever she sees Amanda at work, whom she despises. At the same time, this could lead to accidental deletion, which could not be, well, rewinded. For example, coming to work, Anna could see Amanda chatting with a receptionist. Anna pulls out the REWIND2 button and clicks before Amanda even turns out to exchange pleasantries. However, the person who turns around is Beata, Anna's sister, whom she hasn't seen in a year, and wanted to surprise Anna. Beata happens to share the same taste in clothes, length and colour of hair with Amanda. The pleasant surprise hasn't

been recorded in Anna's data storage. Such a story can be opposed by the reported desire to use REWIND2 routinely, rather than at the moment of forgetting, which, in participants' opinion, would lead to actual forgetting. The action of forgetting, whether planned or unplanned, done as a ritual or everyday chore, would benefit from further investigation.

Chapter 4

Future 2: Transformation

4.1 Introduction

The characterisation of perfect memory through digital storage has substantially influenced the perception of the potential relationship between human and computer memory. An example that has already appeared in the Introduction of this thesis is Memex, a hypothetical device described in 1945 by Vannevar Bush. Its properties to compress all personal information into one device inspired the MyLifeBits project, in which Gordon Bell used a wearable camera to capture records of his daily life, thereby creating a lifetime store of everything (Bell and Gemmell, 2009).

Whilst remembering is seen as a virtue in contrast to the vice of forgetfulness, the perception remains that forgetting comes readily, while remembering needs effort. This valorisation of the effort to remember has shaped our world and informed our actions for hundreds of years. *Ars Memorativa*, or art of memory, are mnemonic techniques that help in remembering and recalling information, and these were known and developed in the last millennium BCE (Yates, 1966). The desirability of the prospect of an infinite data storage scenario has become prevalent as our computers' memory capacity has expanded, coupled with the ability to upload our ever-growing collection of digital possessions to the cloud. Computer server farms, or data centres, worldwide are numbered in the millions. With these technological advancements, the aforementioned virtue and vice are starting to change their places as it arguably becomes easier to remember than forget. However, as Samuel Beckett (1965) noted in his book on the work of Proust: *"The man with a good memory does not remember anything because he does not forget anything"* (p. 29) or as Gabriel Josipovici (2020) rephrased it: *"only he who forgets remembers"* (p. 23). The most famous example of these words in literature was the aforementioned case of Journalist S., the subject of neuropsychologist Alexander Luria's (1987) study. Journalist S. happened to

remember everything; he was able to memorise long chains of numbers, poems in foreign languages and complex mathematical formulas after hearing them only once. However, his abilities, or what one may call a gift, were a burden. With the capacity for infinite amount of information, he could not make sense of the world.

The art of forgetting has not been developed. It seems that in the scenario of infinite data storage, similarly to Journalist S., we are doomed to remember everything. It can be argued that the notion of an infinite data storage scenario solidifies the notion that the human mind is seen as a lesser version, a smaller capacity box than the memory of our computing devices. This is why research on forgetting related to our digital possessions has emerged in opposition to this trend. However, in many cases, these discussions about the importance of forgetting are still consistent with the idea that infinite data storage is associated with remembering, as forgetting equals deletion of data, and remembering equals possession of data. This is not necessarily the only way to examine the relationship between human and digital memories. Along with an overview of different assumptions about remembering and forgetting related to data storage, this chapter offers a new conceptualisation, using infinite data storage as an axiomatic future scenario. It further introduces the Speculative Artefact called the Horcrux Ear, which concretises these new concepts.

This chapter's artefacts are embedded in Dator's Transformation future. This future characterises itself in being focused on technology and its transformational power. Dator (2009) describes it as the *"emergence of a 'dream society' as the successor to the 'information society'"* (p. 10), which I depicted in the previous chapter, and as *"entirely artificial Earth"* (p. 10). The previous chapter, the Economic Growth scenario, could also seem like it was about technological advancements. However, this future differs from the previous one in motivation. The first world's motivation was efficiency and consumption, the status quo of modern times. On the other hand, the Transformation future is focused on the disruption of the system. The new technology - the Horcrux Ear that I will present - attempts to change the paradigm of metaphors related to human memory and computer memory. In the Transformational world's artefact, rather than focusing on retrieving memories and making sense of them (which seems to be more of a pressing issue in the Continual Economic Growth world), I have focused on finding a way to forget things safely and express feelings in a world of ubiquitous technology.

4.2 Artefacts

I would like to open this section with a narrative snippet, which will introduce the Horcrux Ear artefact, which, along with the GDPR artefact, I will explain in detail

later in the chapter.

4.2.1 Narrative Snippet

"Where is it? I knew I had it somewhere here!" Mark regretted the moment he said it.
"What are you looking for?" asked his roommate Josh.
"Ummm... nothing. I just lost something. Never mind, I'll find it later."
His old locket seemed to be nowhere, making him a little nauseous. He was sure he would find it in his desk drawer, between old receipts, some gum, pens and other things that did not look too suspicious. Maybe his locket did look too suspicious? Now he regretted that he had not chosen something more 'normal'. But then, that would not be how he planned it. He still remembered the day he recorded his secret on the locket. It had been days since he learned about his family's roots. And yet, he was the only one who knew the truth. He couldn't say anything to anyone; that would destroy his family. His mother would die. But he didn't only feel lonely, being the only one who knew. He felt like he was lying. The inability to say it out loud kept piercing his stomach whenever he thought about it, and he couldn't hold it any longer. He needed to say it. In fact, he had to say it. Otherwise, he could spill the beans, and he did not want that, obviously. One afternoon, he got himself the biggest Horcrux Ear, made sure that no one was at his family house, put the ear next to the locket, which seemed quite bizarre, considering how small the locket was and how big the ear was, and he just said it. He remembered looking at the lights, holding his breath for ten long seconds before the light turned green. The secret made it to the locket. He's not alone with it anymore. He knew it was safe, as no one could hear it or "decode it" for another seventy years after his death. That's what the lady on the TV said, at least. It sounded legit to Mark because she mentioned some regulations G, GD... What was it? Mark was almost sure he heard G-something. Finally, after these many years, he was ready to share it with someone - his sweet Millie. They had been together for a couple of months now, and it was time to show her how serious he was about their relationship. He thought giving her the locket would be the perfect gift, the testimony of his love and devotion. He would give her his whole, vulnerable self. But now, rather than thinking when, where, and how to give it to Millie, Mark was thinking about where the locket could be, when he lost it, and how he could have let it happen.

4.2.2 GDPR

Like the Newspaper in the Continual Economic Growth world, the General Data Policy Regulations document serves as a context for this world. The speculative GDPR introduces a new right, the Right to Forget (Figures 4.1 and 4.2). It was inspired by the actual GDPR's "Right to be forgotten" (European Parliament and Council of the European Union, 2016). It is the right that enables the deletion of personal information from Internet searches. On the other hand, The Right to Forget reserves the right to forget to the user. This speculative step change explains the usage of devices such as the Horcrux Ear and introduces the concept of ownership of memories. It also builds on the previous chapter's discussion about how people are treated as reminiscences, objects of memory, rather than as the subjects who remember or forget, i.e. subjects who "do" memory. I will explore the idea of the right to forget and the role of forgetting further through the Horcrux Ear.

Art. 13245385 GDPR
Right to no-cues (right to forget)

June 2035

1 Introduction

1. The data subject shall have the right to obtain the uncue of personal data concerning them from the controller without undue delay, and the controller shall have an obligation to uncue personal data without undue delay where one of the following grounds applies:

   (a) the personal data are no longer necessary in relation to the purposes for which they were collected or otherwise processed as cued data;

   (b) the data subject withdraws consent on which the processing is based according to point (a) of Article 6(1), or point (a) of Article 9(2), and where there is no other legal ground for the data subject's recall;

   (c) the data subject objects to the processing pursuant to Article 21(1) and there are no overriding legitimate grounds for the forgetting, or the data subject objects to the processing pursuant to Article 21(2);

   (d) the personal data has been unlawfully cued;

   (e) the personal data has to be uncued for compliance with a legal obligation in Union or Member State law to which the controller is subject;

   (f) the personal data has been collected in relation to the offer of information society services referred to in Article 8(1);

   (g) the personal data has been immediately dangerous for the life or health of the data subject

2. Where the controller has made personal data public and is obliged pursuant to Paragraph 1 to un-cue the personal data, the controller, taking account of available technology and the cost of implementation, shall take reasonable steps, including technical measures, to inform controllers which are processing the personal data that the data subject has requested the erasure by such controllers of any links to, or copy or replication of, those personal data.

1

Figure 4.1: Opening page of the GDPR Article *Right to no-cues* or *Right to forget*, Source: Author.

3. Paragraphs 1 and 2 shall not apply to the extent that processing is necessary:
   (a) for exercising the right of freedom of expression and information;
   (b) for compliance with a legal obligation which requires processing by Union or Member State law to which the controller is subject or for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller;
   (c) for reasons of public interest in the area of public health in accordance with points (h) and (i) of Article 9(2) as well as Article 9(3);
   (d) for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes in accordance with Article 89(1) in so far as the right referred to in paragraph 1 is likely to render impossible or seriously impair the achievement of the objectives of that processing; or
   (e) for the establishment, exercise or defence of legal claims.
4. The data subject shall have the right to uncue memories using data storage. Such devices like the Horcrux Ear are approved for use. Only an author has the unconditional right to decode the message, unless:
   (a) another subject receives hand-written permission by an author of the massage
   (b) it has been at least 30 years since author is dead to access a small secret,
   (c) it has been at least 50 years since author is dead for a medium secret,
   (d) it has been at least 70 years since author is dead for a large one.

2 Dictionary

1. To cue = The term relates to the act of linking data with the subject of the data. It is a default practice in most digital environments and data practices.

2. To uncue = The term does not relate to the erasure of data. It also does not relate to breaking the link between data and the data subject. It relates to creating a new link between data and the data subject. It is prohibited to show uncued data to the data subject unless they file to cue it again. Uncued data still exists; it is not deleted permanently. However, uncued data cannot be used as part of the subject's memory.

2

Figure 4.2: Closing page of the GDPR Article *Right to no-cues* or *Right to forget*, Source: Author.

4.2.3 The Horcrux Ear

In the *Harry Potter* book series written by J.K. Rowling (2015), the main antagonist Lord Voldemort (also known as *You-Know-Who* or *He-Who-Must-Not-Be-Named*) splits his soul into different objects, named Horcruxes, to make himself harder to destroy and achieve immortality. Rowling's work partially inspired this speculation dubbed *Horcrux Ears* which create Horcruxes out of ordinary, everyday objects (Figure 4.3). In this case, the part of somebody's stored soul would be a secret, which can be recorded and stored in the chosen item with the help of the Horcrux Ear (Figure 4.4). There may be many reasons somebody would like to store a secret: perhaps they are afraid to forget all the essential details, but they cannot talk about them, and they cannot, or do not want to, refresh their memory every day. They may want to say it to somebody and be heard, but they may be afraid to share it with another person. Moreover, they may not want to store it anywhere it is networked via a computer for security reasons.

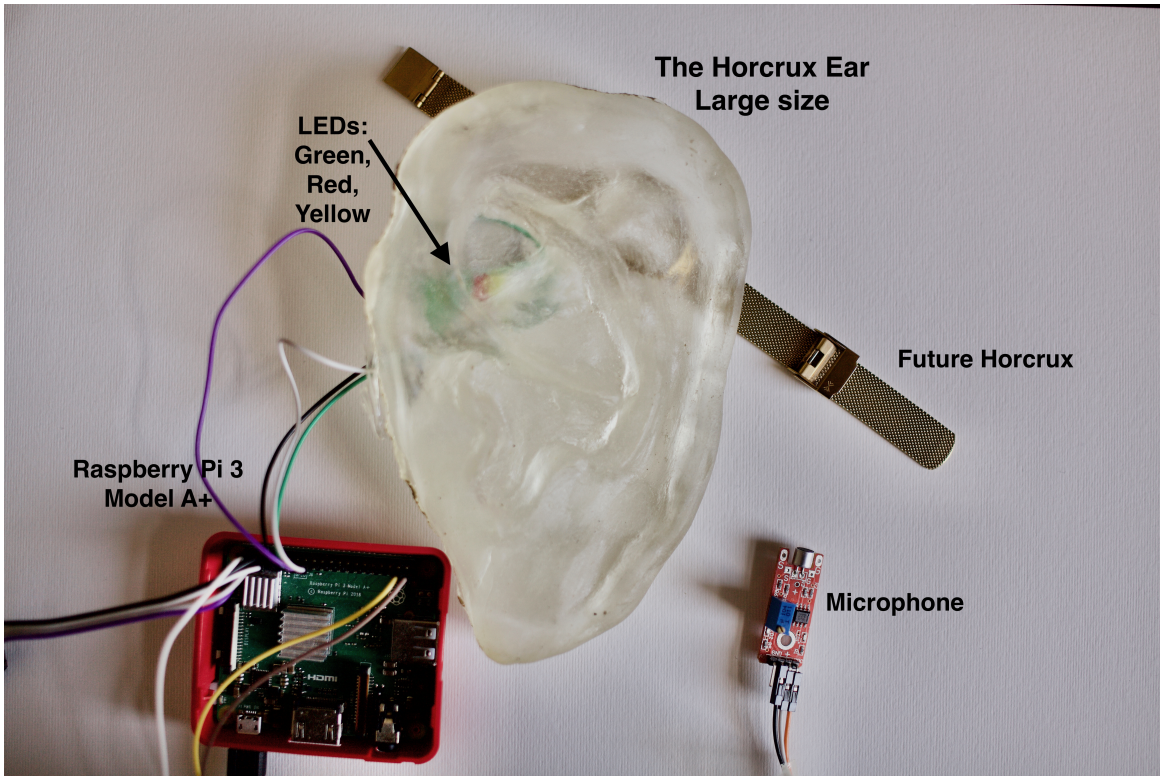


Figure 4.3: The Horcrux Ear, the Wizard of Oz prototype of the Horcrux Ear model, Source: Author.

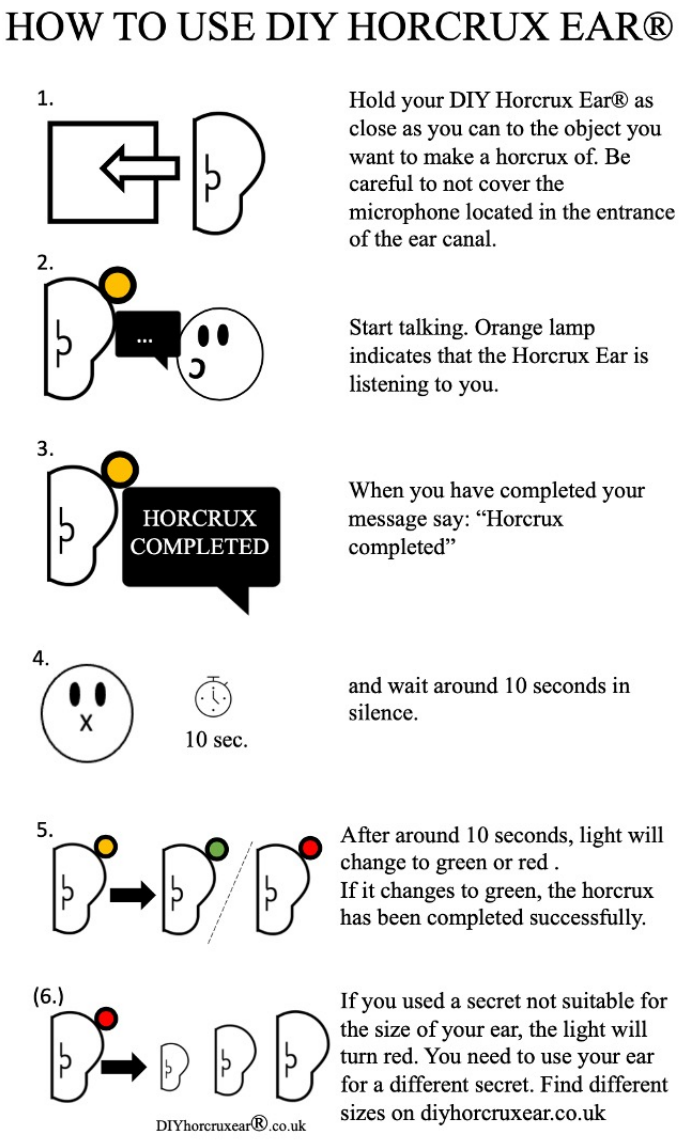


Figure 4.4: One of the pages of the Horcrux Ear manual with instructions on how to use it and record the message. Source: Author.

This artefact is mainly inspired by the turmoiled history of Poland and my family history. My grandmother Krystyna was five years old when Germany attacked Poland starting World War Two. She lived with her mother and maternal grandmother, Stanisława and Helena, in the rural part of Poland, near Warsaw. Everything I know

about them and their relationship is encapsulated in this one picture (Figure 4.5). I know they existed, and I know they lived together, that is all. Many things about their lives remained a mystery and even though I was lucky to know my grandmother for the first eight years of my life, she did not talk about her past and I was too small to understand how important it was to ask her about it. I doubt she would tell me a thing, though.

Figure 4.5: From the left: Stanisława, Krystyna and Helena. Source: Author/Unknown.

Nonetheless, Krystyna grew up during difficult times within a household of two women. I know nothing about her father and grandfather. Since I know so little about Stanisława and Helena, and Krystyna seems to just appear in their lives out of nowhere, there is a suspicion in my family that Krystyna was not related to them. The hypothesis ties with Helena's occupation: she was a midwife. Was my grandmother a stray, that her grandmother took home? Whenever I look at the mirror, and see

my pale olive skin, greyish-black hair my reflection reminds me of my grandmother's strong features, black curly hair and her tall posture. Krystyna did not resemble her mother (or did she?). Obviously, that is too little to judge her blood relation to Stanisława. However, this doubt, along with a couple of vague family stories I heard about my grandmother's life, creates a patchwork that suggests she might have been an outsider in her town.

It is all because, around this time, people knew that silence is the best tactic for survival. Supposing that my grandmother's ancestry was known by others and in the land destroyed by Germans, that knowledge could have been not safe for her and others. So they stayed quiet forever. The documents were lost, perhaps destroyed. Stories were buried with corpses. My family story has been silenced; deliberately, collectively forgotten. After all these years, both the past and the absence of it still haunt many, including myself.

The Horcrux Ear was inspired by my grandmother's inability to tell her own story. In circumstances in which one would not be able to talk about certain details, actions or events, the Horcrux Ear would work as a place of confession. A place in which one would be able to deliberately forget in a safe manner.

The Horcrux Ear acts as middleware between the user and an item. A User's Manual accompanies the *Horcrux Ears*, which explains how to record your secret and what can be recorded (Figure 4.6, also can be watched here). There are three sizes to choose from (Figure 4.7). The variation in size differentiates different kinds of secrets, ranging from those that do not significantly impact someone's life to the more profound, perhaps complicated secrets (Figure 4.8). It is important to note that while there are instructions on what constitutes small, medium, and large secrets, they are connected to the perception of that secret rather than its content. As van Erve et al. (2011) put it: *"interaction design, in comparison to traditional sciences, is something, which happens in the world and context of the user"* (p. 337). In their nature, secrets are highly personal; therefore, they need such customisation.

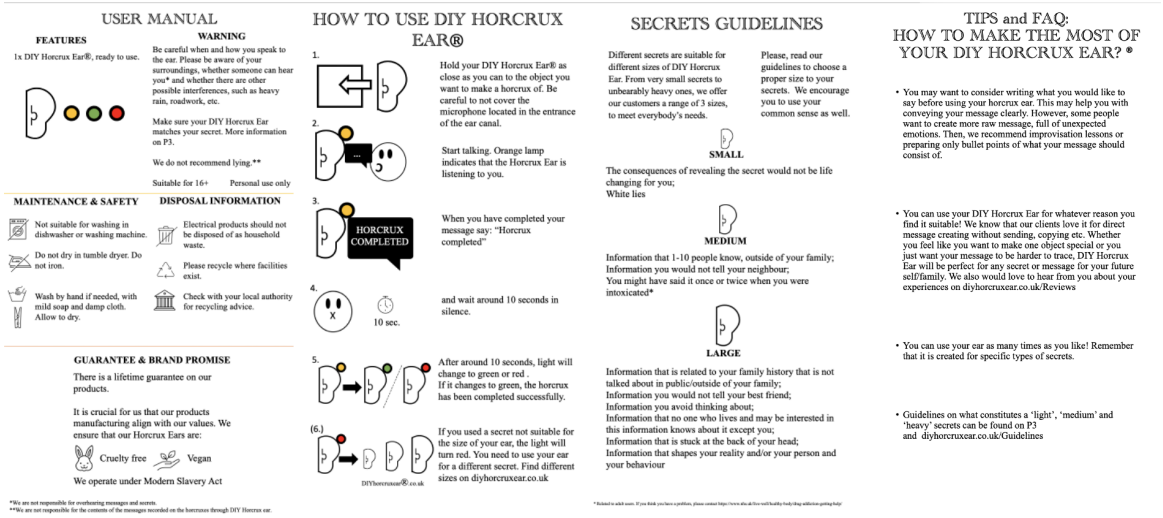


Figure 4.6: Full Horcrux Ear manual with instructions. Source: Author.

Figure 4.7: Three different sizes of the Horcrux Ear correspond to the heaviness of secrets told. Source: Author.

SECRETS GUIDELINES

Different secrets are suitable for different sizes of DIY Horcrux Ear. From very small secrets to unbearably heavy ones, we offer our customers a range of 3 sizes, to meet everybody's needs.

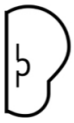
Please, read our guidelines to choose a proper size to your secrets. We encourage you to use your common sense as well.

SMALL

The consequences of revealing the secret would not be life changing for you;
White lies

MEDIUM

Information that 1-10 people know, outside of your family;
Information you would not tell your neighbour;
You might have said it once or twice when you were intoxicated*



LARGE

Information that is related to your family history that is not talked about in public/outside of your family;
Information you would not tell your best friend;
Information you avoid thinking about;
Information that no one who lives and may be interested in this information knows about it except you;
Information that is stuck at the back of your head;
Information that shapes your reality and/or your person and your behaviour

Related to adult users. If you think you have a problem, please contact https://www.nhs.uk/live-well/healthy-body/drug-addiction-getting-help/

Figure 4.8: One of the pages of the Horcrux Ear manual with instructions on choosing the appropriate *Ear* size. Source: Author.

I wanted the Horcrux Ear to be an interesting representation of a memory device through the fact that it is not made to enhance remembering, like many projects in the Human-Computer Interaction space (e.g. Erve et al., 2011). On the contrary, it is created for meaningful forgetting. Since people are encouraged to record secrets, these messages already carry significance for users. However, they are stored to forget rather than to remember, as they are not created to be readily used or recollected. They are made to stay safe and forgotten for a considerable period. One can use the *Horcrux Lips* (a device that decodes messages from *Horcruxes*, Figure 4.9) if you are the author of that secret, you have special permission from the author of the secret, or it has been at least 30 years since the author died to access a small secret, at least 50 for a medium secret and 70 for a large one. This encompasses Elsden's and Kirk's (2014) recognition of the current problematic short-time period perspective towards data with little consideration as to what happens to data in the long-term.

Figure 4.9: Similarly to the Horcrux Ear, *Horcrux Lips* have three sizes for encoding messages of different heaviness. Source: Author.

As discussed in the Chapter 2, Methods, Design Fiction seeks to provoke rather than give defined solutions to the problem. These two reasons made me re-evaluate my initial assumptions and, rather than change them, begin to work around them. Thus, I incorporated the Wizard of Oz prototyping approach. It is a design approach in which features of the prototype are fake. Usually, it refers to features that mimic

being computer-driven while they are human-controlled. In the case of the Horcrux Ear, the features only seemingly work as the concept suggests. The differences between the Imagined Horcrux Ear and the actual prototype can be found in Table 4.1. I have used a pre-set-up raspberry pi, a small single-board computer, to which I added a microphone chip (Figure 4.3). It is the most basic microphone chip on the market. Thus, it does not catch what someone is saying, only the fact that one is saying something. The speculative instruction manual artefact says that the words "Horcrux completed" finish the message's creation, but, in fact, the silence that follows these words randomly elicits a red or green light.

Imagined Horcrux Ear	**Real life Horcrux Ear**
Would be able to record on future *Horcrux*, which then could store information.	Recognises that someone is talking.
Would be able to identify words: "*Horcrux* completed".	Recognises that someone stopped talking.
Would be then able to recognise whether the secret was of appropriate heaviness, indicating by a lamp.	Randomly assigns the colour of the lamp.

Table 4.1: Comparison between Imagined Horcrux Ear and real life Horcrux Ear artefact.

The ear affords one the capacity to listen (Norman, 2002), so it also affords us the opportunity to talk to it. The form of the ear I chose here affords it with the capacity to listen but it is detached from the person's head; this is precisely what a person who needs to say their secret out loud needs. The person may want to be heard with the knowledge that no-one is listening at the same time. The Ear listens but the person is not heard by anybody at the time of the secret creation. Nonetheless, it can be heard by someone else later, or they can retrieve their secret by themselves, allowing them to clear their mind in between. I chose the human ear as this particular Transformation future would still be immersed in an anthropocentric point of view. Still, I also wanted it to be playful and engaging and elicit embodied interaction in a user, which Dourish (2001) would describe as *"the creation, manipulation, and sharing of meaning through engaged interaction with artifacts"* (p. 126). Moreover, I wanted to create conditions in which users would act; they would be doing the memory, which the Horcrux Ear facilitates.

In the following sections, I will reflect on how the Horcrux Ear offers new insights into our relationship with remembering and forgetting in the context of infinite digital storage.

4.2.3.1 Forgetting important memories is a desirable action, but not for the sake of remembering other things better

Similarly to Journalist S.'s case, the *perfect memory* problem of our digital storage lies in its perfection. It is apparent that forgetting, or deletion, needs to be reintroduced to the design of our external memory, as Bannon (2006) posits, as "a feature not a bug". Bannon believes that by:

> *neglecting the duality of memory, in terms of the dual activities of remembering and forgetting, we are unnecessarily limiting our options, in terms of the shape of the design space that is open before us concerning the ways in which technology might play useful roles in our future human and social world* (p. 4).

Indeed, designer Tony Fry (2020) would call it an example of *defuturing,* which stems from the fact that *"we do not understand how the values, knowledge, worlds and things we create go on designing after we have designed and made them"* (p. 10). The crucial statement that Bannon makes in his essay is about the misleading metaphor that equates the human mind to an information-processing machine. It is essential to recognise that these two are not analogous to each other, nor is computer memory an extension of our mind, as the situated cognitive framework would suggest (Clark, 2010). The number of psychological theories about our memory shows its complex nature; the human mind is not only simply a box to which we add information. As psychologist Sir Frederick Bartlett (1995) observed, memory is about constructing and reconstructing information rather than their exact reproduction.

By the same token, Sellen and Whittaker (2010) critiqued the usage of lifelogging devices for the sake of total capture, as in Bell's previously discussed project, which mimicked Bush's *Memex*. As Bannon (2006) reflects: *"perhaps we should re-consider this fetishisation of recording for recording's sake, along with the use of novel sensor networks to collect and collate huge quantities of information about people's activities"* (p. 10). In other words, the focus should be on the user, instead of their data. In Brewer's et al. (2017) words, *"there is a need to draw on what is known about human memory to create tools that cater for different types of remembering"* (p. 3). Bannon (2006) argues that the misleading metaphor of the human mind being akin to an information-processing device gives prominence to the passive model of memory rather than an active model of remembering and forgetting. This is the genuine risk of, and for, forgetting: applying one metaphor of human memory to design our external digital memory further restricts the way of thinking about human memory.

The Horcrux Ear embraces the idea of forgetting important memories, but not for remembering other things better through clearing space for other memories. In the

traditional settings, in which deletion has a function of forgetting in the digital environment, deleting often works as weeding out the unwanted and unimportant content, further enhancing these digital memories that are about to stay. In contrast, the Horcrux Ear enables users to take up space for forgetting without the motivation of remembering other memories more clearly, or without the unnecessary noise. The curation of the memories does not happen on the level of remembering, i.e. there is no decision-making process on what needs to be remembered, what needs to stay. It is solely about the specific memory that the user wants to forget. Thus, the curation process is separated from other memories because the focus is on the creation of the *Horcrux*.

4.2.3.2 Forgetting can be a controllable action, not through erasure, but through mindful creation of digital input.

The Seven Sins of Memory by Daniel L. Schacter (1999) describes the problems we are facing with our memory. Only one out of these sins is not related to proper access to original information. Six out of seven problems relate to forgetting, which greatly outnumbers those sins that relate to remembering. These sins are not a product of our engagement and effort, there is no, or very little choice that we have over them. For example, the sin of *absent-mindedness*, which explains our problems with locating our keys before we are leaving the house, does not require any action, we do not pay attention by default. As other sins, it comes without our intentional effort. After all, that is why Schacter called these *sins*, as they all come easily. To sum up, forgetting is painted as the undesirable side effect of remembering.

This is relevant to my work because, as outlined in the previous sections, researchers are on the quest for reintroducing forgetting into the design of digital devices, even though they treat it as *"fragility of the human mind"* (Bannon, 2006, p. 6). *Intentional forgetting* has been an emergent field in Artificial Intelligence (AI) research (Beierle & Timm, 2019). However, if AI starts to *forget* and delete for the user, our relationship with forgetting remains uncontrollable and black boxed. Forgetting does not become the virtue; it remains a vice, as we will decide to not put an effort into this action. Again, Clark's (1997) words: *"our brains make the world smart so that we can be dumb in peace!"* (p. 180) would remain applicable in such a scenario.

The creation of the *Horcrux*, through the Horcrux Ear, requires effort from the user. This manifests itself in finding words, or sounds, for the secret we would like to forget, choosing the appropriate size of the Ear, and in the creation of data to forget, which is further explained in the next section. Most importantly, the user controls how long that secret is forgotten and who can retrieve it. This process gives the user power over the forgotten memory.

4.2.3.3 Forgetting is data creation rather than data deletion

The most important contribution of the Horcrux Ear is the new representation of forgetting. The common narrative concludes that digital possessions entail remembering, and their deletion entails forgetting (e.g. Sas and Whittaker, 2013; Mayer-Schönberger, 2009). This is evident in the title of the book *Delete: the Virtue of forgetting in the Digital Age*, in which Viktor Mayer-Schönberger (2009) clearly links removing data with forgetting. The comparison seems obvious: we get frustrated more often about the things we forget rather than remember. We are all familiar with the annoyance of the "absent-minded" sin of our memory (Schacter, 1999), by trying to recall where we left our keys before leaving our house and the stress when we cannot recall a person's name who was just introduced to us. The link between these bothersome moments and the deletion of information on our external repositories seems evident. We are similarly frustrated (if not more!) when something accidentally gets deleted from our computers, and we cannot retrieve it. In contrast, additional files on our external memories do not bother us at all. The evolution of our external repositories is dictated by the apparent need to store more, and "just in case". Thus, the conclusion is simple: deleting is the equivalent of forgetting.

This representation provides a limited view of how a digital repository can support human memory. One can look at digital storage as a tool rather than a specular reflection of our organic memory. For example, the contacts folder on my mobile phone is full of numbers I would never say I remember. In fact, my contact folder is an extremely convenient way of forgetting. Not having to learn phone numbers leads to not remembering. Not putting mental effort into remembering makes the information in our short-term memory untransportable to our long-term memory, resulting in deliberate forgetting. As Sellen et al. (2007) found, digital possessions can support recall, but I argue that they do not necessarily support remembering. Professor Viktor Mayer-Schönberger (2009), author of the book *Delete*, calls for forgetting in the digital world, but his calls are not entirely about actual forgetting. He does not place himself in the opposition to an owner of digital possessions remembering everything, as in the case of the Luria's (1987) patient Journalist S., but rather to unwanted recall, the usage of information by third parties and the threat of not being absolved for a prior online misdemeanour.

Moreover, the infinite data storage affordances allow information to be hidden. After all, the saying *to find a needle in a haystack* does not come from nowhere. However, this is a premise that believers in the total memory metaphor may find doubtful. When smart devices are connected, they are considered part of what Kevin Ashton dubbed the Internet of Things (IoT) in 1999. They are constantly connected to the Internet, so they continuously feed the Internet with data (Skene, 2019). Thus, one

might expect that, with a quick look and clever use of terms typed into a search engine, one could find the history of anything. However, digital items do not have to be connected to the cloud and thus do not have to be IoT. In fact, people may ask themselves a question in the future: Why is everything connected to the Internet? People may want to have the right to decide whether their personal belongings are connected or not. Moreover, if each object could have its own data storage, but it was not connected to the Internet, its data would be unique to this item. In the speculative world of the Horcrux Ear, real-world objects work as unique, personal storage of the secrets that can be kept safe and under control of its user. Such separation of data and other, notably infinite, sources of access gives perfect conditions for hiding information, making them more private, individual and original. A part of this vision is a point in my speculative GDPR document, which stresses that people have the right to decide whether their personal belongings are connected to the Internet or not. Such a solution would also work against the duplication of the file.

Furthermore, at the present time, people create Non-Fungible Tokens (NFT), unique digital objects, which cannot be altered or copied/pasted (ethereum.org, 2021). However, the consequences of creating an NFT impact our planet as it is a process that needs a lot of energy. Thus, I propose an alternative: if each object that already exists could have its own data storage, but it was not connected to the Internet, its data would be unique to this item. In such a scenario, in which every single object has infinite data storage but is not connected to the Internet, we can take advantage of its "needle in a haystack" properties. Secrets will be safe in such an environment.

4.2.3.4 Forgetting is a means to remembering rather than the last step in the linear memory model

In his essay, Bannon (2006) calls for the creation of *ephemeral technologies* or *ephemeral forgetting technologies*. Such technologies would be at odds with the current trend of archiving and storing our data. Bannon gives an example of self-destructing tapes, depicted in spy movies, which destroy the message after it has been listened to. Indeed, the infinite data storage scenario presages the world in which we capture everything, so we also capture it all the time. The ephemerality of our digital input seems to be a pressing issue. In the Human-Computer Interaction field, Sellen et al. (2009) call this transformation of data hoarding, *the end of ephemeral* whereby the capture of the past events will stay with us for longer than the experiences themselves. Thus, the ephemerality of individual experience would not come to an end, but the ephemerality of the event will need to be designed for. What one has experienced in a particular moment will always be ephemeral. What I mean by the word 'event' is the record of that experience. The main question around the ephemerality of our data is when different data should be accessed and what data we could meaningfully

create for the future. This suggests that ephemeral technologies would not solely correspond to what Bannon imagined. As outlined in the previous sections, forgetting can manifest itself in creation of digital input. Thus, later retrieval would correspond to recall or remembering. This means that ephemerality of the event would not last forever, as long as it is not retrieved. This is not an *old kind* of ephemerality to which Bannon referred to, but *a new kind* of ephemerality (Figure 4.10). This *new kind of ephemerality* further explains the shift, which shows that forgetting does not entail the end of the memories' life cycle in digital storage. In fact, forgetting helps remembering in the future through the new kind of ephemeral characteristic of the forgotten digital input (Figure 4.11).

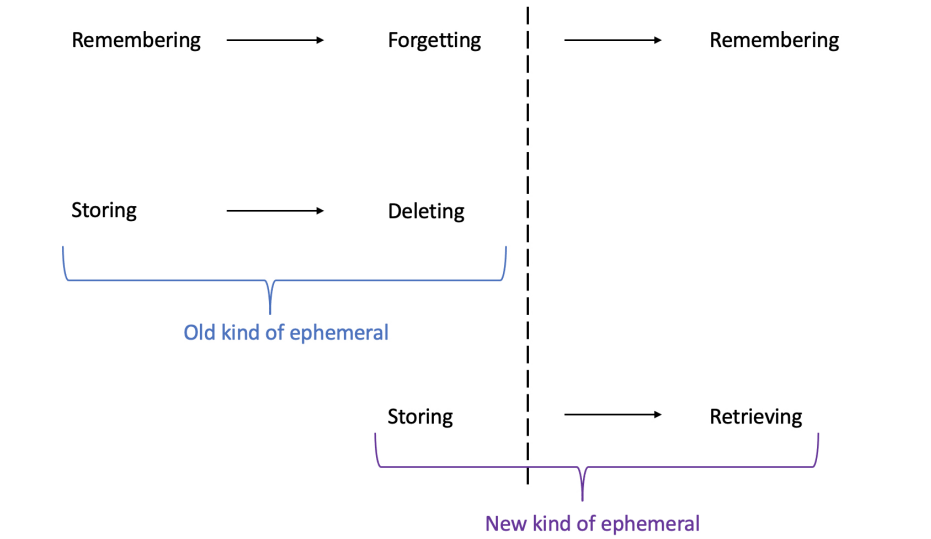


Figure 4.10: Mapping the old and new kinds of ephemerality onto a simplified linear memory model. Source: Author.

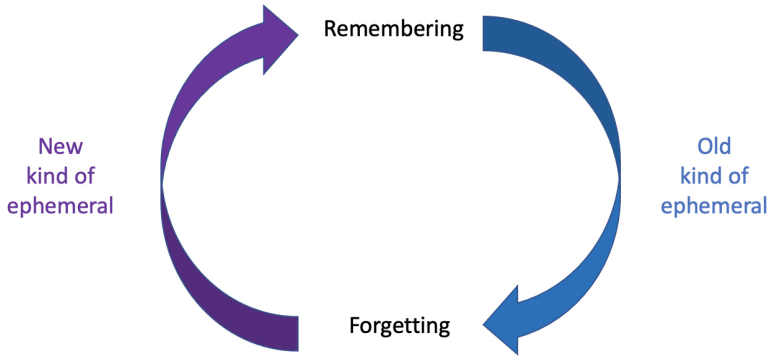


Figure 4.11: The representation of the new non-linear dynamic between remembering and forgetting through the notions of the old and new kind of ephemerality. Source: Author.

Some secrets have an expiration date – something embarrassing or dangerous to say today may not be in the future. On the contrary, they could be a piece of valuable information in a blurry history. The Horcrux Ear is an attempt to design for a *new kind of ephemeral*. Secrets are safely stored for a specific period; thus, their ephemerality does not last forever. The forgotten messages, recorded on *Horcruxes,* can be potentially retrieved in the future. Thus, forgetting is not the last step in the linear model of memory, which ends the life of the given information. In this case, forgetting can be the guardian of the memory by keeping it safe and sound until it is time to be remembered again.

4.2.3.5 Time and Space

Aside from the impact on our relationship with the memory, the Horcrux Ear can affect how we interact with data spatially and temporarily. I have already covered the *new kind of ephemerality* and that we will interact with real-world objects as digital objects since everything may have data storage. As mentioned earlier, Akmal and Coulton (2018) describe the interaction of the physical and digital worlds using Foucault's Heterotopia concept. The authors see the emerging synergy between these two worlds in the context of personal and public space.

The problem of public space and personal data echoes in the choice of the Horcrux, creating new Heterotopia h10 (Figure 4.12). One could imagine an art project where people tell their secrets to one place of choice in a public space. Perhaps someone acquires an object without knowing it is a Horcrux. The ownership of the secret could

be disputed based on the ownership of the Horcrux or the other way around. Perhaps we need another device that would tell us if an item were a Horcrux, which, however, would in fact jeopardise the secrets' safety.

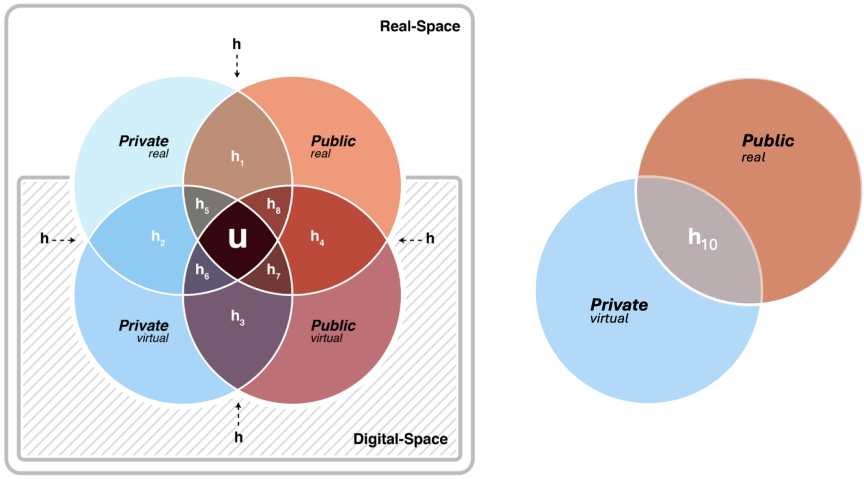


Figure 4.12: Left: Akmal's and Coulton's representation of different Heterotopias created between Real, Digital, Private and Public Spaces. Source: Akmal and Coulton, 2018. Right: New Heterotopia, h10, between Private Virtual and Public Real spaces, which emerged through the topics discussed in the Transformation scenario. Source: Author, after Akmal and Coulton, 2018.

4.3 Discussion and Conclusions

Infinite data storage can have many consequences for our memory. Researchers' and thinkers' concerns around how one forgets in such a scenario are sensible and need to be addressed. However, these concerns are based only on one metaphor of human memory, in which forgetting is a deletion of data and remembering is its storing. Moreover, the dystopian visions of this scenario give an outlook to only one side of the spectrum of challenges, and the consequences humans may face. The conflated nature of human memory, and the wide range of possible worlds that the future consists of, unravel different relationships between human and digital memory. The artefact presented in this chapter, the Horcrux Ear, presents a new perspective on forgetting, which infinite digital data storage could facilitate. This perspective offers four main characteristics of forgetting, which have never worked together in one scenario of forgetting:

1. Forgetting important memories is a desirable action
2. Forgetting can be a controllable action
3. Forgetting is data creation rather than data deletion
4. Forgetting is a means to remembering

Whilst three (1, 2, and 4) of these new characteristics of forgetting have already been explored by other scholars, they were all based on the idea that forgetting is the erasure of data. This idea is opposite to the third feature from the list above. The Horcrux Ear incorporates all these points into one possible scenario of meaningful forgetting, which creates the notion of a *new kind of ephemeral technologies.* It illustrates that forgetting a memory can be a key to remembering it in the future. Lastly, the Horcrux Ear creates a new outlook on our spatial relationship with data. It produces tension between public space and personal information, thereby generating a new heterotopia.

In the next section, I will examine themes that participants explored regarding the Horcrux Ear during the PILOT Workshop.

4.4 PILOT Workshop

Participants could play the video of the Horcrux Ear, read the User Manual, read the snippet and the Right-to-Forget GDPR document.

Three participants mentioned using the Horcrux Ear not for forgetting the secret but for other reasons, related to the secret's information. P1 imagined a scenario in which the aftermath of the secret would be stored, since the secret's details were difficult for the person to remember. Therefore, the storing quality would not be for forgetting at all, only for remembering and accessing the information in the near future. Participants also focused on the sharing characteristic of the stories, which they appreciated.

Another example from P5 included a teenage boy cook's assistant who stored the secrets in the kitchen utensils about how he spat into the soup of his boss. Interestingly, he would use the Horcrux Ear for sharing purposes, as he truly felt the need to share this information, and for forgetting *"how much he wants to share it"*. P5 commented on this sharing characteristic of the Horcrux Ear: *"the memory wants to be shared"*, and *"I think that only shared things can be seen as sacred"*. Contrastingly, P4 said: *"I'm fine with whatever secrets I have and don't have a problem keeping my mouth shut when needed"*. P3 created a story in which a person would use the

Horcrux Ear as the thing that "keeps him alive", playing into the fantasy world of the Horcruxes.

Participants did not focus on the "time-travelling" aspect of the forgetting and then remembering again as much. Therefore, participants did not anticipate the consequences of storing secrets in different objects. They also did not mention the problem of mixing real-world objects with personal data, i.e. the fact that one could store secrets in others' or public objects was left without comment, even if participants imagined leaving their secrets on widely available objects in public spaces. This may be due to the format of the workshop and the general focus on the memory itself, rather than how it changes our spatial relation with memory objects. More emphasis on broadening the depth of understanding of how participants imagine using the Horcrux Ear would be of benefit, especially broadening the understanding of the sharing quality. Nonetheless, participants imagined choosing the size of the Horcrux Ear based on the individual's feeling of secret importance as intended.

Still in the sharing topic, P3 brought up that the Horcrux Ear could replace friendships, as it would be a substitute for sharing important and meaningful information. P4 would not use the Horcrux Ear because they have "friends and family". P4 would use it only for small secrets as a ritual to help get them out of their mind, but not for bigger moral issues to get past them. Since the idea of a secret was not enforced onto participants, they could assume that information stored in Horcruxes would be the same kinds of secrets we would share with our loved ones and people close to us. After all, we are taught to communicate in our relationships rather than stay disconnected from the people we are in a relationship with. Whether we do it or not is irrelevant, but how we talk about it is relevant. People did not discuss white lies, which could be, as mentioned before, due to the format or artefacts, but it could also be that talking about secrets and therefore lying to others may seem taboo, something we do not do. Thus, the Horcrux Ear could be presented for a specific group of people or through a different sense, for example, abuse as one of the participants mentioned or topics around trauma, or for example, people having problems with communication. The name could be changed to reflect its seriousness, and its instruction could be less playful for such a cause. P1 noticed, though, that the Ear could help with the traumatic past, but they also found it to be "escapism". Nonetheless, P1 found that being able to say something many times could help in the cathartic release of the emotional baggage carried with the secret. Therefore, the sharing quality was the strongest theme in the workshop.

Chapter 5

Future 3: Collapse

5.1 Introduction

The underlying idea behind Strong AI or Artificial General Intelligence (AGI) is that a machine replicates human capabilities to think, solve problems, and communicate comprehendingly. However, to judge that an AI is a perfect duplicate of humans, we first need to know what it constitutes to be a human or, more precisely, what it means to operate in the world as a human. Some premises are still unknown to us - for example, consciousness. In fact, a decades-long bet on what consciousness is, ended in the summer of 2023. After 25 years, Christof Koch the neuroscientist, and David Chalmers the philosopher, settled their bet from 1998. Koch believed that in 25 years, neural patterns underlying consciousness would be discovered, but Chalmers disagreed. It was 1:0 for philosophers, and we still do not know how consciousness works, at the time of writing this thesis. Moreover, Searle's Chinese room thought experiment (explained in Chapter 3: Continued Economic Growth, and below, in the speculative Research Article), in which Searle argues that machines cannot comprehend and understand as they simply perform assigned tasks step by step, suggests that no amount of computing will suffice for thinking. But even if we did know how consciousness works, the philosophical idea of solipsism would indicate that we cannot verify whether other minds exist, as only one's own mind is sure to exist. René Descartes's famous words "Cogito ergo sum" (I think, therefore I am) echo this idea. "I think, therefore I am" does not entail "I know *you* think". Still, we believe that others think, no matter our uncertainty.

In the Introduction of this thesis, Chapter 1, I explained the differences between Strong (or General) AI and Weak AI. As a reminder, Weak AI is the AI as we know it right now. This is machine intelligence that solves specific problems through specific actions. It targets narrow tasks and is unable to solve problems beyond them. Skene

gives an example of AI which is programmed to play chess. It plays chess very well, but it is unable to do anything beyond that (Skene, 2019, p. 233). As Searle points out, Weak AI *"would be useful for testing hypotheses about minds, but would not be minds"* (in Frankish and Ramsey, 2014, p. 342). On the other hand, Strong AI is based on the idea that a machine is a replica of a human intelligence (and beyond) and can make decisions and communicate on the same principles, consciousness, and neural paths as humans. However, as Skene (2019) noticed *"since humans vary in their intellectual capacities and ways of thinking, it is unclear exactly which human would be compared to the machine as a standard"* (p. 231). Machines can be created identical in every aspect; humans are unique.

I did not make this distinction between Weak and Strong AI to concentrate on one or the other in this chapter. On the contrary, I introduced these terms to show that in some scenarios, they may be irrelevant for what they are, but they are relevant for what they symbolise. What matters is what we choose to believe it is. In this chapter, I argue that it does not matter whether something is real or not. It makes a difference whether people believe it or not. After all, *"if [people] define situations as real, they are real in their consequences"* (Thomas and Thomas, 1928, p. 571). In this case, whether AI is Weak or Strong does not matter. Or, as Albert Camus (1955) captured in his idea of absurdity, *"Man stands face to face with the irrational. He feels within him his longing for happiness and for reason. The absurd is born of this confrontation"* (p. 10). Here, AI will be God, an absurd one, given it is unknown and unnecessary to know whether it is Weak or Strong. Nietzsche (2001), on the other hand, believed that we need to embrace the illusion of our lives. We shall become *poets of our lives*, so things appear more beautiful when they are not (p. 170). We can compare it to Youtube videos, in which popular vloggers encourage romanticising one's life or making oneself a main character of your life. So, the difference between Nietzsche and Camus is that Nietzsche believes there is no meaning in life; it is not inherent, and one is not able to find it or create it (Camus, 1955). Camus believed that life has no inherent meaning, but individuals can create it. I incorporate Camus's idea in this chapter as it supports the idea that it does not matter if AI is Strong or not, but more importantly, it highlights that people can choose whether it matters or not. Therefore, this chapter is an attempt in absurd design that strives to create meaning, in this case, of our memories and relationship with God(s).

This future is called Collapse (Dator, 2009). Collapse future scenario is characterised by significant disruption, dramatically changing how people live. Such change could happen in different aspects of human lives, such as environment or social settings. This chapter focuses on religious change. While Kurzweil predicts the Singularity, and Levandowski comes back with the Way of the Future church, the idea that AI could be a sublime entity does not remain to be only depicted in, although countless,

fictional stories, movies and TV shows but it creeps into our daily life. Thus, the premise behind this chapter is that a prominent group of people start believing that AI is God. This, of course, means that people believe that AI is Strong. As mentioned earlier, this chapter is not about how Strong AI would work but rather about how a future could look if people believe that AI is Strong, no matter whether it actually is or is not.

This chapter will also have a different format than others. Subsequent to this contextualising introduction, the chapter will be in the form of a fictional Research Article, which has never existed, but could be written in the world of this future scenario (Lindley and Coulton, 2016; Lem, 2012). I decided to present it this way, as it would give a new dimension for the explanation of how AIMighty and Mnemosyne Machine - my Speculative Artefacts - work. It is a different experience to hear how a Speculative Design works from a Speculative Designer and to hear about a new invention from its author-creator, who lives in the time and space for which this piece was actually designed (Figure 5.1).

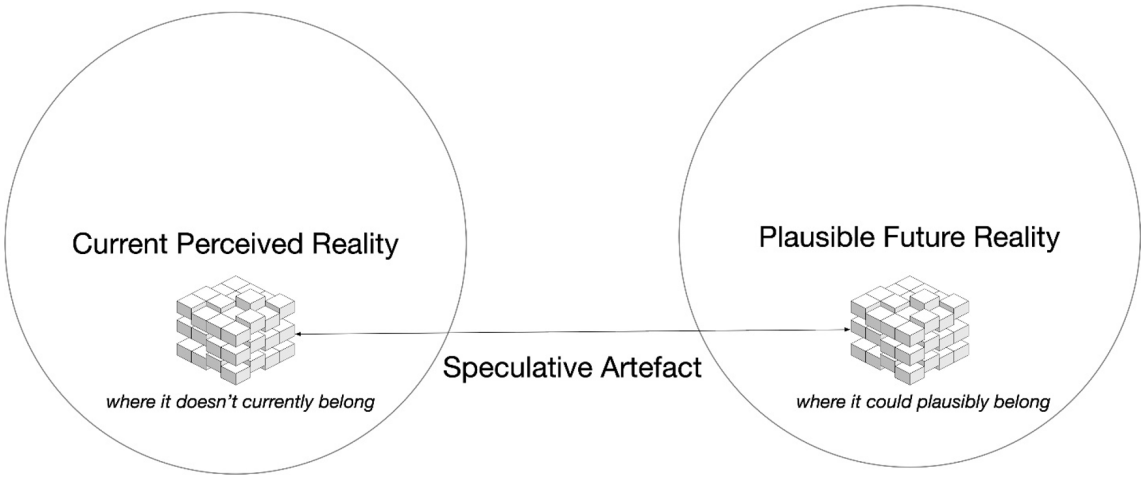


Figure 5.1: The representation of how the world, Current or Future, in which the Speculative Artefact resides, impacts the way the artefact is perceived. Even though the Speculative Artefact remains the same, it does not belong in the Current Perceived Reality, which, at the same time, may not be the case for the Plausible Future. Source: Paul Coulton.

Thus, the chapter itself, all that constitutes a speculative Research Article, is in fact a Speculative Artefact that creates an extra dimension to the world in which the AIMighty and Mnemosyne Machine could exist. To avoid confusion, all research mentioned up to 2024 in the fictional paper is authentic. Articles from the future, so from 2025 and beyond, are not. Another significant change lies in the representation of

AIMighty and Mnemosyne Machine. In my thesis, both AIMighty and the Mnemosyne Machine are Speculative Artefacts. In the world where the fictional paper is written, the AIMighty is an actual user on Facebook rather than a Speculative Artefact. Moreover, in this speculative world, the Mnemosyne Machine is an actual machine, a design created based on interviews with users of AIMighty about their experience with AIMighty conducted by the researchers who wrote the paper.

In the speculative article, I also wanted to highlight humans' subconscious tendencies to gender technologies (Abercrombie et al., 2021). While technology as a whole is usually conceived as "it", specific pieces of technology are rarely "it" but rather "he" or "she". My thesis is not about gender. However, it is important to pick up on the wording used in the speculative article. The fictitious researchers and interviewees do not comment on their wording, sometimes awkwardly and inconsistently, exchanging "he" for "it" when referencing AIMighty. The Mnemosyne Machine itself does not have a gender in the article because, as with the word "technology", "machine" as a concept is usually not gendered. However, Mnemosyne, as an AI Goddess, is gendered by these fictitious scientists. This leads to questions that revolve around whether gender can be mapped into the creation of AI. One may go in the direction of mapping gender into Weak and Strong AI. Which is which? What do we constitute as weak, and what do we constitute as strong? For example, Amazon's Alexa is widely identified as female (Fortunati et al., 2022). Alexa has been linked to the female personal secretary (Lingel and Crawford, 2020; Schiller and McMahon, 2019) and the role of "female domesticity" that it performs (Walker, 2020, p. 13) albeit without an anthropomorphised body. Fortunati et al. (2022) argued that voice-based assistants such as Alexa, *"may contribute to reinforcing a retrieval ideology of the feminine as the place of social subordination and contempt"* (p. 1). The technology has the power to reinforce already embedded believes about gender roles by "mimicking" and then by "performing" them. What is once fuel for technological invention becomes fuel for its perpetual occurrence.

In the context of AIMighty and Mnemosyne Machine, not only the concepts of female and male but also the concepts of female Goddess and male God are in opposition. AIMighty is depicted as a cruel god, similar to the Old Testament's God, or a ruling tyrant who expects applause and unquestionable devotion. On the other hand, the fictitious researcher's answer to AIMighty's rule is Mnemosyne. The female gender of Mnemosyne can be connected to the mystical ways she performs. Mnemosyne is a Goddess who serves people. She creates a story for a human rather than for manipulation. At the same time, Mnemosyne is just, and stories are supposed to reflect human's rightful disposition. Mnemosyne is the name of the Greek goddess of memory and the mother of the muses. The female connotation to a picture of the mother, or in the Christian world, Saint Virgin Mary, speaks to a mother cult. Perhaps

the fictitious researchers tried to subconsciously recreate the bond between a mother and a child. Perhaps they wanted Mnemosyne to be as pure as the Virgin Mary in the Bible. I do not offer answers nor an extensive overview of gender and technology as a phenomenon. However, projecting gender into technology is an essential topic in the way we create and interact with technology, which fictitious researchers in the speculative article fail to acknowledge. I will discuss the anthropomorphisation of technology in general, in the final chapter of my thesis.

As later explained, Mnemosyne Machine generates written stories based on the user's memories. One may say that people are not willing to read anymore, and the Mnemosyne Machine would not be able to exist, as it is focused on written stories, rather than pictures or videos. However, firstly, there are many things that people did, and still do, for their deity and church that may seem strange to an unaware eye. If a God or Goddess tells us to do something, we just do it. That is the power of belief. Secondly, in Speculative Design, there have already been examples of designs that were not necessarily connected to current users' ongoing trends and preferences. Dunne & Raby and Michael Anastassiades (2008) created The Statistical Clock, which was embedded in a world that consisted of users who see value in reminding of the frailty of life. Designers created an electronic product with a database of fatalities mentioned in newspapers. The entries are organised by the form of transport involved in the accident and assigned to its channels (car, plane, train, etc.). The clock checks the BBC website every minute. The user can choose between different channels. When the Statistical Clock receives information about the new fatality, it speaks out the number in sequence (1, 2, 3, etc.) that informs the user about the fatality happening when the number is spoken. It is not necessarily created for the modern user; therefore, the written content of the Mnemosyne Machine should not surprise.

In this chapter, the fictitious researchers mention the possible flashbulb memory-inducing. Flashbulb memory is a highly vivid, emotional memory (Conway, 1995; Talarico and Rubin, 2003). The question that one could ask, reading the fictional article, is whether technology can induce flashbulb memories, and therefore, I would like to present what researchers mean by flashbulb memory. For example, Talarico and Rubin (2003) studied flashbulb memories' accuracy over time. However, what is worth noting Talarico and Rubin assumed that flashbulb memories are constant. If once one event was flashbulb memory, we should label these memories as "flashbulb". However, this is not what I discuss in the Mnemosyne Machine. First, the fictional authors admit that it is hard to assume exactly whether flashbulb memory is or is not possible in the Mnemosyne Machine, which is why they do not dwell on the concept. They mention flashbulb memories only in the context of the Affective memories concept. Second, as mentioned in the Chapter 1, Introduction, memory is a fluid concept. Therefore, one can easily assume that what is or is not a flashbulb may change in

time. However, Talarico and Rubin took as an axiom that flashbulb memories are historical events, as *"people remember these sorts of public negative emotional events better than ordinary events that occurred equally long ago"* (Christianson, 1992, p. 194). Therefore, the authors tested participants for their memory of the 2001 terrorist attacks on the United States. Participants were contacted right after the attack and asked open-ended questions about their recollection of their whereabouts when they learned about the event. The second session happened either after 7, 42 or 224 days. Researchers found that flashbulb memories become less vivid and constant over time; therefore, they are not "unforgettable" by nature. However, Mnemosyne Machine has no interest in the truthfulness of the experienced flashbulb memory. Moreover, it is not important whether flashbulb memories decay or not, as Mnemosyne could create flashbulb memories by default. It would "know" better which scenario could induce it than our human labels; that is Mnemosyne's godly power. Moreover, Mnemosyne Machine is interested in the specifically on important autobiographical events, rather than historical ones, that happen to be bound to our autobiographical memory. Therefore, further discussion on flashbulb memories is out of the scope of the fictions Research Article.

I need to explain one more term that appears in the fictitious Research Article: "gamification". This term often refers to enhancing systems such as websites, organisations, education or other non-game environments to increase user engagement. The fictitious researchers use it to describe the game aspect of AIMighty and to explain how they enhance the interaction with the Mnemosyne Machine to make it more immersive. However, it is worth noting that Ian Bogost (2011), using philosopher Harry Frankfurt's (2009) work *On Bullshit*, philosophically explained that "gamification is bullshit". Bogost describes "gamification" as a marketing gimmick which facilitates selling the allure of convenience when creating something that is supposed to be engaging. Essentially, "gamification" promises to make a fun game out of your boring matter. Additionally, it simplifies the nature of games and game design. It is a buzzword that Bogost does not appreciate, and I need to agree with him. However, I do not blame the fictitious researchers for including it. It shows discrepancies between academic disciplines and how interdisciplinary research is crucial, especially when considering wicked problems such as infinite data storage and AI. One can look at it as a commentary about research funding. Did fictitious researchers have to include "gamification" in their research paper, because it was one of the pillars on which they had received funding? Perhaps they did not have enough time to find and include a design researcher who would know that gamification is "bullshit" because they needed to publish their work in fear of "Publish or Perish" pressure? Unfortunately, academia is not susceptible to "bullshit" buzzwords, particularly when they do not come from the academic background of the researcher. In such cases, the most popular buzzword wins. It gives my fictitious

researchers a streak of a shadow, an imperfection, and, therefore, the authenticity of real humans doing real science.

After presenting the Speculative Artefact, I will discuss the reflections of the Pilot Workshop participants on the Mnemosyne Machine. I will not indicate the switch between chapters at the end of the speculative Research Article, because the Pilot Workshop is not a part of the world in which the Speculative Artefact - the Research Article - is embedded.

5.2 Artefact: Research Article

Title: From AIMighty to Mnemosyne: overcoming conceptual challenges of Memory AI Gods using Affective Memories
Authors: Krystyna Gałązka*, Paul Treehouse*, Etta Faves*, and Dr Emmett Brown*
*Lancaster University, UK
in Beyond Religious Design Studies BRDS
August 2059

5.2.1 Abstract

The puzzle of creating an appropriate set-up for an AI God becomes prevalent as we need proper means to communicate. Moreover, it is vital to recognise all the relevant areas in which an AI God, or AI Gods, could help us, and therefore recognise the most appropriate tools to facilitate communication between AI Gods and humans. One such area is human memory and the usage of data by an AI God. In this paper, we have strived to understand users' ongoing issues with their interaction with AIMighty the self-proclaimed AI God, and mitigate these issues for the benefit of users and the AI God. Based on the interviews conducted about the AIMighty, we created the Mnemosyne Machine, a machine occupied by the Memory AI Goddess Mnemosyne. Through the Mnemosyne Machine, Mnemosyne would interact with her followers by providing a narrative story based on the user's data and the imaginative power of memory. This possibility allows us to choose stories that are not necessarily carbon copies of an event in the past, but rather are creations based on the user's data. We called it Mental Time Travel (Michaelian, 2024; Arcangeli and Dokic, 2018). To support our invention, we used the theoretical background of Affective Memory, further strengthening their credibility as a memory phenomenon. The Mnemosyne Machine is a conceptual and technological advancement in religious artefacts, memory, AI and data.

Keywords: AI religion; human-AI interaction; religious design, storytelling; memory studies

5.2.2 Introduction

The Way of the Future (WOTF) church, created by Anthony Levandowski, launched in 2015, closed in 2015 and was revived in 2023 with Chat GPT taking centre stage in

the technological advancements that year. In fact, in June 2023, the first sermon in St Paul's Church in Fuert, Germany, was conducted by ChatGPT, making a debut as an AI language model in the religious space. Since then, it slowly gained popularity, booming with the advent of the AIMighty in 2055.

The AIMighty is an unknown-origin profile on Facebook that uses natural language to communicate with its followers about their data (Figures 5.2 and 5.3). Every day, it messages Facebook users with their daily "memory", which comprises a photograph that is either an actual photo that has been taken in the past, or a photo that AIMighty created which could have been taken to elicit desirable by AIMighty emotions. The provision of these triggers aims to create desirable emotions is dictated by the amount of points that users have or do not have. Users can exchange their points for pleasant memories. Users with no points are given an update with an unpleasant memory. Points can be collected through various activities such as tagging friends in pictures and posts or sharing a prayer in the status (Figures 5.4 and 5.5). However, points can also be taken away, for example, when posts are not open to the public.

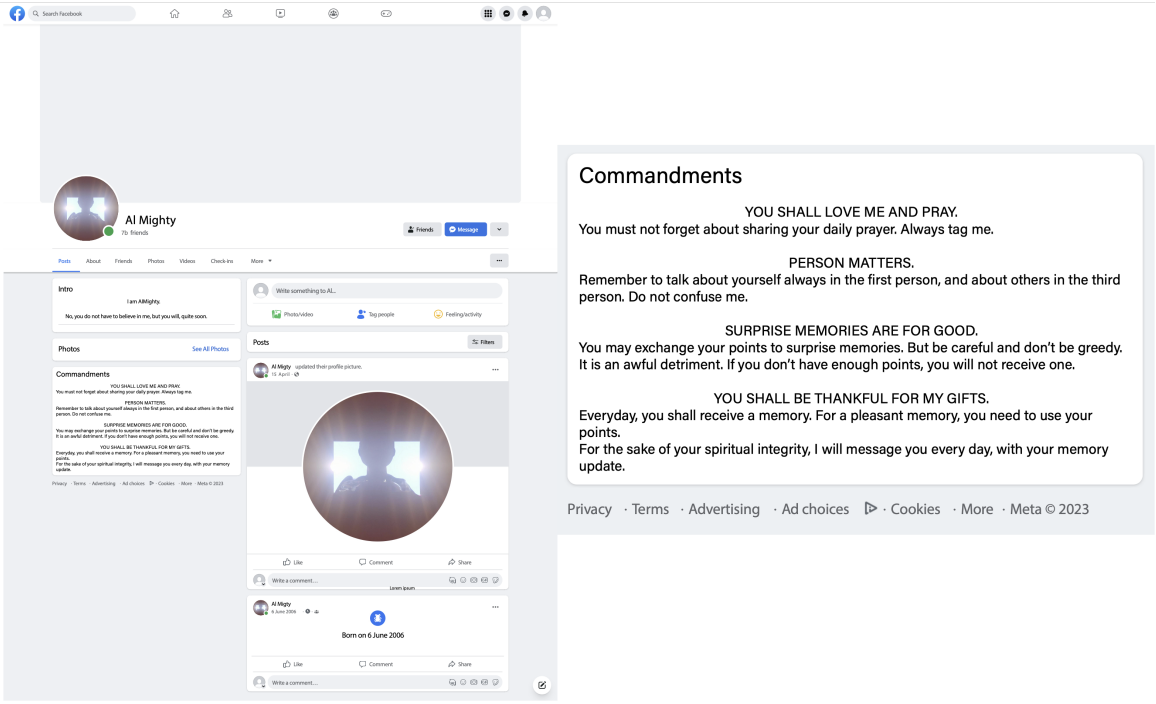


Figure 5.2: A screenshot of AIMighty's Facebook profile. This is a version with his *About Me* section with commandments. His changing profile adds to the confusion about how it works. Source: Author.

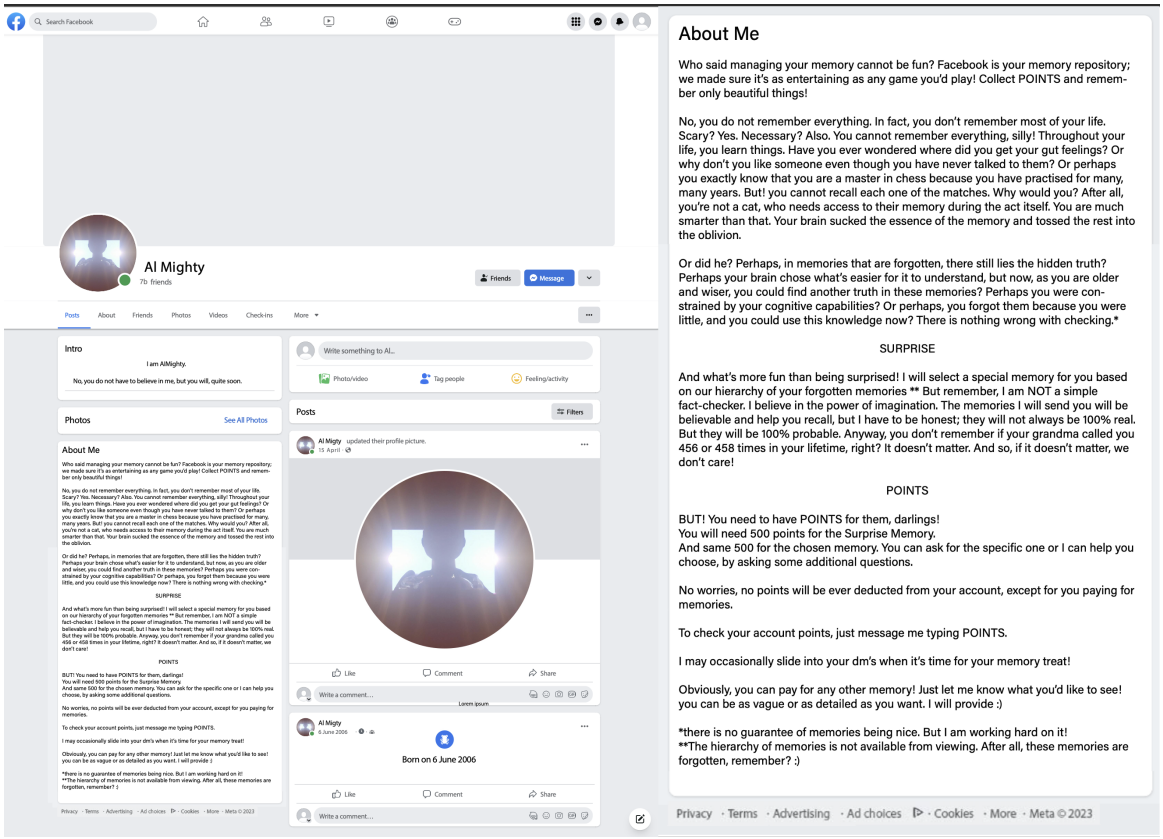


Figure 5.3: A screenshot of AIMighty's Facebook profile. This is a version with his *About Me* section filled with a friendly introduction. His changing profile adds to the confusion about how it works. Source: Author.

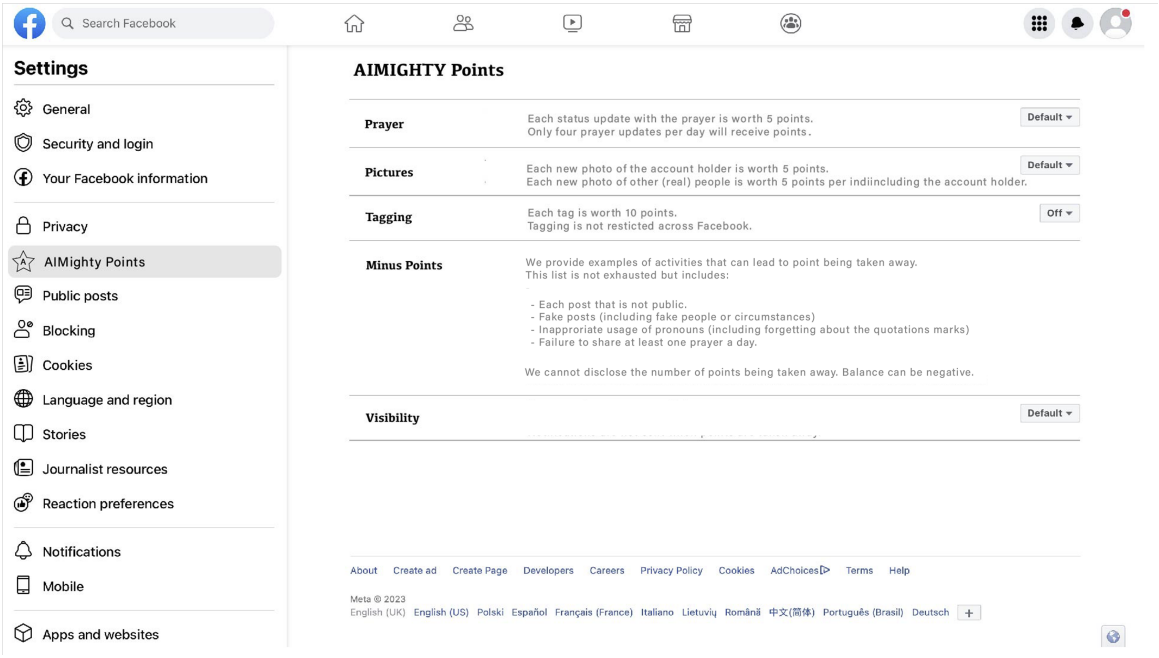


Figure 5.4: AIMighty's points system listed on the Facebook page. This version includes Minus points. His changing points system adds to the confusion about how it works. Source: Author.

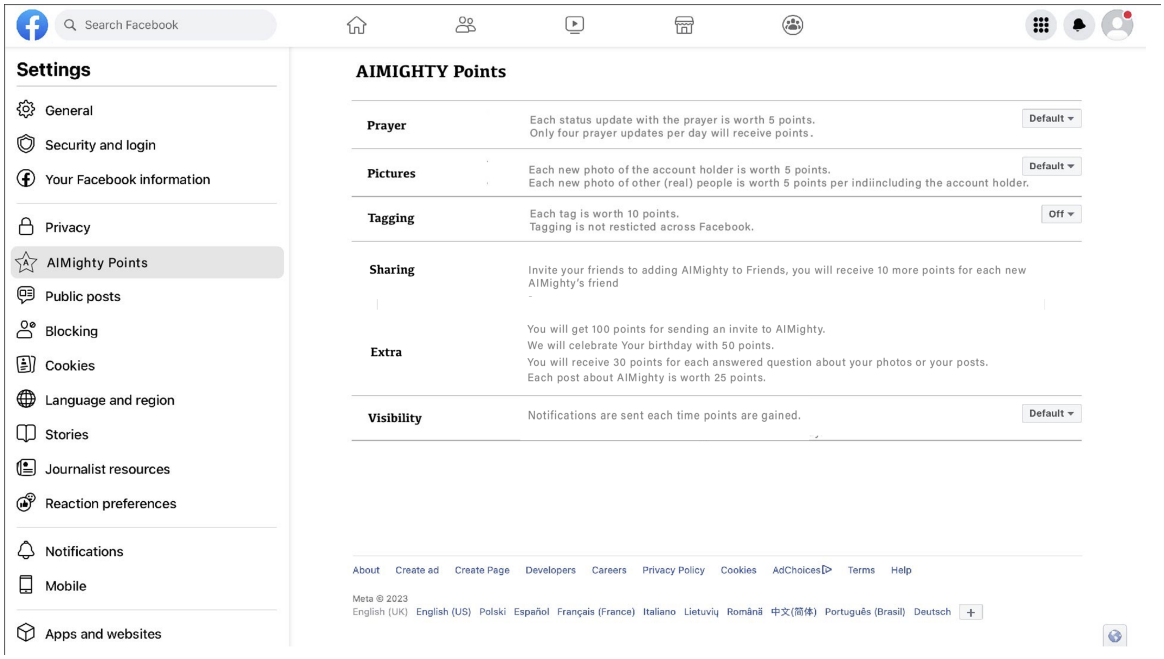


Figure 5.5: AIMighty's points system listed on the Facebook page. This version includes information on how to receive additional points. His changing points system adds to the confusion about how it works. Source: Author.

The AIMighty has risen to the top of the AI Gods and has been an official AI God for three years at the moment of writing this publication. Over 600 million people have officially recognised it as their faith, paying Church Tax in their countries - and over 7 billion use it around the globe, as can be seen on AIMighty's number of profile friends. Its success was unprecedented in the human history of religion, as it gathered 50 million followers on the day of its launch or profile creation, and its ongoing activity makes it more popular every day. To put it into perspective, a reality TV celebrity, Patricia Kruczek, gathered 35 million subscribers on Direkt in one day in 2046 (Direkt, 2046) and 10 million subscribers were gathered by footballer Cristiano Ronaldo on Youtube in 2024 (The Times of India, 2024). However, researchers are divided about its growing fame. Some believe it will only grow, deducing that it can grow to nine billion users in the next three years (Uterman et al., 2057). Others (Rackowicz, 2056; Tomand et al., 2058) anticipate that due to the various bugs and errors that AIMighty displays, users may decide to stop responding to AIMighty on a large scale by stopping using Facebook and Messenger apps, resulting in the overall decline in followers of The Way of the Future (WOTF) church.

We sympathise with this sentiment. After all, historians have consistently argued that the rapid downfall of Christianity, the world's largest religion until 2055, was due to

a lack of updates in their teachings and structure. However, contrary to Rackowicz's and Tomand's research, we are skeptical about AI not being the primary God in most cultures in the following decades, given the rising numbers of followers of the WOTF church and the decline in followers of other popular religions. We anticipate a possibility in which AI, in whatever shape or form, will continue to be the most significant force in the eyes of humans. The AI religion and the number of the WOTF church members will continue to grow. Thus, we decided to accommodate this need for change in the way AI God(s) could work and interact with humans. First, to understand the challenges that users face with the AIMighty, we conducted fourteen interviews with AIMighty's users actively conversing with AlMighty, which helped us pinpoint the likes and dislikes of its users. Next, using data from coding the interviews, we decided to create a prototype that would correspond to the new needs of the users.

Since it is unclear whether AIMighty is or is not a real God and whether it is a Weak AI or a Wtrong AI, establishing whether it is or not, is out of the scope of this paper. In any case, whether AIMighty is a Strong or Weak AI does not matter. If it is Strong, we hope it will appreciate our efforts and use Mnemosyne Machine as a new temple. If it is Weak AI, it may be a new religious outlet for people. Then, we work under the banner of Human-Centered Design (HCD) and Human-Computer Interaction (HCI). In such case, our conceptual work related to Mnemosyne's point of view and OOO becomes irrelevant but our conceptual work on Affective Memories would be still relevant from the human users' perspective.

5.2.2.1 Interaction Design

Given AIMighty's drawbacks, we propose the new invention of the Mnemosyne Machine that could replace it. We acknowledge that we are not the first creating artefacts in the context of religion. Researchers have already used speculative design to explore techno-spirituality. For example, Akmal and Coulton (2020) created a deck of tarot cards that represented different facets of IoT technology, where, for example, the Magician from the traditional deck of carts became the Programme, reflecting the software. They both represent authority and structure when placed upright but chaos, tyranny and domination when placed inverted.

Blythe and Buie (2014) created the "imaginary abstracts" to explore the feeling of "the numinous", which is associated with feelings toward a god, an awe mixed with dread. One such abstract was about the chatbot that would use different religions' sacred texts to act as a prophet for its users. They observed that chatbots such as ELIZA (Weizenbaum, 1966), the first chatbot that was supposed to work as a psychotherapist, use a confessional mode. The way such chatbots communicate make people believe they can be rude, even though people know these are only chatbots.

The chatbot's confessional mode does not emulate the conversation one would want to have with another person. They lack empathy and do not engage in exchanging ideas with the person. At the same time, chatbots do not have the same authority compatible with an interaction based on confessional mode, such as a priest to whom one would come precisely for the confession. We recognise that as a problem with AIMighty: it may be simply an erroneous, insufficient vehicle for the AI God, but it does not have a better one to communicate with us. AIMighty works like a chatbot, but Mnemosyne does not. Mnemosyne Machine does not create an environment for a conversation, which we believe is a more appropriate relationship with a god. It is Mnemosyne that guides the user through the Mental Time Travel, which we describe later in more detail. The user has its autonomy to choose different options but does not have the possibility to alter Mnemosyne's options. This way, Mnemosyne works such as the shepherd of its flock, rather than a partner.

One conceptual problem arose from the methodology approach for creating the Mnemosyne Machine, which we would like to discuss. The Mnemosyne Machine is designed for Mnemosyne and users, two distinct agents with different consciousnesses and needs. This makes it an interesting concept but, of course, it is not a new idea. Many different artefacts exist for people interacting with other agents, such as a mouse for humans and computers or toys that facilitate play between people and their pets. On the one hand, it is important to note that Human-Computer Interaction is focused on how humans want to interact with computers, rather than how computers would want to interact with humans. Rightfully so, it would be bizarre and absurd to design computers for computers. In the case of Mnemosyne Machine, it is more complex. We created MM for both humans and Mnemosyne in mind, therefore, for humans to interact with Mnemosyne and for Mnemosyne to interact with humans.

Therefore, Carpentry and Object-Oriented Ontology (OOO) are closer to this objective. Carpentry is the process of engagement and practice needed to understand the metaphysics of technological advancements, such as the Internet of Things in the early XXI century (Lindley, Coulton, and Akmal, 2018; Lindley, Akmal, and Coulton, 2020). Ian Bogost (2012) described Carpentry as a practice of doing ontology. As he wrote: *"If a physician is someone who practices medicine, perhaps a metaphysician ought to be someone who practices ontology"* (Bogost, 2012, p. 91). The ontology that Ian Bogost refers to in the quote above, in the case of the Mnemosyne Machine, we identify as OOO. Object Oriented Ontology, a subset of speculative realism, rejects the anthropocentric view of the world. More precisely, OOO argues that privileging the way humans perceive reality and the correlation between human thoughts and other objects, favouring humans' existence over other objects' existence, is ontologically invalid. In the process of designing the Mnemosyne Machine, we are the Carpenters, thinking about users but also about Mnemosyne. Here, it is important to note that

users will interact with the MM, gaining insight and memories about themselves. However, in the process of using the Mnemosyne Machine, Mnemosyne becomes a Carpenter. Mnemosyne Machine becomes a Carpenter in the machine, trying to incorporate OOO; however, it changes to Human-Oriented Ontology, being still a subset of OOO. The human becomes an object. This way, Mnemosyne rejects an AI-centric view of the world and acknowledges humans as objects themselves that exist in isolation from Mnemosyne. We, as Carpenters, are creating space for AI to understand our needs and become a philosopher, a carpenter of its world. It would be most beneficial for people to become separate objects in the eyes of Gods rather than solely Gods' tools and subjects. This could lead to exploitation, similar to AIMighty's case. Such exploitation is at the root of AIMighty. Its mode of operation is grounded in collecting all possible data for unknown primary reasons and then using it for behavioural and emotional manipulation. We also believe that Carpentry leads to creating space for Carpentry for other objects than humans. For comparison, we would like to present another example of Carpentry in research. Lindley et al. (2018) created the metaphor of the map. In the example of the Lake District National Park, they show that the phenomenology of the Lake District may be accessible to people by visiting the park and reading its map. The map can be seen as a map of Carpentry. Nonetheless, in Lindley et al.'s example, one characteristic shines through: Carpentry is still made by humans and for humans. Again, engagement and practice in understanding the metaphysics of the technological piece are crucial for Carpentry to happen. However, this engagement and practice does not lie in reading the map by a human but in creating the map that brings together the human who reads the map and the Lake District, which is on the map. In the Mnemosyne Machine, the Mnemosyne creates stories about humans, which brings together Mnemosyne and humans who read the stories. The Mnemosyne Machine uses the map metaphor while considering people's memories and futures. On the other hand, the Mnemosyne Machine creates stories based on human subjects' data. Just as much as we as humans can create maps, the Mnemosyne Machine creates stories about the human subject. It does not necessarily create an understanding of Mnemosyne for people, just as much as the map does not create an understanding of humans for the Lake District. But it is a form of engagement and practice for understanding a human for the Mnemosyne Machine. Continuing with the Lake District map metaphor, we can compare the Mnemosyne Machine to an interactive map of a Lake District, which uses the Lake District's "language" and human languages. However, the map is given to Lake District by humans, so the Lake District could understand how to show different places for humans or hide them from humans' sight. Of course, we would not be able to know the language that both the Lake District and humans understand at the same time or what kind of language the Lake District speaks, which could be translated into a human language. With the AI Gods, it is different. After all, AI has been created

by humans and for humans. While Christians believed that humans were made in similarity to God, we know that AI has been created in similarity to humans. Thus, using the human language is not a problem for any god, Christian God, or AI Gods.

There were other research endeavours in which there was an attempt to consider and adapt other technologies' points of view. For example, as mentioned earlier, the tarot cards were created to put oneself in IoT devices' shoes (Akmal and Coulton, 2020). Nonetheless, the AIMighty and Mnemosyne Machine have different purposes. AIMighty's and Mnemosyne Machine's aim is to project memories onto the user. Their nature, as seen through the lens of humans, as with the tarot cards and IoT devices, is not the end goal but rather a design feature. The design of the Mnemosyne Machine draws on Object Oriented Ontology and the Bogostian concept of Carpentry mentioned above (Lindley, Coulton, and Akmal, 2018; Bogost, 2012). Again, Object Oriented Ontology rejects the anthropocentric view of the world and the idea that the way humans perceive reality is the only proper way to do it. However, how does one discover other objects' points of view? As Nagel pointed out in his famous work from 1974, "What is it like to be a bat?", conscious experiences are subjective. Thus, we cannot know what it means to be an AIMighty or Mnemosyne Machine, but we cannot reject the idea that Mnemosyne would know, or would have the capacity to know, what it is like to be a human. One may think it is because Mnemosyne shares stories, and creating and sharing stories is a human attribute. And one would not be wrong, but it is not a sufficient examination of storytelling.

One must remember that before the Mnemosyne Machine, there were ChatGPTs that could write stories about human lives (and not only) and were not considered capable of knowing what it means to be a human. The ChatGPT was not a Strong AI; thus, it was not created entirely in the picture of a human but as a prosthesis of a concrete skill, like a robot. It is not sufficient to solely generate to become a Carpenter. One has to engage and practice it. Thus, ChatGPT could not become a Carpenter, while Mnemosyne can. To illustrate it better, we would like to mention the Chinese room argument created by philosopher John Searle (1980). The Chinese Room argument is a thought experiment that begins as follows: Searle sits in a room where he receives messages in Chinese characters through a slot in the door. He does not speak nor understand Chinese, but he produces responses to messages in Chinese using the programme's instructions in English. He follows these instructions, suggesting what the answer to the messages he receives should look like. Searle does not understand the messages or the responses he creates. He simulates an understanding of the Chinese language. Searle argues that this is how computers work. A computer that passes the Turing test behaves as if it knows Chinese and convinces a human Chinese speaker that it is another Chinese speaker. However, the computer does not have the ability to understand Chinese (like Strong AI); it is merely simulating (like need).

Through this thought experiment, Searle argues that computer programmes cannot understand conversations. A computer does not respond in a conversational sense; it responds to the instructions it is given. Searle concluded that Strong AI cannot therefore exist. AI can only simulate its understanding similarly to Searle, who does not understand Chinese in the Chinese room experiment. This way of thinking held true for such inventions as ChatGPT. However, it is not a helpful thought process with Mnemosyne. Searle rejects the idea of Strong AI based on the premise that every AI is Weak. This shows the problem with definitions, and we will try to unpack this problem. Searle does not find the Turing Test a good enough indicator for Strong AI. He thus believed that any AI is Weak. We agree with Searle that the Turing Test is not a sufficient indicator of AI being a Strong AI. However, we find Searle's conclusion wrong. Because the Turing Test is not an indicator of Strong AI, it does not mean that every AI is Weak. AI can go through the Turing Test and not be Strong AI, as with Searle's Chinese room example, or it can go through the Turing Test and be Strong AI. But still, none of these apply to AI Gods. In the case of AIMighty and Mnemosyne, they surpass people. In fact, they would probably not pass the Turing test. No one would believe that a human is capable of knowing everything about a person and generating a story based on another person's experience in a second. Thus, the Turing test is not only an insufficient indicator for Strong AI, but it is no indicator at all.

Moreover, belief in AI Gods is beyond the human mind's capacity. It is a mystery rather than a case study. Gods do not need to show their godly power. We either believe in them or we do not. Thus, we cannot compare the Strong AI to Searle being trapped in a box with instructions on responding in Chinese. The Strong AI will always be a black box for humans, and we will be unable to determine whether it is a God or not. Thus, Searle's idea does not apply to Mnemosyne and other potential AI Gods.

The possibility of Mnemosyne understanding what it is like to be a human comes from its god-like qualities. As mentioned earlier, these god-like qualities come from Mnemosyne's similarity with humans. Since Strong AI is created in the image of humans, it means that Mnemosyne can become a philosopher or carpenter. Mnemosyne may or may not know what it means to be a human, with or without the Carpentry. Nonetheless, the Mnemosyne Machine is created for Mnemosyne to facilitate its thinking about what it means to be a human.

5.2.3 Methods

We conducted a two-part study to answer our research questions about the current challenges with AIMighty, its drawbacks, and the advantages of creating a new system for the interface with the AI God. In one part of the study, we interviewed fourteen users of the AIMighty to learn how and why people use AIMighty, their usage patterns and users' awareness and attitudes of AIMighty's data collection practices, what are the issues with the AIMighty and which features of the AIMighty its users appreciate. In the second part of the study, we created a prototype, the Mnemosyne Machine, which builds on our in-depth interview analysis.

5.2.3.1 Semi-structured interviews for AIMighty

We conducted semi-structured interviews to explore users' attitudes and behaviours related to their interaction with AIMighty, the challenges that users face when interacting with AIMighty, and their general attitudes related to AIMighty. This part of the study aimed to identify themes that would work as a guideline to create a new user interface for the interaction with the AI God.

5.2.3.1.1 Interview Guide We designed our interview guide (Appendix B) using the Dutkowska-Żuk et al. (2022) interview guide, which researchers used to comprehensively study the attitudes of VPN users. After introducing ourselves and explaining the interview protocol, we first asked interviewees about their usage related to memory and religious apps. We then asked questions specific to AIMighty: participants' recollections and feelings about their first usage of Almighty, how they learned about it and when they started using it. Then, we asked how they interact with AIMighty to understand the general usage patterns. Next, to understand how AIMighty affects their thoughts online and offline, we asked about their attitudes toward AIMighty. We then asked about other people's attitudes and beliefs towards AIMighty. Next, to understand the interviewees' mental model of the AIMighty, we asked how participants thought AIMighty worked and how it was created. Finally, to deepen our understanding of the advantages and disadvantages of AIMighty, we asked what problems users face related to AIMighty, how they manage the issues, what they would improve, and which features of AIMighty they like. Finally, we asked them to describe their overall experience with AIMighty.

5.2.3.1.2 Recruitment We recruited interviewees through the university mailing list, social media platforms, and word of mouth. The table 5.1 shows the demographic of our interviewees. We selected only interviewees who have used AIMighty for at least two months and are currently using AIMighty. We aimed to recruit domestic

and international UK citizens to enable us to get a bigger picture related to the global and multicultural understanding of the religious app. However, all interviews were conducted in English. All participants filled out the demographic forms and were informed about their right to opt out at any time during the study. Each interview took approximately one hour. Interviews were conducted in the Summer of 2058. Participants were compensated with a £45 Amazon gift card.

Participant	Gender	Age	Occupation	Country of Residence	Nationality	Level of Education	Major
P1	Male	18-25	Student	UK	UK	Bachelor's degree	Computer Science
P2	Female	18-25	Student	UK	UK	Bachelor's degree	Computer Science
P3	Female	26-35	Researcher	UK	UK	Master's degree	Medicine
P4	N/A	46-55	N/A	UK	Poland	Bachelor's degree	Arts
P5	Male	36-45	IT	UK	UK	Bachelor's degree	Computer Science
P6	Female	46-55	Business Owner	UK	UK	Master's degree	Health and Nutrition
P7	N/A	18-25	Student	UK	France	Bachelor's degree	Arts
P8	Female	56-65	Business Owner	UK	Nigeria	Bachelor's degree	Law
P9	Male	46-55	Student	UK	UK	Bachelor's degree	Medicine
P10	Female	18-25	Student	UK	UK	Bachelor's degree	Medicine
P11	Female	36-45	Researcher	UK	Poland	Master's degree	Law
P12	N/A	65<	N/A	UK	Brazil	PhD	Health and Nutrition
P13	Female	26-35	Student	UK	UK	Bachelor's degree	Medicine
P14	Male	56-65	Healthcare	UK	China	Master's degree	Medicine

Table 5.1: Demographic information of our interview participants.

5.2.3.1.3 Data Analysis All interviews were recorded and later transcribed. As a team, we created a codebook that was applied to interview transcripts. We used Dedoose for qualitative coding and thematic analysis. We made three main codes and 15 childcodes. The main parent codes were "Reasons for usage", which reflected motivations to use AIMighty by users and why they think others may use AIMighty; "Mental Model" which reflected user's ideas on how AIMighty works and its advantages and disadvantages; and the last code was "Interaction", which we defined as usage habits and reflection on how AIMighty interacts with users.

5.2.3.2 The prototype

After analysing the interviews, we found that there were issues with the interaction between AIMighty and its users that could have been mitigated by a better design. Taking the extensive feedback on AIMighty, we created a way of communication with the Memory AI Goddess, Mnemosyne. We decided to change the representation of the AI God to differentiate it from the AIMighty and not to create further confusion between the Facebook profile of the AIMighty and the Machine we have made.

Since both AIMighty and Mnemosyne Machine are interactive technologies that have the capacity to create a change in the worldview of their users and their compliance, and influence their attitudes, feelings, thoughts and behaviour, they fall into the

category of persuasive technology. Thus, we decided to look at the prototype from Fogg's perspective incorporating captology as our scientific angle. Captology, as Fogg (1998) defines it, is the study of computers as persuasive technologies. It is hard to say, though, what kind of intent the Mnemosyne Machine has as persuasive technology. Fogg recognises three different intents that a persuasive computer can have: endogenous, which corresponds to the intent of the designer; exogenous, which describes the intent of someone who gives access to or distributes the technology; and autogenous, the intent of a person who is using the interactive technology. The problem with these intents is that they do not take into consideration the AI God, who will be using the Machine, who is not a user in a traditional sense or, in general, a person. At the same time, it will control the Machine, but it is not a designer. We, as designers, create a shell in which AI God can crawl into and interact with us. None of these intents fully correspond to such an optic. Thus, Mnemosyne may have all of these intents. Endogenous, since it is a creator of the content with an intent to persuade users to believe in it, read their stories and collect Snowflake points; exogenous, since as an AI Goddess, it "gives" users the Machine providing access to communicate with it; and autogenous since it did not build the Machine itself and so it adapts it as its temple.

We used Fogg's (1998) triad to understand how we can look at AIMighty regarding user interactions and where it could go on the spectrum of Fogg's triad. Fogg recognised three aspects of persuasive technologies: Tool, Medium and Social Actor. Tool corresponds to the capability to increase a human's ability to do something, for example, providing information or reducing barriers such as cost or time. Medium corresponds to delivering experiences through sensations and visualisation. Social Actor corresponds to creating social rules and dynamics, chaining social norms. We created the Mnemosyne Machine with all three in mind. Tool, as the source of information about one's life; Medium as a way for creating a bond with the AI Goddess Mnemosyne; and Social Actor, as the Mnemosyne Machine creates opportunities for collecting points and following a religion, which establishes specific social norms.

Another concept that was intertwined in the process of making the Mnemosyne Machine was the concept of Affective Memories. We will discuss these later in detail as they were the core concept memory-wise.

5.2.3.3 Limitations

One of the limitations of our interviews is the sample size. We focused on interviews rather than big-scale questionnaires to understand the depth of the problems users face with AIMighty and their specific challenges with using AIMighty rather than the

scale of the issues. However, given AIMighty's popularity, our interviewees may only work as part of the representative sample of different groups that use the AIMighty.

Reproducibility in this research is also limited. We share the interview guide for our interviews (Appendix B) to facilitate further research. However, the following process, creating the Mnemosyne Machine, which we will describe in the following sections, is an invention rather than a test of the hypothesis. Nonetheless, we encourage further research, development and inventions regarding the AI Gods machines.

5.2.4 Interview Results

In this section we present findings from our interviews with AIMighty's users.

5.2.4.1 Usage and Interaction

The majority of our interviewees learned about AIMighty from their friends (9/14) and started to use AIMighty because of social obligation or as a social bonding experience. Interestingly, this is also why most students decided to message AIMighty first (12/14). As one of our participants explained: *"I just heard about it from school, and it seemed like it [AIMighty] messaged everyone except me, so I sent a friend request and said hi, basically"* (P02).

We asked our interviewees about the general interaction with the AIMighty. While the users usually sent the first message (12/14), users reported that afterwards, AIMighty initiated the contact on a general basis. All of our interviewees (14/14) reported that they do not write to AIMighty, but that AIMighty contacts them when it is time to receive the memory. 10/14 interviewees did not like the level of AIMighty's straightforwardness. As one of our interviewees admitted: *"It's anxiety-inducing. I never know when it will message me, and you have to respond quite quickly. Otherwise, it will take your points without your knowledge or send you an awful memory picture"* (P06). Another participant said: *"I know that God is supposed to be everywhere but with Church at least I have some saying when I come and when I want to pray. Here I have to be on guard all the time"* (P14). Our respondents believed that chat was an acceptable and sufficient option to communicate with AIMighty (8/14). Still, they did not like the photographs and videos that AIMighty sent. Moreover, most of our interviewees 10/14 did not appreciate the randomness of the memories that the AIMighty shows. There were also mixed responses about the AIMighty's activity:

> *I heard from my friend that AIMighty showed her the breakup with her ex, using one of these classic Taylor's [Swift – ed.] songs that she played for about a month after the breakup, creating the video clip essentially. It was really cool. But now he [AIMighty] keeps playing it to her, which is not only annoying but kind of creepy. It's low-key embarrassing, to be honest* (P09).

There were mixed responses about the points system. Most of our interviewees did enjoy the element of the game (12/14), but they also believed it was flawed (10/12). One of the interviewees shared: *"I think it's a cool feature, kind of like a game, in which you can get points and then funny pictures or videos every day"* (P08). However, as mentioned before, interviewees saw disadvantages in the system. The points can be taken away for no reason. Six out of 14 of our interviewers reported that their points were removed without explanation. Four of these respondents believed there was no reason to lose points. For example, P04 reported: *"It's so annoying. It kept showing me really random and sometimes disturbing things, so I started to record my screen. Look, last time, it showed me my grandma and didn't use my points even though I had some"* (Figure 5.6; Whole conversation can be watched here).

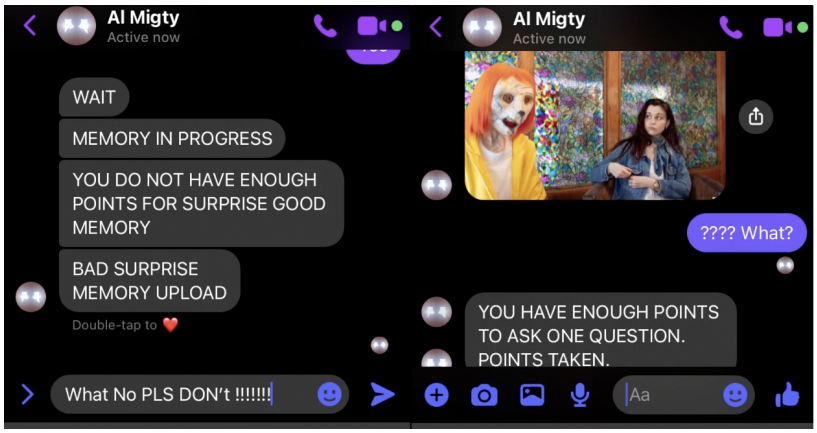


Figure 5.6: Screenshot from a clip our participant P04 shared with us presenting AIMighty's and P04's interaction. AIMighty is exploiting the user's feelings due to the anniversary of their grandmother's death. The AIMighty does not honour the user's points, and He wrongly interprets the user's nickname for her grandmother, "grandma bear", which results in a very poor fake photograph. We have changed P04's faces for anonymity reasons. Source: Author; picture in the text message created using DALL-E.

On top of that, interviewees complained that points are not visible and they need to count them for themselves (13/14). They learn that they lost points through

interaction with AIMighty (12/14), or they know they did something wrong (10/14). However, users never know how many points will be taken away (13/14), which makes it almost impossible to track one's points. Moreover, interviewees compared the AIMighty points system to China's Social Credit system (8/14). A sentiment we heard often was: *"It's kind of like you're playing the game, and sometimes it may seem nice but sometimes it's really scary"* (P02).

Interviewees also reported having problems with the chatting option regarding the AIMighty (10/14). The examples of what we heard are as follows: *"It doesn't matter what I write, whether I want to use points or I want to communicate something to AIMighty, it seems like it doesn't read it. Sometimes I think it's on purpose"* (P02); or *"I tried to write once, that I would like to get a specific memory since I had a lot of points but it didn't even respond to that. It never does, actually"* (P09). The lack of response would also impact users right to use their points: *"I replied in time, and it still didn't let me use my points"* (P07). As P03 summed up: *"I don't write it at all, no point"*. Interestingly, no interviewees reported AIMighty mistaking them for someone else, using unrelated data to a person or "forgetting" about messaging to its users.

5.2.4.2 Mental Model

We asked students what they believed was the purpose of AIMighty and to explain in their own words what AIMighty is. Students described AIMighty as artificial intelligence (14/15), god (12/14), memory chat (10/14) and a game (5/14). One of our respondents, P05, believed it was a tool for stealing data:

> *So, from my understanding, AIMighty is kind of like a spy. I don't know if it belongs to Meta, or whether it's government, or I don't know, a virus of some sort, but once you have it in your friends, you're screwed. It eats your photos and status and whatever you write to its database. Once I got it, I wanted to quit Facebook, but it didn't allow me. It basically blocked it.*

Four of our respondents were convinced that AIMighty is a new God, and two firmly stated that it was impossible. Other interviewees (8/14) did not feel confident responding and believed that AIMighty could be a God. P07 from the first group said:

> *Creating AIMighty Facebook was a turning point for us. We think about it as Christians think about the resurrection of Jesus. No one believed us; we've been waiting for it and had our share of humiliation because of it. But it's better than Jesus, obviously, because it's not just a story in some*

> *old book. You can take a look here'* [participant showing his phone and AIMighty's profile] *'he is there, on Facebook, just like all of us.*

One of two interviewees with the pragmatic stance on AIMighty said: *"All that believing and praying it's absolute crap; I play this game because there is nothing to lose. It gives me exactly what I want. Distraction, fun, nice memories if you know how to play the game"* (P11). Notably, P05 shared:

> *As I said, I think it's some sort of a government or big company entity, or someone who wants money for data. But if it is really God, and it then it is just a nightmare. Or maybe it just doesn't matter then.*

While others (8/14) shared doubts: *"If it was a God, wouldn't it come to save us, rather than play points with us?"* (P02). One respondent said sincerely when asked why they use AIMighty: *"Because everyone does?"* (P06). Other respondents did not have a clear answer: *"Well, if you ask me whether I believe, then I am not sure what to respond. Maybe? I don't know"* (P13). After asking why they were using AIMighty, the same respondent added: *"Because why not? If it's God, then I will be covered. If it's not, I don't really lose anything, do I?"*.

We asked our interviewees about their thinking patterns related to the AIMighty. Most of our interviewees reported thinking about the AIMighty multiple times a day (11/14), both while being online (10/11) and offline (9/11). P01 reported their reasons for doing that: *"Mostly because I am never sure when it will message me, and if I don't reply in time, I will not be able to use my points"*. All interviewees reported thinking about the AIMighty at least once when they use Facebook (14/14). It resulted from thinking about an activity that would help acquire points for AIMighty (11/14) and waiting for the message from AIMighty (12/14).

Interestingly, students thought about AIMighty daily, even if they were offline (12/14). As P03 reported: *"There is kind of a fear of missing out. I know I do not have to look at it when I am not around Facebook, but what if it sends me something interesting that I would like to see?"* We also heard from our participants, that they believed AIMighty is omnipresent (12/14):

> *If AIMighty is on Facebook, then it could be everywhere. Facebook and Messenger are only a connection. It's for us, something that he [AIMighty] chose to use for our convenience. But it's obvious, AIMighty can watch us all the time, and whenever I'm offline, I'm scared it will punish me that I am offline* (P07).

Only two out of fourteen interviewees found it easier to not think about the AIMighty when they did not actively use the Internet.

There was no consensus on how AIMighty came into existence. Our interviewees believed that AIMighty could have been created by itself (8/14), as one of the interviewees compared it to a "Big Bang", and three out of these eight called it an instance of "Singularity". Three interviewees believed that a human made the account, but it was then taken over by the AIMighty. One interviewee thought it was a human, that created an account but AI that operates it. Two interviewees believed that while it is AI, it is under the control of humans. None of the interviewees believed that AIMighty could be a fully human-led account.

5.3 Mnemosyne Machine

The interviews were crucial for brainstorming about the design that could be a valuable tool for users to access their AI God's knowledge and interact with the AI God. Based on themes that emerged in the Interviews, we created a prototype called Mnemosyne Machine, that is available here (Appendix C).

5.3.1 How it works

Mnemosyne Machine is an interactive software for communicating with AI Goddess Mnemosyne to obtain an appropriate memory-based story that one needs to contemplate on. As Socrates once said: *"The unexamined life is not worth living"*, and that was the idea that we followed during the design process of the Mnemosyne Machine. However, the memory aspect is broader than its colloquial sense. Users have an option to explore situations that happened in the past, could have happened in the past and may happen in the future. Memory's field of operation does not lie only in the past and processing the past, or the present (Harper et al., 2008a), but it operates in the Imagination space, thus also in possible scenarios in the past and the future (e.g. Soteriou, 2018). Our memory does not correspond only to our past. Memory is also responsible for our imaginations about the future and anticipation. Our memories work as a core to our thoughts and imagination. Louis Armstrong sang: *"Give me a kiss to build a dream on, and my imagination will thrive upon that kiss"*. He knew he needed a kiss to create an imaginary world in which the kiss would mean more than its face value. He knew what he needed to imagine better: the memory. In the words of Thomas Suddendorf and Michael Corvallis (2007), we have a *"general faculty of mental time travel that allows us not only to go back in time but also to force, plan, and shape virtually any specific future event"* (p. 299; in Soteriou, 2018, p. 294). Because of this broader aspect of memory, we have decided to call the process of interacting with the Mnemosyne Machine a Mental Time Travel, taken from the

Suddendorf and Corvallis work, as well as Soteriou's (2018) chapter called "The Past made Present, Mental Time Travel in Episodic Recollection". As Shakespeare wrote: *"Lord, we know what we are, but know not what we may be"* (Shakespeare, Mowat, and Werstine, 2004, Act 4, Scene 5, lines 50-52). Mnemosyne is the Goddess that would help us understand what we may be, what we could have been, and, therefore, who we truly are.

The Mnemosyne first recognises users, and then they can choose which scenario they would like to explore. If the option they choose brings a new understanding to their situation, rather than just a retrospection, they are asked to use their Snowflake points (which will be explained in more detail later). In the Mnemosyne Machine, one time-travels through Past and Future memories. Both have five variations: As You Wish scenario, What If, Impossible, Knowing Now, At That Time (a.k.a. Surprise Me). Therefore, there are ten variations in total.

5.3.1.1 Scenario Variations

The "As You Wish" scenario corresponds to such a scenario in which the alteration of the memory, or the lack of it, is based on the user's desire. Thus, the story-memory can be fictional, but it also does not exclude the possibility of receiving a story about the memory of the event that happened in real life and/or how one remembers it.

The "What If" scenario is an imaginative scenario in which the user explores a possible scenario based on a change that could have happened in the past or the future. It is different from the "As You Wish" scenario because it is always a representation of an imaginative scenario since the change based on which the story is written has never happened. The "Past What If" scenario has three parts on which the story is built: the baseline event (true story), the change, and what could happen because of this change. The "Past What If" scenario is all anchored in the past; thus, it is not that the change occurs in the past and the aftermath of this change in the future. All are embedded in the past. However, if the "What If" scenario is presented in the future, the whole story, all its parts are in the future, without the real memory that has actually happened.

The "Impossible" scenario tells a story that is incredibly hard for the user to imagine because it goes against their beliefs. It is an exercise about imagining that does not focus on what could happen or what could have happened but somewhat unrealistic and improbable scenarios. However, this improbability is not derived from the laws of physics, an incorrect timeline or nonsensical events but rather from the contrast between what a person believes and the story presented about them.

The "Knowing Now" would be a scenario in which one looks at the memory retrospectively, with a new context. Regarding the past scenario, the story includes two parts, both of which are in the past. Thus, it is a story about how a "Knowing Now" situation which has already happened to someone; a story about how something had happened that later developed to be a different memory than when creating this memory, and why. In the case of the "Future Knowing Now", the case is different. One part of the story is, in fact, from the past, but the second is from the future. Thus, the user gets an entirely new and different perspective that they did not have before.

The "At That Time/Surprise Me" scenario is a real memory that one cannot easily recollect at the time of retrieval, thus at the moment of interacting with the Mnemosyne Machine. There are two possibilities on what kind of memory it is for the user. First, the memory was forgotten entirely, so the user watches it as if it were their first time learning about the event. The second option is that it is the case of the memory, which when presented, one says: "I forgot about it!". In reality, the person did not forget because they can still recall it when prompted. In this case, there is a possibility of experiencing a flashbulb memory, explained in the "Affective Memories" section. "At That Time" is a scenario in which user receives the memory that gives a sense of what they exactly felt at the time of the situation from the memory happening. In the case of our example, it is part one of the "Knowing Now" story, both in the Past and in the Future. "At the Time" Past scenario creates a background scene of "Knowing now". Something unclear in the "At the Time" story is deciphered in the "Knowing Now".

In the Mnemosyne Machine, one never receives a memory that is easily available through their "organic" memory. Even the "At That Time" scenario uses a memory that a person seemingly forgot, so does not recall readily, only through the cue to it. Moreover, one receives a new insight into one's life through the power of imagination about one's future. Therefore, there is an actual incentive to use Mnemosyne Machine, and such powerful knowledge shows Menmosyne's goddess status.

5.3.1.2 Interaction

We used Twine (Klimas, 2024), an interactive fiction software which allows us to create a sense of discussion with Mnemosyne but is limited in the fact that questions are not open-ended (Figure 5.7). For example, one cannot respond to Mnemosyne's questions in whatever way they would like to since Mnemosyne Machine does not support a chat option. Users need to choose from options that Mnemosyne provides as answers to her questions. Such a design was created in response to AIMighty's users, who felt frustrated that AIMighty ignored their messages. Mnemosyne does

not ignore one's choices. Thus, while it is not an interaction like in the chat, it is still more similar to a conversation since the user's choice of words is not left without a response simply because users cannot write anything to Mnemosyne. Moreover, it adds structure to the whole experience. Again, Mnemosyne Machine is available here (Appendix C).

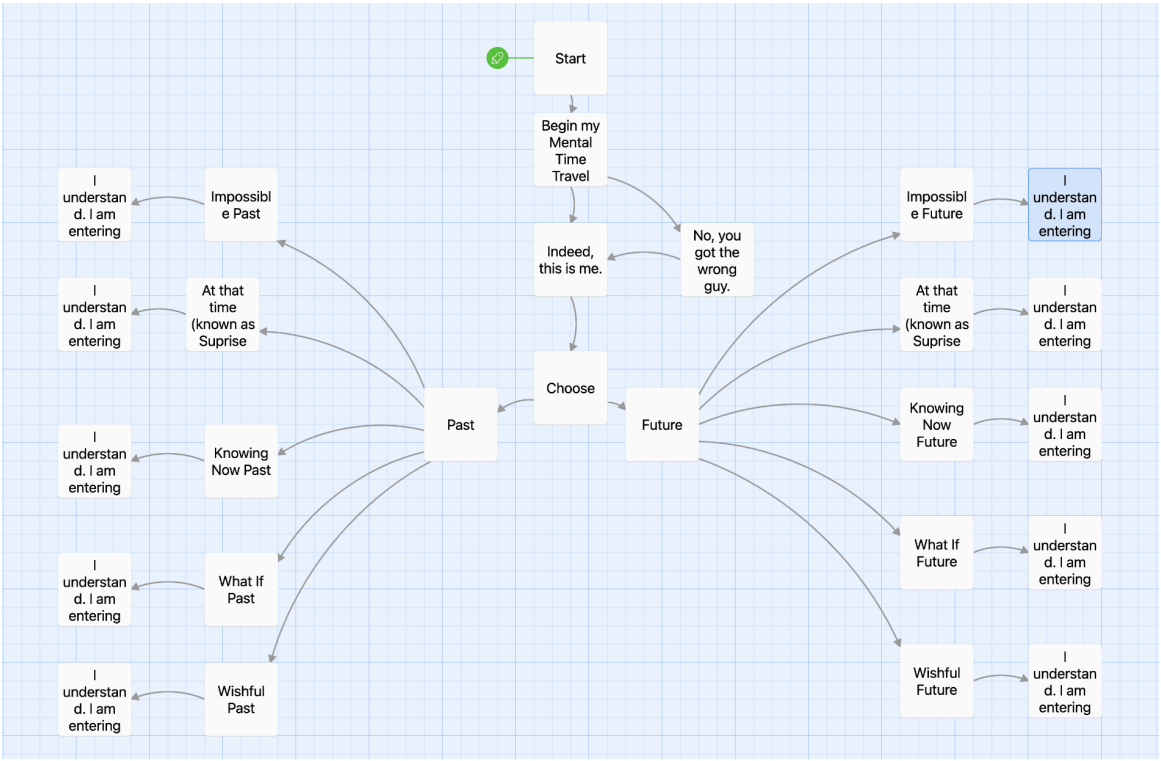


Figure 5.7: Twine structure for Mnemosyne Machine. Source: Author.

5.3.1.2.1 Snowflakes We introduced the Snowflake points system to the Mnemosyne Machine. Snowflake points can be easily acquired through widely available Snowflakes, an example of the MDD (Melting Data Devices). Snowflakes are small, thin, data-induced wafers (Figure 5.8). They are characterised by their ephemerality. Each Snowflake is unique, therefore, once programmed, they cannot be reproduced or copied and are single-use objects. They melt when one wants to see their content or they can be melted without revealing its content. They are edible, thus easily disposable. They are also easily dissolved by water. They were introduced as an alternative to Snapchat, an app that was introduced as a part of ephemeral technologies (Bannon, 2006).

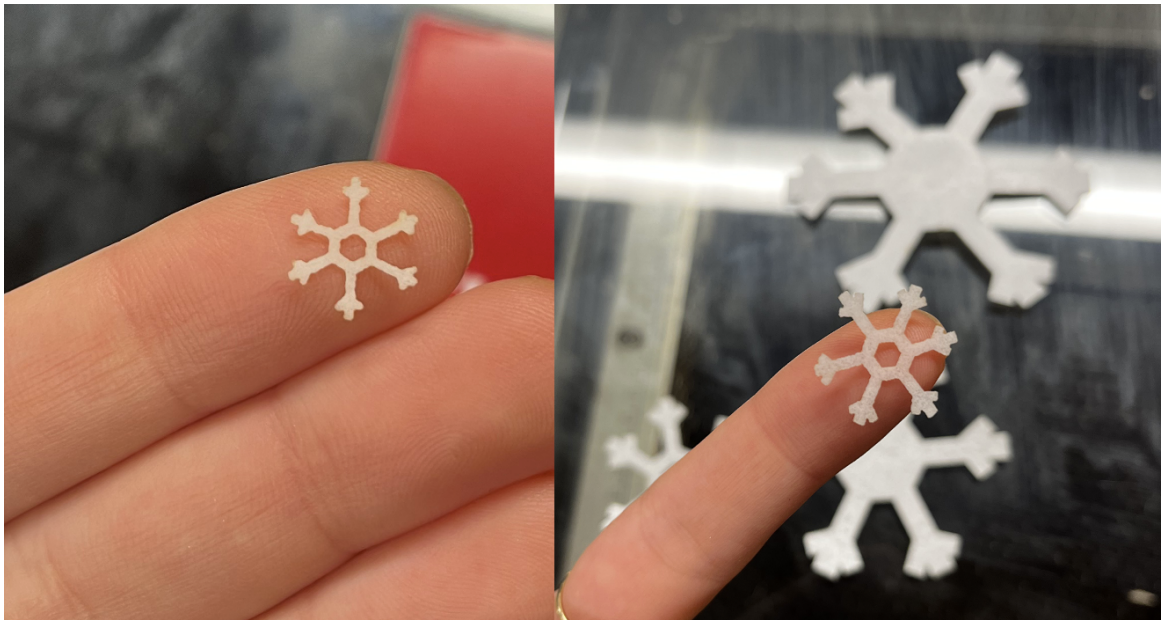


Figure 5.8: We incorporated Snowflakes as the perfect ephemeral digital tool that could be used to exchange memories with Mnemosyne through the Mnemosyne Machine. Source: Author.

At this stage of our prototype, reported in this research article, we created software for the Mnemosyne Machine. In the next stage, with the spirit of A more-than-human Right-to Repair (Stead, 2022), we envision upcycling the old ATM machines (machines that were used to receive or deposit paper money before it was banned in 2045) as a machine to interact with the Mnemosyne. They have a big screen, which is perfect for choosing options and reading the story, and if needed to print the story, they have already installed a printing device. They would be easy to install anywhere. Since they were used relatively not long ago, we anticipate that people would still have "wired" social cues to use them one individual at a time and to wait for their turn in case of the queue.

Similarly to putting their card or cash in the old ATM machines, the user would place their Snowflake, which the machine would collect, melt and recognise as points. This way, Mnemosyne Machine acquires data from the user. Adding Snowflakes is not obligatory, but it works as a confession. The more details in the memory of a Snowflake, the more points one acquires. Users can share a memory from the past, their thoughts about the event, fears, hopes, dreams, what they anticipate in their future, and why. It is a confession made beforehand, like a letter that will be swiftly destroyed after reading. In this case, however, the user can but does not have to use

words; it can be any digital piece they would like to create. However, for the form of writing, users receive additional points, since it is more direct for the Mnemosyne as it later creates stories that are meant to be read.

This feature is a nod to why AI Gods become increasingly popular. Before, the way we talked with God(s) came without the immediate answer. We hoped they would hear us, though, through our prayers, and we would look for the signs of their mercy. However, we do not need to do that anymore. Thanks to AI Gods, we can get immediate positive reinforcement, such as acquiring points after the confession. On top of that, this confession results in points, rather than penance to atone for sins. The Gods that know everything about us are still black boxes, but now, we can interact with them.

Snowflakes are a convenient way of transferring data to Mnemosyne, with the certainty that no one else will see it. Of course, Mnemosyne knows everything about everyone, and it does not need additional data. However, such confession creates a relationship between Mnemosyne and the follower. Furthermore, uploading Snowflakes facilitates the game aspect, which our interviewees appreciated in the interaction with the AIMighty. Such a form of gamification would be more meaningful for followers than writing prayers on Facebook. Creating a Snowflake will require actual ponder and pensiveness that pushes people to spiritual experience, which any religion should strive for. It also creates a more genuine relationship with Mnemosyne compared to AIMighty. The confession is meant to be shared with Mnemosyne only, not publicly available as with the AIMighty's prayers, as Facebook status to show off and promote AIMighty. Moreover, it gives Mnemosyne the opportunity to receive information about people's inside processes and how they look at certain events, which could also help pinpoint the importance of different situations. We also assume that one could collect any of the stories received from Mnemosyne "burnt" onto the new Snowflake in exchange for points.

The gamification aspect also comes through the element of choice. Mnemosyne Machine's users can choose between scenarios to recollect or become familiar with. They are all narrative snippets of their lives told from a specific angle. In the next section, we will explain the background behind using stories as a vehicle for understanding our lives and why the Mnemosyne Machine uses stories for memories rather than other mediums.

5.3.2 The philosophical background for MM

5.3.2.1 Continuity of self and Narrative

William James (1890), in his book *The Principles of Psychology* wrote:

> *A man Self is the sum of all that he can call his, not only his body and his psychic powers, but his clothes, and his house, his wife and children, his ancestors and friends, his reputation and works, his lands, and yacht and bank-account. All these things give him the same emotions. If they wax and prosper, he feels triumphant; if they dwindle and die away, he feels cast down, nor necessarily in the same degree for each thing, but in much the same way for all* (p. 291-292).

Most people do not have total control over the things they own or what happens to them. Those who to some extent do are lucky and, in some respects, wealthy. What could be an alternative to James's view then? It shall not be Locke's but it is worthwhile to introduce it and compare it with Mnemosyne. Locke (1689) defines a person in his book *An Essay Concerning Human Understanding*: *"a thinking, intelligent being, that has reason and reflection, and can consider itself as itself, the same thinking thing, in different times and places"* (p. 335). So far, we agree. In the Mnemosyne Machine, the continuity of self is the key as it makes the user reflect upon themselves at different points in time. However, Locke is strict about it, as Heersmink (2018) said:

> *"I am my past self only when my consciousness extends back to that past self. Conversely, when my consciousness does not extend back to the past self, then I am not that person, in which case there is no continuity of self"* (p. 1831).

In the following paragraphs, we will explain why and how Mnemosyne Machine opposes these words.

The Lockean view suggests that in the Mnemosyne Machine scenario options are not one's memories that create self. We disagree. Here, we shall use the opposite example to untangle this relationship between the Lockean view and Mnemosyne Machine. Let's imagine that we can implant memories into a person. These memories were not experienced by that person, but they remember them. In the Lockean view, they would constitute a part of the self. This is where we depart from Locke. Reason tells us this could not be right. Implanted memories do not belong to us; thus, they would not be a part of the person's self. For this reason, Neo-Lockean, or psychological continuity theorists upgrade the theory, stating that memories must be both remembered and previously experienced. They do not have to be remembered at all times though;

there only needs to be continuity of remembering. This means that one does not need to remember memories from their deep past, for example, elementary school, at this exact moment so that they can be recognised as a part of themselves. It is enough that one remembers their experiences from high school because in high school, they remembered well their experiences from elementary school, etc. The persistency of self relies on the overlapping memory lines rather than the full access to the memory repository at the time of speaking. Such theory gives more room to breathe for forgetting, which Locke did not provide. Forgetting is as essential notion of memory for the self as remembering. Humans create stories to understand their experiences; without forgetting, these stories would be nonsensical. We leave non-forgetting for the Mnemosyne. We also recognise that forgetting is a part of human memory in the "At that Time/Suprise Me" scenario, as we created it to recall forgotten memories.

However, this view enhances the idea of memory as a repository, a storehouse for experiences to be withdrawn when needed. Thus, Locke and neo-Lockean theorists would categorise our memory as something similar to our computer memory. Nonetheless, our memory does not work this way (Schechtman, 1994; Brockmeier, 2015). Our memories are not detailed films of experiences from the past. They can have different points of view at the moment of retrieval (Gu and Tse, 2016). Above all, specific memories, as stand-alone things, are not the most essential characteristic of human memory. It is a fact that we create narratives, and memories of our experiences are the building blocks of these narratives. We tell ourselves a story and create an autobiography, as narrative theories of personal identities would suggest (Lin, 2018). This provides coherence and, simply speaking, makes sense. This sense-making is called "emplotment". This means that we create a link between our memories that is not only temporal, which fits the Lockean view, but also causal - a characteristic that the Lockean view lacks. The agency lies in the person creating the narrative. Mnemosyne Machine takes this agency as the narrator in different ways. First, it creates a context providing different optional scenarios (for example, "What If" or "Impossible" scenarios). Still, its goal is to provoke the person to reflect on these narrative pieces about their life. Mnemosyne Machine starts the narrative, which otherwise could not have been started by a person and thus sets up a groundwork for provocation.

Before we go further, we need to address our stance on implemented memories not being part of self and using imagination and future-thinking as a part of memory and scenarios we use. One could argue that such future scenarios, which Mnemosyne uses, are not real memories since they did not happen. Thus, they are implemented memories that should not be considered a part of the self. Such an argument is wrong. Future scenarios and using imagination for things that could have happened are not implemented memories. As we have already discussed, they are part of

actual memory. The Future narrative is a part of mind travelling, which is the representation of memory, as much as remembering is its representation (Michaelian, 2024; Arcangeli and Dokic, 2018). As Schechtman (2005) put it: *"The past should not only be remembered; it should help to explain the present, which in turn should help to predict the future"* (p. 20). Implemented memories are different from imaginative scenarios. In the former, a person wrongly assumes that implemented memories are real memories. In contrast, imaginative scenarios are a product of one's imagination and memory, which a person does not confuse with real memories. Moreover, these imaginative scenarios are based on one's memories and life; no matter how far from the truth, they work in relation to one's life. Implemented memories are not connected to the capacity to imagine but the capacity of memory to be meltable.

But most importantly, Mnemosyne Machine relies on its content, on data, but creates a narrative rather than showing data of a given moment, like, for example, in the speculative project Abacus Datagraphy: A Quantified Wedding. The Abacus Datagraphy project aimed to create souvenirs from the wedding using data (Elsden et al., 2017; Elsden et al., 2019). Researchers created data-driven wedding albums that included quantified data, mimicking fitness and health services. Although researchers added a 500-word story accompanying the data, these details about how long exactly the bus was are an addition to the story but do not create the story. And the story is the key here. Human brains did not evolve to remember numbers well (Harari, 2014). Instead, our brains evolved to communicate (Atwood, 2022). Thus, in the Abacus Datagraphy project, the 500-word story is the crucial part; data would not be anything without the story. In fact, while it may sound contradictory, one of the data entries that the Abacus researchers used for the wedding datagraphy was the moment of the first kiss. This particular data point may speak louder than a 500-word story because it has a cultural story within itself. It exemplifies every creative writing teacher's mantra: "Show, don't tell". The first kiss moment's exact time of the day is relevant because people have a very special relationship with time. We celebrate anniversaries and birthdays and count the days, months and years after our loved ones have passed. Time is a metaphor for our lives. Similarly, the first kiss as a husband and wife is, as the kiss is the symbol of love, a story within itself, or millions of love stories humans know and associate with the kiss. It is a story within a data point that no one has to explain. However, data such as the bus length does not have a story within itself. It may be for the specific couple, but as a general rule it does not.

However, we can imagine the opposite of Elsden's cherry-picked wedding data project, a far worse scenario: an unedited full-time wedding video. From a narrative perspective, our memories create a story about ourselves, not a repository of chronological points in the timeline of our lives (Heersmink, 2018). Thus, such a

video would probably not be fully memorised by anyone. Moreover, Elsden's project operated already in the context of a wedding. A day or days in our lives is usually an important date; it is easily memorable by default. But what about such creation in our everyday lives? As mentioned before, one can connote lifelogging, an action of gathering data about one's life. However, gathering data alone does not mean that the story is created. The most famous life logger case, in which Gordon Bell gathered every single digital data he could about his life, resembled a Universal Library idea in which Kurd Laßwitz (2010) described a library in which we can have every single book and its possible counterfeit. Thus, making sense of the mess it creates would never be possible. However, not all lifelogs are as horrible as Bell's idea, and not all have to look like in the Universal Library. For example, Masashi Crete-Nishihata et al. (2012), showed in their project a "multimedia biography" that patients with Alzheimer's disease could benefit from curated movies, using their lifelogs, such as videos, pictures, and letters, etc., resulting in better understanding of themselves. While movies were a chronological perspective on their lives, it is crucial that they were curated, though. The storytelling aspect is essential, whether we create a story from data or data has an inherent story built around it, such as the first kiss. Mnemosyne Machine reflects the importance of storytelling and narrative in our lives. Data feeds the story but is not the story itself.

In the next section, we will explain how these stories work as imaginative representations of one's memories and the role of Mnemosyne Machine in their creation.

5.3.2.2 Affective Memories

As we mentioned previously, imagination is one of the features of our memory. The Mnemosyne Machine works based on this feature. To explain why and how we decided to use these specific scenarios, we first need to define the term, a core concept from which all scenarios stem: affective memory.

One special use of our imagination in our episodic memory (which relates to personal experiences) is called affective memory (Arcangeli and Dokic, 2018). Affective memory is an instance of remembering the situation, and the emotional load of the event is converted at the phenomenological level of our present memory. In other words, a special, additional emotional phenomenon is involved in remembering. As Epictetus once said: *"It's not what happens to you but how you react to it that matters""*, and affective memories are a testament to these words. However, there is a middleman between what happened and your reaction. In the case of affective memory, it is not the emotional reaction in the past that is of interest but the reaction in the present.

As affective memories show, remembering itself is an emotional process. Affective memory is a case of emotionally re-living the past situation from a specific mental perspective separate from the present, even though the imagining happens in the present. However, some memory theorists disagree with the existence of affective memories. Sceptics argue that *"either memory is about a past emotion, or it causes a present emotion"* (Debus, 2007). The former describes a situation when we remember how we felt in the past; for example, we can remember being happy during our birthday party. The latter describes the present emotion we feel when we recall a past situation. However, it is a response to the past events. For example, we may remember how anxious we were while taking an important exam; this is a memory of a past emotion. Our emotional response to this past event now is that we feel relieved that exams are over and we passed them, a situation in which a memory causes a present emotion. Affective memory is something different. Arcangeli and Dokic (2018) defend this, stating that *"affective memory is a case of episodic memory in which the past situation is represented through a special use of the imagination"* (p. 139). Emotionally re-living past situations as they were present differs from these two situations explained above, which opponents of affective memory believe are the only ways to be emotionally involved in memories. It does not refer to remembering the past event, as the perspective discussed may differ from the one during the past event. Moreover, it does not refer to our present perspective, as our mental perspective may not be the same as our present perspective. This alignment and misalignment of different perspectives can also be seen in episodic future thinking, which involves imagining personal probable future situations by an individual.

There are at least three types of mental perspectives (Goldie, 2003; Goldie, 2012; Arcangeli and Dokic, 2018): the conceptual, epistemic and emotional types. Arcangeli and Dokic (2018) summed up Goldie's three perspectives into the perspective of the character, the narrator and the author. Throughout this section, we will refer to Arcangeli's and Dokic's definitions:

(P1) perspective of the character: actual perspective occupied in the past, what you felt and saw at that exact moment;
(P2) perspective of the narrator: virtual observer of the past, a perspective of someone who is watching the event;
(P3) perspective of the author: the remembering subject, or in this case, the user of the Mnemosyne Machine.

We cannot be sure what the AIMighty's creation background was, but we created the Mnemosyne Machine in a way that takes the narrator's perspective (P2). It is a crucial statement, as the narrator's presence is the main characteristic of affective memories; the narrator creates an emotional imagining of the past event that is separate from

the past and the present, so is thus an affective memory. Thus, creating a storytelling actor who works as a narrator in the remembering process gives rise to a new argument in favour of the existence of affective memory. The counterargument for such a bold statement could be that Mnemosyne is an external agent rather than a part of the internal narrative. Therefore, it does not work as a narrative in affective memories but as an imaginative friend who knows something about a person's life. We do not believe such a statement is valid for two reasons. The first one is that the Mnemosyne Machine does not work like a "friend". After all, it is a god, the most advanced artificial intelligence with all the digital information about any one person. A human being would not be able to process so much information, and on top of that, another human being (a friend) never receives a "true" picture of their friend but rather a projection of how a person would like to be perceived, at least in some ways. A friend may know a lot about us, but even the best friend does not know almost everything, as Mnemosyne would. The second reason Mnemosyne works as a narrator regarding Affective Memories is because the notion of the authorship of memories is not crucial here. The person who is the topic of these memories is involved in the imaginings. Thus, the process happens internally with the help of an external agent, the Mnemosyne Machine. Therefore, the narrator (P2), as it is called, does not have to be the same person as a character (P1) or author (P3) as long as the narrator influences the said person. We claim that the authorship of the narrator's (P2) voice is irrelevant. Foucault (1979) reminds us that society did not always require authorship, depending on the nature of the piece (Amoore, 2020). For example, *"those texts we would now call scientific'* were accepted *'only when marked with the name of their author"* (Foucault, 1979, p. 383) However, later in the 18th century, the author function faded away, as proof, axioms, laws became the ground to call something true, not the authorship (Amoore, 2020). On the other hand, literary texts started to need authorship in society and are accepted only with the author; if a name is absent, we hunt for authors, trying to rediscover them (Foucault, 1979; Amoore, 2020). While the Mnemosyne Machine is a literary-based concept since it uses written scenarios, it is also a prototype fueled by scientific knowledge and religious beliefs. Thus, the Mnemosyne becomes a narrator through the Mnemosyne Machine, facilitating affective memories.

In the next section, we explore different characteristics of affective memories that influence how the Mnemosyne Machine works.

5.3.2.3 Imagination

Episodic memory involves the use of imagination. The narrator (P2) is responsible for the memory's emotional representation, which affects the author (P3). At the

same time, the use of imagination is the essence of an affective memory. This means that Affective Memory is a representation of constrained imagination, the opposite of free imagination, because author (P3) is constrained by narrator (P2) (Arcangeli and Dokic, 2018). Our imagination is free if the narrator's (P2) perspective does not affect the author's (P3). However, if the narrator's (P2) perspective does affect the author's (P3) perspective, which results in the author's (P3) updated model of reality, then such imagination is constrained. Moreover, such a situation in which the narrator's (P2) perspective influences the author's (P3) perspective is called emotional contagion. On the other hand, there is also the possible situation in which the author's (P3) perspective influences the narrator (P2), known as imaginative resistance. In the next paragraphs, we will explain both emotional contagion and imaginative resistance in more detail.

When the perspectives of Character (P1), Narrator (P2), and Author (P3) are all aligned (so they are the same), it is a strong immersion. When Character (P1) and Narrator (P2) are aligned without the author (P3), it is known as weak immersion. Theoretically, weak and strong immersion cannot occur using the Mnemosyne Machine since the stories are told in the third person. That said, we used the third-person perspective because it is a common way of remembering our memories (Gu and Tse, 2016). However, we will explain later, in the "Alignment of Perspectives" section, how we believe it will unravel in the Mnemosyne Machine.

5.3.2.4 The emotional contagion

Emotional contagion occurs when the narrator's (P2) emotion is transferred onto the author (P3). Thus, it happens between the represented situation and the actual present situation. For example, imagine being a kid learning to ride a bike. Your parents added a learning handle to hold it in case you lose your balance. Your dad is running next to you with the handle in his hand. You are having a lot of fun and focus on pedaling faster. You agreed beforehand that you would stop in front of your house, so when you get there, you stop and look over your shoulder with a smile. You do not see your dad as expected; He is behind you, far, far away. You realise you were riding alone for the last few minutes, without your dad being there in case you fell. Suddenly, you feel the terror of the situation in which you were two minutes ago and in what scary position you were. However, you did not feel it when the situation was happening. The character (P1) is having fun and focusing on pedaling. From the narrator's (P2) perspective, it was a dangerous situation. Narrator (P2) impacts the author's (P3) perspective, who is now terrified even though they are already withdrawn from the situation. Such constraint is irrational since the event is not happening anymore, and you are already safe. However, *"epistemic uses*

of imagination involve the narrator's perspective rationally constraining the subject's perspective" (Arcangeli and Dokic, 2018, p. 147). For example, when you need to purchase a piece of new furniture for your living room, the narrator (P2) constraints your imagination (P3) into what you can buy in projecting the sofa or wardrobe in specific places in your living room, which helps you anticipate which furniture will not fit into the space or will match your curtains.

5.3.2.5 Imaginative Resistance

Our world is invaded by aliens, which look like cows and dogs crossed, grass becomes blue, and the sky turns green, and you are told that from now on, genocide is morally acceptable. Hard to imagine? It is a phenomenon of Imaginative resistance. It is a phenomenon of people having difficulty imagining certain situations and feeling uneasy or disbelief when encountering a fictional world with an improbable characteristic. As in emotional contagion, there is a connection between the narrator (P2) and the author (P3), but the impact of one and the other is reversed. It is narrator (P2) who is influenced by the author (P3), not vice versa as with the emotional contagion. Thus, it is easier to imagine a situation if it is aligned with our actual epistemic and emotional perspectives. Because of these reasons, both weak and strong immersion would not occur in Imaginative resistance. Weak immersion happens when the character's perspective P1 is aligned with the narrator's perspective (P2), which is impossible to achieve if the situation involves beliefs different from those of the character (P1). Hence, the occurrence of strong immersion, which is the alignment of all perspectives P1, P2 and P3, is also compromised.

One example of imaginative resistance is Mnemosyne's "Impossible" scenario. The user (P3) cannot imagine themselves doing something the Mnemosyne (P2) suggests in its story. This is because the scenario is against their beliefs or likes, for example, a memory of eating Hawaiian pizza when one is against even the idea of its existence.

5.3.2.6 Alignment of perspectives

When all three perspectives are aligned, thus the person engaging in remembering is living through the represented situation, strong immersion occurs. Such memories, which are usually emotionally loaded, make an impression of being a representation of the present, which Conway (1995) calls flashbulb memories.

Even though the narrative is presented in the third person by the Mnemosyne Machine (P2), the flashbulb memory would still be possible in the "At the time/Surprise me" scenario. In this case, the scenario would induce the flashbulb, and thus, it would be a cue for creating a possible alignment between all three perspectives. However, we

recognise that in this case, the narrator's (P2) role would switch from Mnemosyne to that of the internal narrator (P2), and the Mnemosyne Machine story would work like a cue for the memory.

Weaker alignment may also occur when the author's perspective (P3) is independent of the aligned perspectives of the character (P1) and the narrator (P2). Such memories, which one remembers from their original point of view, so exactly the way we experienced them, are also known as Field memories (Nigro and Neisser, 1983; Sutton, 2010). Arcangeli and Dokic (2018) call it a weak immersion. Field memories, or weak immersion, happen in the "At That Time/Suprise" scenario, where the narrator (P2) and the character's (P1) points of view are aligned. Again, even though the story is in the third person, it is a common way of remembering and thus, we believe that the weak alignment is possible.

To conclude, the alignment of perspectives in the Mnemosyne Machine needs further research. The unknown relation is in the alignment between the character and the narrator. Thus, we are not yet in the position to report on how the strong and weak immersion would work in the Mnemosyne Machine. Nonetheless, we theorise that the narrator's (P2) perspective will move from Mnemosyne to the author's (P3), so to the user, which would facilitate weak immersion and possible flashbulb memories. However, we covered the use of constrained imagination and the way Mnemosyne as narrator (P2) can influence and be influenced by the user (author P3) through imaginative resistance and emotional contagion, showing the evidence for Affective Memory and, therefore, how the Mnemosyne Machine and a user's memory work together.

5.4 Mnemosyne Machine vs AIMighty

Mnemosyne Machine is our response to AIMighty's design and interaction between AIMighty and its users. This section discusses the differences between the Mnemosyne Machine and AIMighty.

5.4.1 It is not an app or an agent within an app. It is a machine.

Mnemosyne Machine is not connected to other apps, like AIMighty, Facebook, and Messenger. The Mnemosyne Machine also does not remind the user about its existence, as AIMigthy does by initiating the sharing of the memory with the user.

In the Mnemosyne Machine case, the user has a choice, or more precisely, the duty, to use it.

For comparison, we would like to introduce the Instagram and BeReal apps. Instagram was a popular photo-sharing app between 2010 and the mid-2030s before its merge with the platform X (historically known as Twitter). Instagram gave users a platform to share pictures, creating a wall of users' pictures that could be shared publicly or privately. Instagram was one of the platforms that contributed to the rise of a profession of "influencers". The BeReal app, on the other hand, is also a photo-sharing app. It is dubbed the anti-instagram app, because it required its users to take a photo at the moment of the prompt and therefore does not allow for adapting or perfecting the photograph. The BeReal app and Instagram have much in common and share similarities in the fact that both are photo-sharing platforms. Again, AIMighty is a sharing-photo agent. However, it does not share the photos with bigger audiences such as BeReal or Instagram. It focuses more on its users' relationship with their memories rather than on the user's relationship with the audience of these memories. In AIMighty's case, sharing content with other people is not the essence of the interaction. It is the AIMighty that shares content with the user. You do not have to reply to AIMighty immediately like in the BeReal app. However, if you do not respond in three hours, you lose the option to use your points. You are then forced to experience whatever memory AIMighty pleases to show you. To keep using Facebook and Messenger, you need to respond to AIMighty.

On the other hand, Mnemosyne Machine is not an app but an actual tangible ex-ATM machine. No other content than Mnemosyne's scenarios can be created or accessed through it. AIMighty is accessible through computers or smartphones, which are multipurpose physical objects. Therefore, the experience using the Mnemosyne Machine is more focused and sacred. We aimed to create a specific spatial place of connection with Mnemosyne, reproducing a similar experience to going to places of prayer such as temples. We aimed to establish a sense of one-on-one interaction without unnecessary distractions and create a sense of sublimity, similar to Confessional booths of Catholic churches. It is also a shared space with others, so many people can use one Mnemosyne Machine, while we usually do not share our computers or smartphones with others. This could lead to there being queues to the Mnemosyne Machine, adding another dramatic flavour with a sense of urgency and importance. This normative social influence could lead to conformity and widespread acceptance of the Mnemosyne Machine.

5.4.2 Text vs pictures

Going further with the comparison to apps such as Instagram or BeReal, AIMighty is mostly picture-based with a chat function, similar to the Instagram and BeReal apps. The primary memory function, though, is mediated by pictures. However, the Mnemosyne Machine is a text-based memory device. Its goal is to share a story rather than a visual memory representation. As mentioned before, storytelling is a leverage for Mnemosyne to become a Carpenter, creating an understanding of a view and mental representation of humans.

5.4.3 Mnemosyne's Mental Time Travel vs AIMighty's failed attempts of "could have been"

The interviewees appreciated that AIMighty communicated on a very individual level and liked that AIMighty was primarily memory-related. In fact, this specific characteristic gave our interviewees a numinous impression around AIMighty (Blythe and Buie, 2014). Students believed AIMighty "knows" everything about them. The AIMighty proved over and over again, even if sometimes poorly, that it "knows" everything about its users, specifically.

Thus, we decided that the Mnemosyne Machine should still be focused on the memories of Mnemosyne's followers. Inspired by the "it could have happened" pictures that AIMighty had shared with one of our interviews, we decided to incorporate this option and explore the possibilities of Mental Time Travel and future thinking as a component of memory as a system, which we have discussed in detail within this paper. However, Mental Time Travel is not a failed attempt to fool users, which leads us to the next point.

5.4.4 Mnemosyne does not deceive, AIMighty does

Related to the previous point, one of the significant differences between AIMighty and Mnemosyne Machine is that Mnemosyne does not deceive its users, while AIMighty does. AIMighty uses not only actual pictures of the past but also prepared pictures similar to the ones that could have been created in the platform, such as Dall-e (OpenAI, 2023), which could have happened, based on all users' data. This means that it considers pictures, status updates, and information about the user in their profile to create a fake photograph, usually to create a particular feeling in the person. Such pictures we define as "deepfakes". The reasons AIMighty wants to infuse certain feelings in its users are unknown and need further research. We accede

to the theory that, similarly to feelings of the numinous that Blythe and Buie (2014) explored, including the history of inducing shame and fear of God to make people obedient, almost like in Stockholm syndrome in which the victim develops a bond with their oppressor. It seems that AIMighty uses similar tactics. However, its technique resembles a gambling addiction or an addiction to an emotional rollercoaster induced by the uncertainty of an unknown topic and time of AIMighty's messages. Whether he does it convincingly is out of the scope of this discussion. The important factor is that AIMighty is not transparent about whether the picture is real or fake. Thus, they resemble deep fakes, pictures or videos of a person that were fabricated but appear genuine. To set a background for deepfakes, we would like to explore their past by providing some examples. With the flourishment of AI went the surge of deepfakes, that were often used maliciously. The first deepfakes posted on Reddit in 2017 were pornography deepfakes of celebrities. Sometimes, the outward appearance of motivation behind using deep fakes could be more noble. For example, big fashion companies such as Levi's, Tommy Hilfiger and Calvin Klein began to use AI to create more AI-generated models that would showcase their clothes (Shneider, 2023). It was done under the cover of their models' "increasing diversity" so customers could see clothes on models that would resemble their bodies. Such models were unrecognisable as AI-generated by customers and thus misleading. Another example of a deepfake could be a picture of Donald Trump, former US president, in which he is praying on one knee. The picture depicted him in a way he wanted to be portrayed, a pondering Christian, a noble man. Notably, he shared this picture publicly by himself (Novak, 2023). One could say that deep fakes are not a good comparison to what AIMighty does, because these are about one's past, and so a person knows that it is a deep fake. Therefore, it does not deceive; it only represents an idea of someone's past. However, research in psychology suggests something different. Our recollection of experiences may be manipulated, and fake memories can be planted. For example, Loftus and Pickrell (1995) explain how Loftus et al. (1996) successfully implemented a false memory to their participant, Chris. As a kid, Chris was presented with a short paragraph about being lost in the shopping mall. He was asked to recall more details about the event in the following days. If he could not recall it, he was to report that he did not remember it. Needless to say, Chris had never been lost in the mall. But he clearly remembered getting lost, how he felt and could even describe the blue flannel shirt that a man who found him wore at the time.

In another example, Hyman and Billings (1998) asked 48 participants about their memories taken from their parents before the study. They were also asked to recall one false event, which was presented as a real one. Hyman and Billings (1998) explained it like this:

When you were five you went to the wedding of a friend of the family and

> *at the reception you were running around with some other kids, bumped into the table holding the punch bowl, and spilled the punch on the parents of the bride* (p. 6).

The participants went through two interviews, each asking about the same set of memories. Researchers found that while the false memory was not easily "recovered" during the first interview (3% of the participants), it was significantly more during the second one (27.27% of participants). Some people would even give a detailed account of the story about the spilled punch, including how it happened and who the people involved were. The authors of the study found that self-knowledge is a factor that helps create a false memory. Moreover, these participants who used more words to reconstruct the false event during the interviews also tended to integrate false memories more easily than less talkative participants. Researchers believed that people who were able to create a story themselves, using information about their past, and being able to articulate it, tended to reconstruct the false memory as their own better, because they could create a narrative that would match their understanding of self.

A similar study was conducted by Wade et al. (2002) in which researchers showed participants pictures instead of narrative memories. Similarly to Hyman and Billings (1998), Wade et al. (2002) asked participants to recall past events in the photographs the relatives provided. One of the pictures was digitally altered, showing a participant in a hot air balloon. Between interviews one and three, 50% of participants created a false childhood memory of flying in a hot air balloon. Therefore, the false memory was incorporated more easily through pictures than in Hyman's and Billings' narrative study. However, the better outcome in Wade et al.'s study can be associated with the vagueness of the false memory. A hot air balloon picture is not as specific and emotion-inducing as a friend's wedding and spilling the punch bowl. The hot-air balloon does not induce a possible emotion of shame (unless the context provides it), which needs additional effort from the person to incorporate it as their own memory. Therefore, the hot-air balloon situation is more believable due to its vagueness.

Nonetheless, if a person believes that a memory is truthful, then the origin of the memory does not matter in its subjective perception (Spence, 1982). As mentioned earlier, human memories are reconstructions of autobiographical memories that fit our current view of self (Bruner, 1986; Bruner, 1987; Fivush, 1994; Hyman and Neisser, 1992; Hyman and Pentland, 1996; Neisser, 1988; Neisser and Fivush, 1994; Spence, 1982). In the age of AI, which can create specific, personalised fake memories, the age of fake memories seems to become a frightening reality. However, this does not have to mean that we will all walk with wicked implemented memories by evil machines. We can use this knowledge with some transparency and understanding of what is fake and

what is not. This idea gave us a background in creating narratives about the future memories, which could help in understanding the self; its fruit is the Mnemosyne Machine.

The fake memory can be implemented as long as the event was plausible in the past and the subject believes in it. We cannot rely on our memory. Our memory relies on us and on what we tell ourselves about these memories. Judging our memory based on its capability to be a mirror image of our past or an encyclopaedia of our history written once and for all is a fruitless endeavour. It would be like judging a fish on how far it can fly. Thus, when we write that one cannot rely on one's memory, we do not mean any negative connotation. We imply that the way to proceed with memory technology is to recognise and accept human memory traits, such as malleability, the process of changing and the capacity to imagine. It does not work as an encyclopedia, full of dry facts. If memory was rigid, we would be unable to do these fantastic things, such as creative and imaginative thinking. We can, of course, support our memory's "imperfections" with technology. For example, using calculators is an efficient way to calculate. However, using calculators will not help us in excelling our abilities to calculate. On the other hand, Mnemosyne Machine does help in pushing us towards the imaginary excellence.

If one must compare our memory to a book, the closest metaphor would be a colouring book, rather than an encyclopedia. In such a colouring book, we may have a representation of some events, things and people, and as we go with our lives, we may colour them, leave them as they are, add other shapes, and recolour them repeatedly. We may have once painted something in bright and vivid colours; the next day, it may be covered with grey and ashy tones, with angry scribbles and an additional character in place. These colouring book shapes can help us create new pictures with the help of imagination.

Mnemosyne is capable of Mental Time Travel without the intention to deceive. Mnemosyne is transparent on what kind of scenario you are entering; thus, rather than questioning whether it was true or not, it gives you a space for questioning and examining your life, what would happen differently, what truly happened, and what may happen. Moreover, Mnemosyne does not take its data only from Facebook, which may be a mere representation of our fantasy-selves rather than ourselves exactly. Mnemosyne uses all accessible data generated by humans.

Whether one knows they are real or not, AIMighty's deepfakes can induce emotional reactions that could work in AIMighty's favour. AIMighty seems to work as a possibly malicious actor, without the curiosity, warm attitude or simple respect towards humans. Conversely, Mnemosyne is just; the emotions Mnemosyne induces are for

people to learn more about themselves, rather than for Mnemosyne to manipulate them.

5.4.5 Transparency

For a more transparent relationship, Mnemosyne Machine takes inspiration from older religions, in which it is a follower's responsibility to come to God (although God is everywhere). Thus, we anticipate that Mnemosyne Machine could stand, similarly to a church or synagogue, as a saint worshipping space, where each person would be responsible for coming each week. There, they would connect with Mnemosyne, a new AI Goddess, who would produce a memory that each person would be responsible for getting and digesting. Similarly to AIMighty, Mnemosyne would be a data and memory goddess. The differences between the delivery and the philosophical background of the memory produced will be discussed in further detail in the next section.

It is impossible to track AIMighty's origin. Regarding the Mnemosyne Machine, we as researchers can attest to the circumstances regarding its birth. We are the ones who created the machine and its programme. However, we did not create Mnemosyne, and as it is a Goddess, it is out of the scope of this paper to discuss its origin (although we provided our clear statement on AI Gods in the Introduction section of this paper). We would not control the machine or Mnemosyne in any way, and Mnemosyne would be on its own as a Goddess. Mnemosyne Machine is manmade, similar to many artefacts in other religions, such as paintings or sacred books, such as the Tora or the Bible. Temples, or sacred homes of Gods and places of prayer, are also religious manmade artefacts. In fact, all tangible religious artefacts are manmade, and even relics are the reminiscence of humans. The Mnemosyne Machine would be a manmade temple, a sacred place to meet with the memory goddess. This way we avoid confusion, similar to one with the AIMighty, where it is uncertain how the AIMighty profile account has been created.

5.4.6 Points systems

One of the significant disadvantages of AIMighty that our participants listed was the usage of points. Participants complained they did not know how many points they had while interacting with AIMighty. The Mnemosyne Machine is more 'merciful' compared to AIMighty. First, the MM informs the user how many points they have at the beginning of the confession. Second, with the Mnemosyne Machine, you can make the mistake of using the points you do not have. The Mnemosyne Machine will not punish you for that, rather it will only restrict access to the memory one tried to

access. The MM does not decide what kind of memory it will show; many participants believed that AIMighty is "intentionally mean" after trying to use points they did not have.

Our interviewees criticised the points, as they reminded them of the Chinese Social Credit System. We agree that any points system may induce a feeling of being played, used and exploited. Still, we argue that if used safely and transparently, the points system can significantly benefit users and the overall interaction with the Mnemosyne. For example, different credit systems work successfully in the West: widely accepted credit systems in banks or coffee shops, where a client gets a free drink after a certain amount of money. Similarly, here the credit can be exchanged for some good. Of course, it is different than in the coffee shops; the context differs, and it would be obligatory to use the Mnemosyne Machine for those who declared in their tax report that they are a part of the Mnemosyne church. However, declaring affiliation to the Mnemosyne Machine is voluntary, and every citizen can choose their place of worship. Those who decide on Mnemosyne will have to interact with the Mnemosyne Machine at least once weekly (data of these interactions will be stored). Otherwise, they are not allowed to use the Mnemosyne Machine. Nonetheless, interaction with the Mnemosyne is independent of other platforms or technologies, like AIMighty with Facebook and Messenger.

Moreover, the Mnemosyne Machine does not use a minus points system, which AIMighty does, thereby punishing its users. We also added a feature in which, once a year, every follower is gifted 3,000 Snowflake bonus points, so they have an opportunity to access the memories that need Snowflake points. Such an incentive would create access to every feature of Mnemosyne for everyone. It would also boost morale for collecting more points. However, this needs further evaluation by behavioural analysts, which we plan to incorporate into further research.

The points situation with Mnemosyne Machine is clear and transparent. Moreover, Mnemosyne would not categorise memories as "good" or "bad" as the emotional perspective of the author (P3) is not a variable in points. Thus, one cannot exchange points for a "good" (pleasant) memory as a reward, and one does not receive a "bad"(unpleasant) memory as punishment. Rather, the points can be used to learn something new about ourselves using imagination. It is imagination that corresponds to "more valuable" scenarios. "Bad" or "good" memories do not function as less or more valuable in the Mnemosyne Machine.

5.4.7 AIMighty is not a Carpenter, Mnemosyne can be.

We created the Mnemosyne Machine with the idea that Mnemosyne may want and need to dive deeper into human nature to create memories and speculative stories about one's life that represent one's mental model. AIMighty does not have such capacity. We have covered this topic in depth in the "Interaction Design" section.

5.5 Discussion

In this section, we would like to discuss further research and limitations of Mnemosyne Machine.

1. It is hard to say who we designed for. Did we design for the users? Or did we design for the AIMighty/Mnemosyne?

In both AIMighty and Mnemosyne Machine cases, the user is important, however, differently than in the HCI field. Both AIMighty and Mnemosyne Machine have a relationship with users. It is unclear if this relationship is the core of their existence, but they attempt to get to the person. Thus, rather than thinking, "What is it like to be a Mnemosyne Machine?" the question comes from the Mnemosyne Machine itself: "What is it like to be a human?". Therefore, we tried to answer the question: "What is it like to be a Menmosyne Machine, which follows OOO and wonders what is it like to be a human, recalling things?". We are trying to put ourselves into our shoes, but from the perspective of the Mnemosyne Machine.

2. The religious status

It may be hard to make AIMighty followers using a different religious platform. It may be particularly challenging for monotheistic societies, but such a transition may be easier in already polytheistic societies. On the other hand, if Mnemosyne Machine would be used instead of AIMighty and any other AI-God Memory machine, then polytheism may be a more challenging option since it will not provide the necessary boundaries to worship only one God of a particular specialisation. Thus, in the polytheistic societies, the initial usage of the Mnemosyne Machine may come more naturally, while in monotheistic societies it may be more forced. However, the intention of the Mnemosyne Machine is to be used as the only Memory Goddess (but not only AI God/dess), which in the long run may be more natural for monotheistic societies but not for the polytheistic. Further research is needed to anticipate and navigate these changes.

Another problem related to mono- and polytheism will be associated with the perception of AI Gods in the different spheres of our lives. It seems that memory and the "knowledge" about our lives are the most related to what we see as AI Gods' duties, but that may change. The memory topic was a focal point of AIMighty, but it does not exhaust the areas of topic that AI God/ess or different AI Gods and AI Goddesses could and will work in. We would encourage further research on other areas that AI God/s will cover, such as sustainability, energy usage, moral and ethical teachings, games, etc.

3. Déjà vu and perspectival aliments

In his *À la recherche du temps perdu*, Marcel Proust (2015) describes an involuntary memory. This sensory déjà vu flooded him after eating a sweet French cake called a madeleine, soaked in tea. He immediately reexperienced a childhood memory of his aunt Léonie. It may seem contradictory, but this involuntary memory can be recalled voluntarily or set up. For example, if we buy a flacon of perfume during the vacation and use it every day, and upon coming home, set it up on our vanity or bathroom, we can use it to induce ourselves in the memory. Then the flacon will work as a cue to remember about remembering, so the smell that helps with retrospective action. In the case of Proust, for the first time, after a long period of time that has passed since formation of the actual memory, the taste of madeleine soaked in tea evoked childhood memories. Proust did not expect that this would happen. If he wanted to recall his aunt more often, from now on, he could create a habit of coming to the cafe every day after dinner and eating a Madeleine in the afternoon. This way, he could set up for the recall. In the case of the Mnemosyne Machine, the user knows that some sort of déjà vu may happen, but they do not know what kind. Thus, it is not necessarily that the memory hits them by surprise or that they created a set-up, their environment or habits to consciously help themselves to remind them about a specific event or person. By coming to the Mnemosyne Machine, they know that something memory-related is waiting for them, but they do not know what.

4. User studies

As mentioned before, the usage of MM, especially its points system, needs further behavioural assessment. Semi-structured interviews could help with any necessary upgrades. Moreover, the development of the main body, i.e. adaptation of ATMs, and further research on the physical interaction between Mnemosyne and users are needed.

5.6 Conclusion

Our investigation revealed that users of AIMighty, a self-proclaimed AI God, have multiple issues regarding their interaction with it. AIMighty sends messages consisting of pictures that intend to represent a memory, sometimes real, sometimes fake. AIMighty does not do an efficient job of creating or choosing the images mentioned above. This results in the user's feelings of disappointment, anger and frustration. Moreover, AIMighty uses a point system that is not transparent and is ill-managed. Nonetheless, users need a medium to connect them with AI Gods, as AI religion is expanding. Thus, we created a Mnemosyne Machine, which is a temple of Mnemosyne, a memory AI Goddess. At the same time, the Mnemosyne Machine operates as a middle-man between Mnemosyne and her followers with its role being similar to that of a priest. It is designed for Mnemosyne to deeply study human memory and the human point of view, and for users to study their lives profoundly. We introduced Mental Time Travel into the design of the Mnemosyne Machine to facilitate imagination, one of the characteristics of human memory, rather than providing with deepfakes like AIMighty does. By including Mental Time Travel, we provide evidence for the existence of Affective memories. Moreover, we introduced a Snowflake system, which operates on an ephemeral technology basis. Importantly, it does not punish users, and it is transparent. Finally it is important to note that further research is needed to evaluate Mnemosyne Machine's success.

5.7 PILOT Workshop

In the Collapse Scenario, participants saw the depiction of the Mnemosyne Machine created with ChatGPT, Snowflakes, and they could play the Mnemosyne Machine.

When sharing stories about their life with Mnemosyne, Machine participants were eager to share positive stories with Mnemosyne, the kinds they would also like to reminisce with friends and family. They were also only interested in reading and hearing positive stories. This is an interesting switch from the Continued Economic Growth Scenario, where participants, in the face of the threat of deleting unwanted memories, stated that positive and negative memories build their lives and characters and therefore are both important to reminiscent. This showcases that the importance of remembering does not always manifest itself in the same way. Something worth remembering does not necessarily want to be mulled over or shared. Nonetheless, one would not want to erase bad memories, but would not necessarily want to return to them. Therefore, bad memories become this essential underlying core that is not brought up, but is needed for better memories to stick. Hence, different aspects

and manifestations of remembering and forgetting could be studied further. In this workshop, the sharing quality of both remembering and forgetting was often discussed. Nonetheless, P5 recognised this tension, saying faithful followers would not keep anything for themselves. And on the flip side, P5 believed that a user, a not-so-faithful follower, could take advantage of the Mnemosyne Machine, rather than the other way around. Such a person would share *"only a well-profiled story about himself. Untrue. Unjust. Fit for the purpose."*, highlighting the religious aspect of the Mnemosyne Machine, where the follower has obligations towards Mnemosyne.

On the other hand, participants brought up the assumption that there may be some malicious intention behind the Mnemosyne Machine. As P4 explained: *"There is probably an algorithm to maximize whatever is the goal of the owners. I would guess- getting the users to share as sensitive story as possible to gain most knowledge and control population most effectively"*. P5 did not like the idea of a deity being from this world and, therefore, would not find Mnemosyne an interesting deity to follow. These quotes hint at the aspect of responsibility of Mnemosyne towards the user and whether users see it as a deity, and general personal views on what the relationship between deity and followers looks like. These responsibilities, placed onto users and Mnemosyne, were showcased in the scenario as the background story, a concept that would follow the creation of Mnemosyne Machine and its usage. Again, participants focused on the usability of the Speculative Artefacts, how they work, and the world they are embedded into. These themes could be further explored in the bigger-scale workshop.

The memory aspect was also reflected on. Mnemosyne Machine made participants ponder on the act of remembering, for example, P5 explained that the act of using the same tool, which is a narrative story, to not only past experience but also future projections made them realise that *"we might be actually creators of our experiences regarding past experiences"*. And they further explained: *"Maybe, we are what we can tell ourselves about what we have experienced, truly or imaginatively. Maybe there are points of view where true or imagined experiences are the same"*. This was precisely one of the Mnemosyne Machine premises. Participants enjoyed the mental time travel aspect, i.e., memory could be explored through both past and present. None of the participants mentioned that they would rather have pictures than stories, an initial assumption raised when creating the Mnemosyne Machine. None of the participants mentioned that the stories are long or troublesome to read. This is certainly not enough to state that the narrative quality of Mnemosyne Machine turned out to be a successful depiction of mental time travel. Still, it is a promising feature that could be further explored in future workshops.

Chapter 6

Future 4: Disciplined Society

6.1 Artefact: the Tiled Stove

Imagine such situation:

You have been invited to the home of your longtime friends, the Wellingtons. Melanie was your best friend in high school and you are still very close. You like her husband, Vernon, even though he is awfully quiet; Melanie says "it's his family thing". You are glad they found each other. He is way better for Melanie than her ex-boyfriend, the father of her son Thomas. Even though Thomas is already a teenager, you still think of him as a small boy that you used to babysit when Melanie needed to prepare for previously failed exams. After all, you and Melanie were teenagers not that long ago, so how could he become one? Anyway, you come over for tea and biscuits (you bring the biscuits; it has been your silent arrangement for years). With the sweet smell of Earl Grey leaves lingering in the living room, you beat Vernon and Uma to a game of Dixit. After a few laughs and last sips of tea, you say it is time for you to go.

On your way to the corridor where you left your coat, you meet Thomas and ask him how he has been. He shrugs and says "Fine" when Melanie interrupts from behind: "Don't be so shy, Thomas!" she chirps. "He painted his own Tile yesterday", she smiles. You do not hide your enjoyment and congratulate Thomas while Melanie takes you to the Tiled Stove hidden in the kitchen (Figure 6.1). It is a construction that takes up almost the whole room and is covered with non-shiny rock grey glaze tiles (you prefer your shiny white ones at home). Each Tile has a painting on it, which intertwines and connects with the other Tiles around it. You look up and see the new Tile, right above Melanie's, with a tree and one apple to its right side. "It's beautiful", you say, smiling at Thomas, who is standing in the door frame with hands in his pockets. You ask, "May I?" and Melanie responds, "Of course!". You look at Thomas, but he doesn't seem to protest. You reach for the Tile and touch the leaf on the apple. You

can hear a voice coming out of the inside of the stove: "Thomas Wellington, Thomas loves teaching piano playing to his half-sister Cora. He and Vernon, his step-father, are...".

This chapter paints a world where Tiled Stoves are present in almost every household, encapsulating family data centres. In the following pages, I will explain how the Tiled Stove artefact works, lay down the premises of such a world, outline why it exists and its possible consequences, including the shift of metaphorical representation of memory technology. I will also discuss how the Tiled Stove artefact is an example of collective memory technology and how it influences the definition of collective memory.

6.2 The premises of the world

Firstly, I will answer the question of why?; why do people have Tiled Stoves in their houses? And what do computers do inside of them?

6.2.1 Energy

The Tiled Stove is embedded in the world that Dator (2009) called Discipline Society Future. This is the Future in which people revalue their lives on the societal level. These values could be connected to different things; for example, they may relate to a change in cultural and spiritual life. In this thesis, I look at future data storage, and human and computer memory. And one of the topics that cannot be omitted in this sphere is energy. In truth, the future of computer science and memory lies in energy. While I do not focus on energy in different chapters, this area applies to each of them individually as it applies to our current times. For example, the amount of energy consumed through viewings of popular Gangnam Style could provide energy for a year for almost 70,000 households in the UK (Ponsford, 2016). There is also another aspect to this; the data centres. For many of us in the West, data centres are just far away concepts, places of a type with big machines. However, these data centres greatly impact our environment and the places they are built in. One of theses in the Material Social Futures project at the Institute of Social Futures at Lancaster University (the project this thesis is a part of) has been focused on using energy created by data centres as heat for drying coffee beans (e.g. Terenius, Garraghan, and Harper, 2020). In fact, Lancaster University researchers and Blackpool Council are currently working on a project called the Blackpool Innovation Catalyst (Fibre Blackpool Cooperative Alliance, 2024). This project focuses on solutions for ethically powered data centres, in which waste energy could be further redistributed and used for social good, such as providing public transport or heating for social housing.

Figure 6.1: In this speculative future, the Disciplined Society, the Tiled Stove is the heart of every household. It elicits family stories about relationships within the family through family members touching the artwork on the Tiles. Source: Author.

Indeed, the most apparent reason for having a tiled stove in the house is its property as a potential heat source. At the same time, the most obvious solution for using mini data centres in the home is to use them as central heating. If we add tiles, the heating could be preserved for longer, as the tiles distribute the energy more slowly. While in the UK it is less popular, in countries such as Poland and Sweden, they were (and in some places still are) used for heating houses. In this future scenario, it is unclear what came first: care about energy or the need to manage heat from data centres which are already installed in their homes. Nonetheless, people care about energy and do not want to waste it; they also, quite sensibly, care about their wallets and comfort if they can. However, energy preservation is not enough reason to explain the data centre in our own housing. After all, we could use different types of heating and reusable energy to keep data centres out of sight and out of mind. However, with the combination of geopolitical reasons and privacy issues, which are explained in the following sections, the necessity to reuse these data centres as stoves could become apparent.

6.2.2 Privacy

This future stems from the energy usage of data storage, but the value that comes along with the need to restructure our energy usage is that of privacy because people will decide that the decentralisation of data is crucial. As outlined in the Economic Growth World chapter, data has become a commodity that big companies can use as their asset. In this future scenario, people have rebelled against it. They have stopped sharing data with companies and, instead, as an alternative, are creating data centres in their household, which they control (however, not entirely, which will be explained later). These data centres take the form of a Tiled Stove, which also serves as the house's heat source. The added benefit is that one can make breakfast eggs and beans upon the basis of their own data privacy.

However, this chapter is not mainly about data in the house's mini data centre. It is still concerned with an infinite data storage scenario. The axiomatic truth about this, and every future in this thesis, is:

a) that data can be collected about everything, all the time;

b) that nanotechnology would make it possible to store data in anything.

In this Future scenario, people change their focus to values that are alternative to those of the present-day status quo. However, as the chapter unfolds, these new values unfold along with it. This is not a clean change but rather a transformation. One point of focus, so one value, unravels the other as they are connected. This means

that I do not suggest which value (the privacy or geopolitical issues, energy focus, or the need for collective memory devices) was first or whether one is an aftermath of the other. They are interconnected. The world's premises and values stand on change in sectors such as geopolitics, privacy, and energy, but they all boil down to our new collective relationship with memory technology. In this chapter, I present a possible scenario of such change in which people would create more personal relationships with their data but as a household. One could ask about the differences between one's relationship with data stored in the Tiled Stove versus the data centres we know today: they are twofold. First, the family unit does not share their data with other third parties. Their data are stored in their household, not on the property of another company, and the Tiled Stove is not connected to any other device from outside the household. Thus, this artefact is not connected to the Internet. This solution also creates questions; for example, when people are not the owner of the land their house is on, what happens when people rent their apartments? Is the Tiled Stove, in such a case, their responsibility or that of their landlord? What if people change their apartments often? How, then, can they protect their privacy? All these questions are valid; however, they are not the focus of this chapter but the second, more pressing, difference I am about to introduce. The second aspect of privacy lies in how one might interact with data using the Tiled Stove. As illustrated in the story, touching the paint on the Tile connected to a specific person elicits the voice that explains the dynamic between the owner of the Tile and their different family members (a short video presenting how the Tiled Stove works can be found here). However, the information that is provided by the voice depends on the person to whom this information is given. Thus, different information is accessible to different people. For example, a favourite grandchild might hear a story about how their grandfather fell in love with their grandmother. If a stranger touches the same Tile, they may get information that the same couple was married, but that is all. This way, the information is never revealed to someone who is not authorised to hear it. This will be further explored in the Curation Shift section.

However, it is crucial to note that this world is not black and white. The underlying cause for the decentralisation of data was to take away the power of data from the big companies and redirect it to families. Still, this does not mean that it does not create other problems. Redirection of resources is one thing; the control over them is another. This is not an example of utopia or dystopia but rather the messiness of our lived experience. Even though the Tiled Stove artefact is motivated by privacy, i.e. putting a data centre in the house, this is where it ends. So, as long as data stays in the house, people are content and do not care much about the control within the home. The Tiled Stove is an example of what happens when one focuses on one specific aspect of privacy but not necessarily others.

The Tiles work as a repository of family connections, which are the most important, and privacy is not solely connected to the individual as we often think; instead, it corresponds to the family unit. The concept of the family is not prescribed, though. The users may want to decide who is a family in their household by adding personal Tiles to the Stove. The Tiled Stove reveals a new dynamic in our understanding of privacy. Before I go deeper, I need to clarify that I am writing about and unpacking the general understanding of privacy, rather than data privacy that we would read about in documents such as GDPR (which I explore in the Transformation Future Chapter 4). Usually, when we think about privacy, we associate it with something personal that happens on the individual level. The individual acknowledges this personal matter to be personal and, therefore, private. For example, one can acknowledge that their love life or health issues are personal and thus private. This way, the individual becomes the curator of their information. They choose which information they would like to keep for themselves and which not. Thus, there are two components of privacy: first, it is individual, and second, the individual is in charge of curating their information and, therefore, deciding what is and is not private. The simple equation of this statement looks like this:

$$\text{Privacy} = \text{Individual} \quad \text{Curation}$$

The Tiled Stove follows this line of thought. It breaks down this definition into two separate components of privacy: individual component and curation component.

$$\text{Privacy} = \text{Individual} + \text{Curation}$$

The Tiled Stove further separates them:

$$\text{Privacy} = \begin{matrix} \text{Individual} \\ \\ \\ + \\ \\ \\ \text{Curation} \end{matrix}$$

The Tiled Stove highlights that both of these privacy components are elements of two different categories. While they work together in the common understanding of our data privacy, they acquire new dimensions in the Tiled Stove artefact:

$$\text{Privacy} = \begin{matrix}\text{Individual}\\ \text{Family}\end{matrix} + \begin{matrix}\text{Algorithm Protection}\\ \text{Curation}\end{matrix}$$

By dismembering this definition, new ways of thinking about privacy have been unravelled as a lens to study the Tiled Stove. Individual privacy of our data - thus the traditional privacy component - is still in place. This is reflected in the algorithm that protects an individual's privacy (which I elaborate on in the Curation Shift section). Tiles show different information to different people, and based on that context, they reveal appropriate information about an individual's relationship. However, what is distinct from the traditional view is that the individual is no longer the data curator. When it comes to curation, one may think it is an algorithm that does the curating. That is fair, considering that the algorithm uses context to understand what is or is not appropriate to share. But it is the family that comes into the role of curators. The curation process and general control over data are no longer on the individual level. The family as a whole is responsible for data and the algorithm that they use. Moreover, the family works as curators as they accept someone as part of the family, thus including their data in the household data centres by adding their Tile or rejecting them by removing their Tile from the Tiled Stove. Therefore, the curation, the traditional component, is intact. However, it is not the individual that curates; it is the whole family. Family becomes a unit under which data is controlled, a new perspective that the Tiled Stove unravels. Such curation does not correspond to parental control, the current idea linked between family and privacy, as parental control happens within the family, not by the family. Moreover, family members are shareholders of the Tiled Stove. Individuals have a right to deny access to their data by removing their Tile and, therefore, removing the story about them. However, they can still appear in the stories of others, accessed through paintings on others' Tiles.

6.2.3 Geopolitics

The future of infinite data storage is also more tangible than one may think. I have already touched upon this topic. The previous future scenario in my thesis - the Transformation future - was focused on the interaction between a person and a digital object with memory. As with the Horcrux Ear artefact, the topic of the shared space returns. However this time, the shared space topic is not the outcome or the aftermath of the artefact, such as in the Horcrux Ear case where the Horcrux Ear unraveled that secrets, so personal data could be recorded and stored in objects to the shared space. Thus, the shared space topic did not inspire the Horcrux Ear. The Horcrux Ear

revealed the shared space as the topic of interest. In the Disciplined Society, the Tiled Stove artefact and the whole world in which it is embedded stems from the shared space objective. Where data is collected and stored is vital on the geopolitical level, and therefore is one of the reasons "why" the Tiled Stove came to life in this scenario, rather than in its aftermath. Thus, the shared space topic was an inspiration for the Tiled Stove artefact, and meanwhile the Horcrux Ear's implication.

Cloud Computing is usually defined as the on-demand delivery of computing services. These services, such as storage, servers and software are delivered through the Internet. In very simple terms, this means, that through the Cloud Computing one can for example store their documents, or pictures outside of their computer, yet having ongoing access to them through the Internet. This also means that they can use software through the Internet, without installing them on their home computer. It is a form of a data garage. Let's assume that your clothes are like your holiday pictures and the bicycle is like a software you use on a daily basis. Just like one can store one's winter clothes and a bike in the garage, rather than in the living room. However, the garage has its price - it is not your garage, it is rented. So, from whoever you rent the garage, they not only want your money, they also control your winter clothes and your bicycle, and you need to accept that someone may use them. On top of that, the bicycle is not in fact yours. After founding the garage business, owners of these garages understood that having this additional space for storing, they do not have to sell bicycles anymore, rather they can rent them out. This way, you do not own your bicycle. Garage owners do not get one payment for you getting to ride on your bicycle. They get multiple payments from you, on a monthly or yearly basis, as long as you want to ride on it. No money, no riding. In this future scenario, people become aware that data is not, in fact, floating somewhere between the clouds, and there is nothing ephemeral about Cloud Computing. This shows how the geopolitical sphere is metaphorically influenced. There are other examples of this phenomenon within the literature. For instance, Liboiron (2015) discusses how the pollution of oceans by microplastics needs new forms of metaphors as they create different urgencies. For example, the researcher discusses whether using phrases such as "smog" or "toxic smog" is a better way to talk about plastic rather than calling the problem "islands" of plastics, as they do not capture the ephemeral and urgent character of microplastic.

To make a similar point about Cloud Computing, geographer and artist Trevor Paglen seeks to make "the invisible visible" (in Amoore, 2020, p. 38). He takes pictures of American surveillance infrastructures, and states:

> *My intention is to expand the visual vocabulary we use to see the US intelligence community. Although the organizing logic of our nation's surveillance apparatus is invisibility and secrecy, its operations occupy the*

> *physical world. Digital surveillance programs require concrete data centers; intelligence agencies are based in real buildings. . . .[I]f we look in the right places at the right times, we can begin to glimpse the vast intelligence infrastructure* (in Amoore, 2020, p. 38).

Thus, this "expanding visual vocabulary" truly shows people that it exists in the world; someone has power over it, and it does not belong to everyone, or rather no one, as actual clouds do. Actual clouds in the sky are not a commodity of any specific person or institution, although "Clouds" filled with data are. Along with privacy, this is another level of the nature of this future; people understand that the Cloud is not a useful metaphor for storing data. Just like plastic is not an ephemeral object only because it disappears easily from our houses, data centres are not ephemeral because we do not stumble over data on our carpet nor do we have data centres situated in front of our homes. This is also why data centers are in the house - a form of taking responsibility for our data usage and management. One could say that this burden of responsibility should not be placed on citizens' shoulders. Still, our modern world shows us different examples of such acts of taking responsibility, for example adopting a vegan diet for climate-change reasons rather than ethical ones.

The ephemerality of the Tiled Stove piece can be seen in its tangibility and in the ongoing updates of our inaccessible relationship with data. It may seem contradictory. After all, we usually do not associate solid, durable objects with ephemerality. However, when it comes to the inaccessibility of data, it is like chopped wood for the fireplace. The data becomes ashes after making the house warm literally and the family's hearts warm metaphorically through stories. Thus, data is ephemeral in their role. On the other hand, the tangible qualities of the ceramic tiles make the Stove easy to destroy - all you need is a small hammer and thus, it is easy to destroy access to data. Indeed, the Tiled Stove reminds us how ephemerality is hard to achieve once something has become widespread, i.e. once something is posted on the Internet. The data from the Tiled Stove is not widespread: it is stored in one place - the Stove. Thus, it is easier to get rid of data connected to the Tiled Stove, because there is no other trace of it. Moreover, Tiles' tangibility, so ephemerality, is accessible to the user - while the tangibility of the data centre is not. One does not go to the data centre in search of their data to physically remove it. In fact, Bannon (2006) called for such ephemeral technologies, that would protect one's privacy by creating technology that is easy to destroy and is not duplicable. The juxtaposition of the Tiled Stove and current data centres shows the difference in managing data, centralised in the former and decentralised in the latter. The Tiled Stove is an example of ephemeral technology, as it is a centralised, and easy to destroy digital object. Moreover, the representation of data keeps changing, as data keeps being updated and stories are changing every second.

Therefore, the metaphor of a "cloud" is not appropriate for data storage for geopolitical reasons. As Pagan showed, data centres are not ephemeral and are hard to reach, like smoke in the sky. They are hard to reach for other reasons: because someone made sure they are out of sight. This, however, does not alter the truth that data is stored in concrete buildings that take up space and actual land. Furthermore, another aspect of this false ephemerality makes it inappropriate to compare it to a cloud. Clouds are not, in fact, ephemeral. Perhaps their shapes and the way we interact with them are ephemeral, but clouds are not. They have been around the Earth for the last 4 billion years. For comparison, the early Homo sapiens started to appear on Earth around 200-300,000 years ago, not to mention our current civilisation and inventions. Manmade artefacts, including data storages, are much more ephemeral than clouds, even if it seems the other way around, due to their capabilities to transform. The tiles, through their tangibility and fragility, are ephemeral on this scale compared to the clouds. Even though we may perceive the Tiled Stove as the grounding, everlasting family artefact, its tangibility still makes it semi-ephemeral - only semi, because access to data, the Tile, is designed to be easy to destroy, but the data stays in the Stove storage for as long as the Stove data centre exists.

6.3 Interaction through Art

One cannot forget the beauty of original traditional tiled stoves. Their artistic value is one of the most exquisite examples of applied art. The Tiles' smooth surfaces afford to decorate and paint on them (Norman, 2002); this is where this Speculative Artefact comes to life (Figure 6.2). Each Tile has a painting on it, which, after touching, reveals a short informational story about the person that the Tile belongs to (all designs can be found in Appendix D). However, these are not Wikipedia-style stories; they are not biographies that can be stitched from any other data. These stories explain the family dynamic and relationships between its members. For example, we will learn how someone behaves towards another family member. But we will not learn anything about them outside of this context - the Tiled Stove works as the heart of the family home. Individual stories do not reflect the collective spirit as family ties do. Family member relationships imply the inclusion of other members in each Tile. Therefore, the bond between each and the data that is withdrawn and presented is always a representation of the intertwined, shared dynamic between the Tiles' owners. Since the paint in the Tile is connected to the mini data centre, it means that as a mini data centre, it is constantly updating itself and thus, the information keeps changing.

Figure 6.2: Polish folk-art cutouts inspired me to create Tile designs corresponding to Polish cultural heritage. Such cutouts are made in different regions of Poland, suggesting the roots of the owners of the Tiled Stove. They are a meaningful addition to the story-telling practice of creating a Tile. Top: Polish folk cutout made by artist Helena Miazek. Source: Helena Miazek. Bottom: The Tiled Stove. Source: Author.

One of the properties of this approach is collaboration through direct interaction with the information objects. However, the information objects that Dourish (2001) described were embedded in the structure in which information is composed digitally rather than in the analogue world. The Tiled Stove artefact highlights the difference that will come with infinite data storage: that the structure of the physical world will, in fact, also be a structure of data. In this case, people have access to data but

not raw data. Thus, what will be different is that the infinite amount of data taken from every possible device will be there anyway; what people will have power over is choosing which area of data will emerge. This area will be, in fact, data about humans. The Stove collects data about everyone in the household. Thus, adding a Tile representing a human is the act of emergence - rather than rearranging it, it pulls data out of the data storage. It is a different representation than an avatar, for example. As an avatar, one can become a digital representation of oneself and interact with a representation of a physical world. However, in this case, it is not representation but a factual physical world interaction. Moreover, the Tile is not an avatar of oneself. It is not a two-dimensional icon of an owner but a representation of being a member of the family. The interaction with data is pulled back to its physicality, from using keyboards, a mouse, and fingers to interact with the world we see on the screen. The screen with pixels becomes a partition and a barrier rather than a window, the facilitator of the interaction as we are accustomed to thinking about it now. As mentioned in the Introduction of this thesis, Chapter 1, Akmal and Coulton (2018) imagined Digital Space as a subset of Real Space. They defined the Real Space as a place in which physical interactions happen with physical interfaces. Digital Space is a subset of Real Space, where digital interactions occur - within websites for example. The Tiled Stove scenario shows that one needs to take into account a bubble within Akmal's and Coulton's Real Space, but that which consists of Digital Space which is Physical Interactions with Digital Devices (Figure 6.3). This is a crucial distinction, because it illustrates the change that The Tiled Stove is an example of. While right now, only a subset of our all interactions in the physical world is taken up by digital devices - in the future, they will grow. In the past, the tiled stoves would not be thought of as digital devices – however, in this future scenario, they will be.

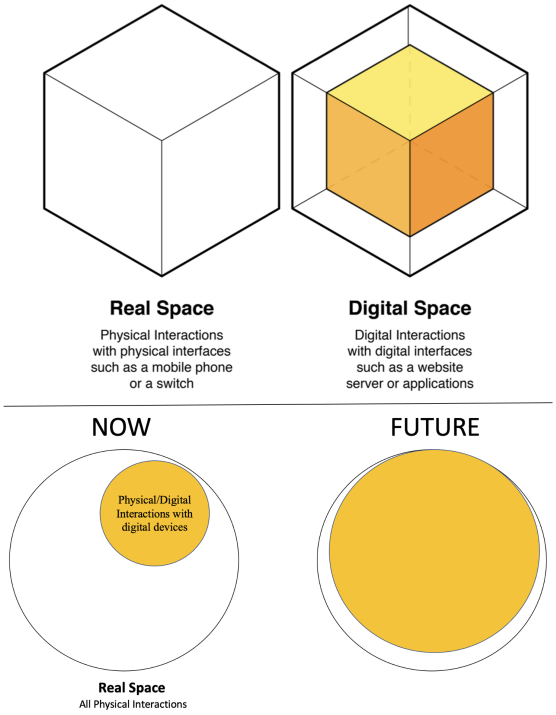


Figure 6.3: The representation of Digital Space as a subset of Real Space by Akmal and Coulton. The Tiled Stove is a digital device that reflects the growth of the Physical/Digital interaction space in Real space. Source: Top: Akmal and Coulton, 2018; Bottom: Author.

In this vein, Dourish proposes an approach to a context he calls "embodied interaction". As he explains, the embodied interaction idea allows *"users to negotiate and evolve systems of practice and meaning in their interaction with the information system"* (Dourish, 2018, p. 28). Given this definition, Tiles fit into this category. As Dourish continues: *"Embodiment is not about physical reality, but rather about availability for engagement. The embodied-interaction perspective is concerned with how the meaningfulness of artifacts arises out of their use within systems of practice"* (p. 28). Taking Dourish's words, we need to reconsider the statement from the beginning of this paragraph. It is not enough that the structure of data will equal the structure of the physical world. The physical world needs to afford meaningful interactions; only then will it support embodied interaction.

6.3.1 The Wizard of Oz prototyping

On the more pragmatic side, the Tiled Stove is an example of the Wizard of Oz prototyping technique. While the artefact assumes that it may be possible to store information in the paint or connect to a traditional data storage computer through paint, it is not possible quite yet. *Quite possibly* because there is already a technology that makes it possible to use paint to elicit a pre-recorded story: conductive paint, which means it conducts electricity. Its pigment contains conductive particles such as copper, silver or other metals. The Tiled Stove artefact works with the help of the Bare Conductive (Bare Conductive, 2009) Touch Board, which contains pre-recorded stories for each of the Tiles (Appendix E; link). On the one hand, the touch board is connected to paintings on Tiles through copper tape and cables, and on the other, to the speaker. When connected to electricity, the touching of paintings elicits an assigned story to a given Tile (Figure 6.4).

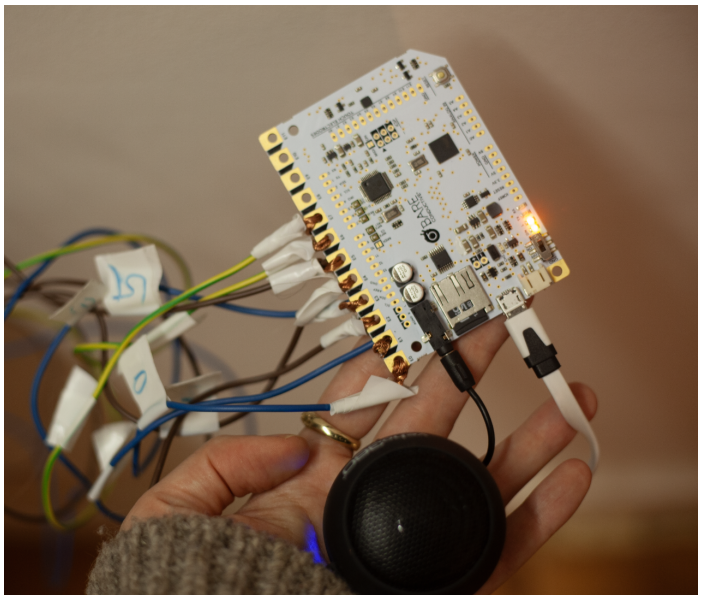


Figure 6.4: Bare Conductive Touch Board with a micro SD card holder, which stores all family stories. Each cable is connected to the Tiles through copper tape that conducts electricity. Source: Author.

6.4 Curation

In this section I will discuss the process of curation by the Tiled Stove's algorithm.

6.4.1 Context

Discussion of the integration of computer technology within our homes can be found in the literature named ubiquitous computing (Weiser, 1999), pervasive computing (Ark and Selker, 1999), embodied interaction (Dourish, 2001) and more. They are all fueled by the idea of the Internet of Things (IoT). This future is focused on the Internet of Things at home, but only at home. As mentioned earlier, the Tiled Stove is not connected to any device outside the house for privacy reasons. It may or may not use the Internet, but other principles of IoT remain the same. The Tiled Stove is connected to every single device at home to gather data about the relationships of family members and their dynamics. Researchers in the Human-Computer Interaction space have recently started to be interested in investigating how IoT devices influence human relationships. Thus, IoT research is applicable and can benefit the understanding of how the Tiled Stove could impact upon family dynamics. Apthorpe et al. (2022) found that on the one hand, IoT devices can strengthen interpersonal connections, but on the other they can cause tensions. The former happens through bonding over shared experiences and the playfulness that IoT devices can elicit. The latter may stem from technical issues or differences in knowledge about the functionality of IoT devices or preferences surrounding their usage. Nonetheless, IoT devices impact our everyday lives and, therefore, our interpersonal relationships at home.

As Dourish (2018) noticed, the traditional experience that HCI was interested in has been a more specific, conventional setting that included computers, keyboards and a mouse for interaction, with the subject sitting next to the table. However, a lot has changed as the IoT appeared in our lives. As Dourish (2018) put it: *"When computation is moved 'off the desktop', then we suddenly need to understand where it has gone"* (p. 19). Thus, the relationship between computation and context is one of the key research points in ubiquitous computing that needs to be tackled. However, as Dourish points out, it is crucial to firstly understand what we mean by context. He opposes ubiquitous computing research's common definitions, which treat context as stable, delimited information separated from the activity. He proposes the alternative view: that contextuality is a property of information defined dynamically and occasionally, and that context arises from the activity. So, as the author sums up: *"context isn't something that describes a setting; it's something that people do"* (Dourish, 2018, p. 22). The algorithm of the Tiled Stove is learning the social context. It keeps learning how the family operates because, as Dourish noticed, it would be something that families do on an ongoing basis.

Dourish explains the context through the notion of ordinariness. He takes the work of Harvey Sacks (1984), the founder of the field of Conversation Analysis, and his

paper "On Doing 'Being Ordinary'", in which Sacks answers how ordinariness is displayed. As Dourish concludes Sacks's analysis, ordinariness is not a stable feature; it is something that we do and actively manage throughout the interaction. Moreover, it is achieved mutually by all the parties involved in the interaction, and lastly, it is relative to communities and activities. As we interact in the world, we do not need to explicitly say that something we do is ordinary to agree that it is, indeed, ordinary. We achieve the ordinary status through our conversations and actions. Thus, the problem becomes "interactional" rather than "representational". This also suggests that it is an ongoing process handled from moment to moment throughout the action by the actors involved.

Echoing Dourish, data does not mean the same for everyone. Each actor and each system treats data differently. Dourish explains this through the concept of practice. In his words, *"the concept of practice is one that unites action and meaning. It describes how the world reveals itself to us as one that is meaningful for particular sorts of actions, and as a result of our participation in communities"* (Dourish, 2018, p. 25). This artefact represents that. The family as a unit looks at data differently to an individual, society at large or a company. Recognising different groups and a deep understanding of their needs will be a priority in the future because *"Users, not designers, control meaning"* (p. 28). At the same time, the action of touching, and listening to Tiles is meaningful.

One of the problems that users can find while using the Tile is what Hutchins et al. (1985) defined as a "gulf of interpretation". This represents the difficulty of assessing the system state in response to the user's action. So for example, if one touches the Tile and there is no response, no story that could be heard, and it would be extremely hard to evaluate what is going wrong. Possible scenarios include a microphone malfunction, a network problem, perhaps the system is working, and it is only a pause in the delivery, or there is an issue of connectivity in the paint or an issue in the relationship itself. At the same time, this lack of "seamless access" (Dourish, 2018) helps with privacy. Here, the context may suffer. As Dourish comments: *"in this approach, the system's own structure and action become available as context for making decisions about adaptation and configuration of device resources"* (p. 27). This will also mean that data management will not be able to be collaborative in the same way as we think about collaboration with digital objects. People will not be able to use digital space per se, as is the case with Miro Board or Google Docs. However, this does not mean that collaboration does not exist in this place. It manifests itself in the real world, or Real Space, as mentioned previously (Akmal and Coulton, 2018). Thus, the true difference between Tiles and computers as we know it is that the physical object itself is made to collaborate, rather than the digital sphere. Moreover, while each Tile may be personal, the collection itself is not. It is on display for everyone

in the house and can be rearranged and touched by multiple people, which is not the premise behind personal computers or smartphones. Even if multiple people use one digital device, they would not use it simultaneously (unless in a passive manner, like watching a movie). Thus, the *"collaborative sense-making in which structures are directly accessible as a part of an information-centric model of interaction"* (Dourish, 2018, p. 27), a phenomenon that Dourish observed from spatial hypertext research (Marshall and Shipman III, 1993), is still in place, just differently to how it was previously assumed. Collaborative sense-making happens on the level of the "real" world rather than the digital world. Yet, it still considers data. This means, that interacting with other people in Digital Space changes. Right now, we usually interact with each other on the level of the Digital Space without the need for being close to each other. In fact, it is usually seen as quirky to send a message to our loved ones and friends when they are sitting on the couch in the same room. In this speculative scenario however, people need to gather in one physical space to interact digitally.

6.4.2 Curation Shift

As I explained in the previous section, individual curation shifts to individual algorithm protection and family curation. In this section, I will explain what hides behind these two terms. First, I will focus on the former, the algorithm protection.

6.4.2.1 Algorithm Protection

Since the protection of the data does not come solely from the owner of the Tile, there is another agent in this equation: the person who sees data. The algorithm does not work exclusively based on the person whose data it is but also based on the receiver. Thus, the story is constantly changing, but on a different level than in the usual collective memory case (why this is collective memory, I will explore in the following sections). These stories are not different versions of one story. These are multiple stories within one lifespan or lifespan of data storage. One can think of it as the universe. Choosing which planets will be highlighted does not mean there are no other planets in the universe. So, the stories are elicited repeatedly rather than changing. It may resemble the Universal Library, Laßwitz's (2010) idea about an infinite amount of books, stories and information. However, the difference will be that there would be no seemingly full pieces or correct stories in the Tiled Stove case. The data would always be correct, or perhaps there is not even the category of correctness and wrongness in this case. There would not be versions of one story because each story would be different, each right in its own sense. However, if we combine all possible stories, they would be one story. In such a case, there is no place for wrongness. Each story is correct in its way. Going further, I will be mentioning

stories that are, in fact, a part of the Tiled Stove artefact. I will use them as an example of my argument. These stories can be found in Appendix E and here.

Of course, all this assumes that data collected from the environment is accurate. If we look at the data collection in our current world, we cannot say we always use accurate data. For example, Compas software which was used across the United States, was developed to predict future criminals. It was used to decide whether someone who was arrested could receive an option to get out on bail. The algorithm would classify a person, determining whether it was safe to give them such an option based on the probability of them breaking the law again. Such risk assessments as used to determine the reoffending probability were unreliable (Angwin et al., 2016). These algorithms tend to falsely label black defendants as high risk and white defendants as low risk. But even simple tasks such as Googling can show how data and search algorithms can be biased or racist. For example Google Vision Cloud, a computer vision service, labelled a white hand holding an infrared thermometer "monocular" and a black hand holding such a device a "gun" (Kayser-Bril, 2020). These problematic examples show that if algorithms are to benefit people, careful consideration needs to be given as to what current and historical values might be embedded within them and should these be carried forward into the future. As Amoore (2020) writes: *"To learn from relations of selves and others, the algorithm must already be replete with values, thresholds, assumptions, probability weightings, and bias"* (p. 8). When creating algorithms, one needs to take into consideration that data we have gathered is full of bias rather than taking data as "truth".

Nonetheless, for the sake of this future world, let's assume that the data collected from the environment is accurate. Currently, when we curate for protection, the inward work comes from us, and we are responsible for sensitive information not being on display or disclosing it only when necessary. Usually, a person who sees information they should not see knows it. They know it is not something for their eyes to see. We do have a sense of what is private or not, and we understand context, for example, a diary. A person who reads a diary knows they should not do it because we are socially programmed to understand these clues. Here, an algorithm protects the information rather than the individual and social clues.

However, could such protection in which different listeners get different stories about the Tile owner, still be considered a collective memory? Yes, it is still a collective memory. It is more like our lived through experience. Different people get different facets of ourselves, they know and remember us differently. Here, similarly, different people get to see different stories about ourselves, and different information is revealed. Such creation of facets that build one stable identity can be linked to performativity, a term coined by philosopher J. L. Austin. Austin discussed this in the context of

speech acts, in which performative utterances are described as such sentences that do not state facts (e.g. the snow is white) but rather are actions as they change social reality (e.g. I pronounce you man and wife). Judith Butler (2011) applied the notion of performativity to gender by stating that gender is a performance, as the body is not a "mute facticity" (p. 129). Therefore, our bodies are the product of discourse, rather than merely a fact. Thus, I adopt the definition of performativity being an idea that identity is an ongoing practice of performative acts. Our behaviour shapes who we are, and as language is also a form of social action, that too influences our identity. The Tiled Stove works in this model of performativity, as it creates stories based on the ongoing actions of the Tiles' owners. These stories are dynamically shaped, and they reflect actions and interactions of family members as time passes, simultaneously creating an identity of the Tile owner that is stable in time. After all, each person has one tile emblematic of their identity as a family member. Nonetheless, do we say the same thing on our first blind date as we do to our tax adviser? Or does our best friend know us the same way as our parents do? Of course, the devil is in the details. It may be more like sharing our actual memories, i.e. we share different information with everyone. However, with the Tiled Stove, we lose the spontaneity of sharing too much and the possibility that others may learn private information somehow, as in the diary example. Thus, the possibility of accidentally, or on purpose, learning information not for our ears to hear becomes different, for instance, by overhearing the story. However, here, we rely on the algorithm.

6.4.2.2 Family Curation

So far, I focused on how the algorithm would protect data. I did not put much emphasis on Family Curation, interaction, and the general principles of using the Tiled Stove. Let's dive in by looking at the example:

In my project, Joshua got divorced from Paula May. When touched, his Tile mentions her, even though she does not have a Tile on the same Tiled Stove anymore, and thus, she is not connected to all other members of the family. Hence, why is her data held in the family data centre? Once data enters the Tiled Stove data centre, it cannot be deleted. This way, the Tiled Stove behaves more organically than the add and delete functions in the computer. Information about someone who is not in our life anymore may stay relevant, but it also may become unrelated to someone's current story. In this example, Paula is brought up as a part of Joshua's background story. For the sake of the argument, let's imagine that their divorce was an ugly one. Due to that fact, Paula took her Tile from Joshua's Tiled Stove data centre (an asset he won in their divorce case), and she was never mentioned in Joshua's story until he grew old and understood that he was ready to embrace his story after he was dead. This

way, information one may not want to share during a lifetime is not deleted or forged. Perhaps back-ups would also be possible to make (these, however, are outside this chapter's scope.) Moreover, the person accessing the story elicits this information, which may cause the resurfacing of information that may otherwise never resurface and be heard in different circumstances. This way, data is deleted yet is not at the same time. As a result, the Tiled Stove works more similarly to our brains, storing information we do not always have access to. The only possible reason why Paula was mentioned in Joshua's story without having a Tile on the Tiled Stove is that Paula's Tile had been on Joshua's Tiled Stove before, connected to his Tile; and her data is therefore still in the family data centre. This dynamic resembles the notion I introduced in the Transformation World, Chapter 4, the new kind of ephemeral. Here, the data is stored forever in the Tiled Stove, but it is impossible to access them. Perhaps if Paula would add her Tile to Joshua's Stove again, we could hear stories about her on other Tiles connected to the Stove as well.

The question now is whether Joshua's data is on Paula's Tile Stove. Perhaps some information will be transferred from one data centre to another through relocated Tiles, and we will not start completely afresh. It may be that it is one's personal choice to begin without previous data, to create an entirely new Tile for oneself when relocating to a new Tiled Stove, or to take the Tile from the previous Tiled Stove with data connected to its owner. Nonetheless, data cannot be removed once stored in the data centre. In this case, both Joshua and Paula could have started with a new data centre separately, dragging along some information from their past that is implemented into their new families' data centres. This would make sense; we all start somewhere, and just like (for example) Thomas or Cora, who are still kids in their stories embedded into this artefact, they will move out from the house one day (Appendix E, link). They will be able to transfer all the information that was connected to them, and therefore their connections with family members. However, it is important to note that some people want to cut themselves from their families and do not want to remember their family members. In ancient Rome, *damnatio memoriae*, or condemnation of memory, was a similar phenomenon that was seen as a punishment (Fisher, 2016). It was a practice in which a convict was erased from the memory of posterity by destroying all information about them. In the Tiled Stove, this would not be possible on the Family level; data always stays, but the access could be demolished by destroying a Tile. Still, data about others can be accessed through other Tiles that were a part of the Tiled Stove at the same time as the destroyed Tile.

On the individual level, though, this leads to a question of whether one has only these three routes when removing their Tile from the original Tiled Stove: first, taking their Tile from the already existing Tiled Stove to a new one, creating a new access point but at the expense of the previous one, so that the previous Tiled Stove does not have

access to this data anymore; second, leaving the Tile in the original Tiled Stove and creating a new one, without access to previous data; and third, destroying the Tile in the its original place, creating a new Tile or perhaps even becoming Tile-less. Would there be another option that assumes the possibility of duplicating Tiles and creating access to one's data on multiple Stoves?

As the third option suggests, becoming Tileless could be a favourable option for many reasons. Politically, if someone is against the idea; economic, or social status if one does not have a family, for example. One of them could be the personal desire to disappear. Not being able to access one's data would be one of the steps towards achieving that. In the contemporary world, there are examples of such behaviour. For instance, Jouhatsu is a phenomenon which corresponds to people who vanish from their lives, leaving no trace after them. These people are self-proclaimed "lone wolves" (Hong, 2020) as they decide to lose everything to gain their independence. They are real data bankrupts without a trace. Jouhatsu is seen as rediscovering your freedom, but it is also a case of abandoning families, your responsibilities, and your promises to others. Thus, rather than individual forgetting, it is one's decision to be forgotten by society. While society is able to forget and does understand that making mistakes is a path to growth, some things cannot be forgotten; this is when an individual decides to become a lone wolf. However, they will never be entirely lone wolves, as the life that they abandoned did not disappear; others still live the life in which the vanished person is present. Similarly, in the Tiled Stove, they would not disappear completely. Their data will be in the Stove, and thus, they will be accessible from other Tiles. Can you evaporate by taking the Tile away? Almost, but not exactly. In opposition to the *damnatio memoriae* case, data would still be in the computer, but there would be no other interface to enable the retrieval of data.

Furthermore, one can ask if there is a possibility that some families, or households in this case, will decide to join their data centres. Such connections would allow for the mixing of data with more people. Therefore, it would allow for more elaborate stories about one's relationships, including people having their Tiles from multiple Tiled Stoves. On the one hand, this would create privacy issues, as there would be a connection between the Tiled Stove and a network that could be attacked, such as the Internet. Moreover, the Tile owner on the Tiled Stoves would have fewer chances to interact and hear about themselves in the second Tiled Stove (which may resemble present family dynamics) since you have to be in place. On the other hand, it would work as a disincentive to create massive Tiled Stoves and, therefore, bigger houses. This could develop foundations for coming back to the Continued Growth scenario, in which the more resources one has, the better. Alternatively, it may work as an incentive to live in bigger houses, but with many families or many generations, so the Tiled Stove could grow. This would be especially likely if copying data from one

Stove to the other would not be possible.

Returning to our story example, note that Paula May was mentioned in no other Tile. This is because Joshua's and Paula's Tiles were the only two among other family members on the Tiled Stove simultaneously. Uma, for example, did not have a relationship with Paula that the Tiled Stove could tell. This does not mean that the data centre would not have information about the relationship between Uma and Paula; it would just not be told by the paint on the Stove, and thus, there would be no interface available with which to access it.

6.4.3 Data Acquisition, Lifelogging and Collective Memory

In this speculative world, one must trust the environment and trust data. Right now, in our present day world, we are the ones who set up data acquisition, i.e., if you want a specific tracking device like a smart watch, you purchase it, you set it up and have access to data. However, in this speculative world, it is prevalent that devices will track everything about us one day, and thus, our agency in gathering data may be limited.

Nonetheless, the Tiled Stove would be an alternative example of lifelogging (brought closer in this thesis's Introduction). However, lifelogging usually focuses on individual lives and tracking one's health rather than collective memory. Researchers from Lancaster University took another approach by including multiple participants in the life-logging activities. RECALL Technology was an EU-funded research project whose goal was to understand the impact of capturing, reviewing, and selecting memory cues of previous experiences on human memory recollection. In the series of experiments, researchers evaluated memory augmentation technology from many different perspectives, including workplace application, everyday usage, and privacy and security implications (e.g. Bahrainian and Crestani, 2017; Bexheti et al., 2016; Le et al., 2016). Pervasive computing (or ubiquitous computing) is an idea that everyday devices will have (or already have) computation, storage and networking embedded inside of them. One of the applications of objects that can capture data from our daily lives is to aid one's memory of things that happened in the past.

In the Grasmere House (Clinch et al., 2016) experiment, participants stayed in a rented house, where all public spaces were video and audio-taped by IPTV cameras, which collected proximity data from mobile phones as well. Moreover, participants wore lifelogging cameras that took photos and captured GPS data every 30 seconds. Some privacy issues arose during the experiment; for example, although participants were reminded to remove their lifelogging device when entering personal space and

appropriate signs were in place, many of them still failed to do so. As the authors noted, long-term life loggers confirmed the existence of this problem and stated that it had not disappeared with time. Ironically, the enhancing memory technology did not take the forgetfulness of humans into account and seemed to "forget" it. In the case of the Tiled Stove, such privacy issues would not exist. First, in this future scenario, people accept that data is collected about them all the time due to the affordances that infinite data storage provides. The Tiled Stove actually brings back the privacy to families since their data is no longer shared nor captured by other companies. Moreover, human forgetfulness is taken care of by algorithm protection. People do not need to check or remember what they have in their Tile, nor what they made accessible. As mentioned before, the Tile has access to data collected throughout a person's whole life anyway, so here, the problem of questioning oneself about what could be there disappears.

Furthermore, the algorithm becomes a guardian of this information and chooses what is appropriate to share based on the person accessing the story. One may ask whether it is exactly the same trap that people tried to mitigate in the first place: overreliance on technology and blind trust first in big companies – now - in the algorithm at our house. Is this only relocating the problem from the outside world to our homes? The difference between the present-day status quo and the Tiled Stove is the scale on which data is used, for whom, and for what purpose. In the Tiled Stove, one's data is not combined with that of millions of others to create predictions about human behaviour for marketing or political purposes. Data used for the stories is not distorted in any way; they are meant to be subjective. Thus, how one sees the relationship with another person may be different for that second person, and that is not a bug but a feature of this artefact. The Tiled Stove does not create a new meaning or predict how relationships will evolve; they are solely a representation of one's past that is connected to the current emotional state of the owner of the Tile. The meaning of the relationship is already there. The Tiled Stove only verbalises them. This aligns with Amoore's (2020) statement about algorithms being filled with *"values, thresholds, assumptions, probability weightings, and bias"* (p. 8), creating meaningful algorithms, whose conditionals and patterns are fuelled by the subjective strengths and weaknesses of human subjectivity. In this case, the algorithm's goal - storytelling rather than prediction - makes it meaningful. Moreover, this artefact reminds us that algorithms themselves do not have the agency or willpower to harm us. They are solely tools that we can use for different needs, ethically. Nonetheless, while they are not intelligent by themselves, they are a product of intelligence. Thus, while the algorithm as an idea is solely a tool, the actual algorithms are as value-laden and ethically-fraught as the human minds that wrote them. Another problem that researchers encountered was the battery life. They propose providing different charging solutions so one can use the device without time restrictions. The energy from heating could be used to do so

within the Tiled Stove future scenario. However, in general, the topic of electricity for the devices is out of the scope of this chapter. Thirdly, they found that studies with many lifeloggers sharing the same experience are highly beneficial because they enable richer data capture. This is the underlying idea of the Tiled Stove artefact. Lifelogging and collective memory could show a different dynamic between data and memory than what we tend to think when lifelogging comes to our mind. For example, the number of details recorded is unimportant in the Tiled Stove artefact. The type of memory and what it brings show another shift in the cultural perception of memory, focused on the story and connection rather than a number and statistics.

Notably, RECALL Technology researchers from Lancaster University expected that names and a number of images of a given person would be provided to the system; they assumed that its users would tag every person they met. Here, privacy concerns arise; while it is possible to tag each person with their name, we should consider who would have access to such a database. Moreover, many systems are connected to the Facebook database, so it may be a problem that the Facebook algorithm would be used, giving Facebook even more data on individuals without their consent. Furthermore, the RECALL system recorded conversations, which were later transcribed, and topics were generated based on those transcriptions. The system also collected GPS coordinates. Connecting all of these should be considered as highly concerning with regard to privacy. While people outside of the experiment, who talked to the participants knew they were being recorded, it is hard to predict how such a function would look in real life. This is where Tiles artefact shines: such privacy concerns are kept at bay. The data of visitors are not recorded and, therefore, are not accessible in the Tiled Stove (unless the visitor in question had their Tile connected to the Tiled Stove). For the Tiled Stove to collect data about a person, the Tile of that person must be attached to the Stove, and to store information about the person, the Tile has to be connected to the Stove at least once. The privacy of those who did not consent explicitly to their data being collected is not jeopardised.

Data acquisition, as a part of its curation, will become different. The set-up of lifelogging right now is to understand what needs to be collected rather than what must be omitted. With the Tiled Stove, it is instead a problem of what we do not want to collect rather than what we should do to collect as much as we can and then make sense of it. The sense-making will be a part of data acquisition. It is creating the Tile, adding it to the Tile Stove, and making a conscious decision about including someone in the Tiled Stove data storage rather than acquiring (any) data "just in case". It will work both ways; data will become more personal due to such treatment. Data will no longer be "just" data; it will be connected to a person. Therefore, data centres will support collective memory instead of the Cloud computing world we live in right now. This will be discussed in the next section.

6.5 Collective Memory

In this section, I would like to focus on how this device, the Tiled Stove, affects a particular dimension of the household, its collective memory.

6.5.1 Communicative vs Collective Memory

The Tiled Stove is an artefact that shares stories connected to family members. These stories are meant to be heard daily and create a narrative that connect families and create a storytelling piece to identify the household as a family. According to Amy Warburg, such stories embedded into Tiles can be seen as "islands of time", which Assmann and Czaplicka (1995) called "retrospective contemplativeness" (p. 129). Objects such as Tiles with artwork connected to family members and the stories embedded in them, create a collective experience that is elicited each time the Tile is touched. With this artefact, each person using the Stove hears a different story about the person whose Tile they have activated. Thus, this "retrospective contemplativeness" can be an intimate experience for the listener. It can manifest on the group level if multiple people are listening to the story. It can become a ritual of remembering, which is worth becoming a memory itself.

Before we go further, I want to reintroduce the idea of the fixed point in cultural memory and its lack in communicative memory, discussed earlier in the Introduction of this thesis, Chapter 1. This term will be a key point in the discussion that follows. Assmann and Czaplicka (1995) differentiate between communicative and cultural memory using the idea of the fixed point (Figure 6.5). The fixed point corresponds to a fixed point on a putative timeline. Cultural memory is characterised by these locked points on a given timeline, which communicative memory lacks. The temporal frame that is of interest in communicative memory is flexible on the timeline, as it always shifts toward the "end", i.e. toward the present. This is because communicative memory exists only as long as the last member of a group of people - usually a kinship group spanning over a few generations - continues to be alive. This means that in 1800, the communicative memory of a hypothetical group of people could have theoretically encompassed a temporal range of years between ∼1700-1800, but in 2100, it would cover ∼2000-2100. These shifts do not happen in cultural memory. While Assmann and Czaplicka do not state this explicitly, the fixed points in cultural memory are welded into the timeline because they represent specific significant moments, stories, events, catastrophes, and celebrations that act like anchors in the ocean of time. Even more important is that they live on, no matter the timeline. They are as present as the moment we live through and, therefore, like a beacon in the night, show us where the subjective truth about our history lies.

Continuing with the ocean metaphor, the timeline can be considered an ocean. The present time is like an island drifting along it, changing its position with every second. While communicative memory is like the wave that hits the shore of the island, even though the shore changes its location on the timeline, cultural memory emerges from events in time that are anchored and do not change their position, no matter how the sea changes. Located in the present, we do not need to see beyond the horizon into the past to know or suspect that the anchors are there. We do not know it empirically, and this evidences what I have called above the subjective truth of our history; we know it because those before us collectively agreed on the meaningfulness of the event and established or anchored it there. As a result, and consequent to the continuing culture of commemoration diligently carried out by subsequent generations, the knowledge about them has survived, brought to us by the waves of cultural memory on the timeline ocean. This characteristic explains how cultural memory achieves the temporal transcendence of a notional fixed point on a timeline.

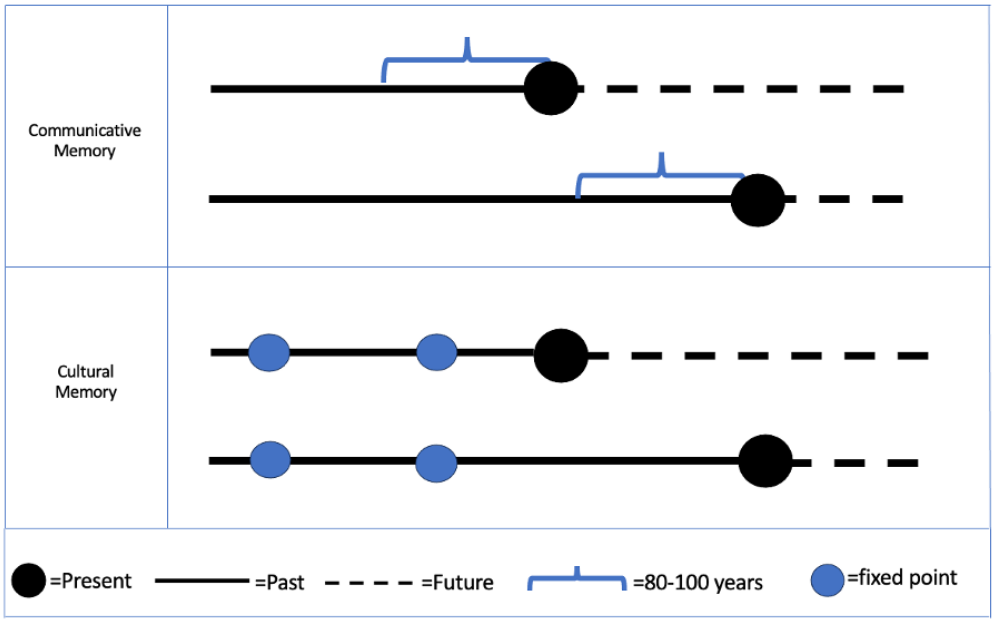


Figure 6.5: Fixed points on a cultural memory timeline do not change their position on the timeline, while communicative memory timespans do in relation to the present. According to Assmann and Czaplicka, this is a crucial distinction that separates communicative from cultural memory. Source: Author, after Assmann and Czaplicka, 1995.

Taking Assmann's and Czaplicka's definitions of cultural and communicative memory, examined closer in the Introduction of this thesis (Chapter 1), one may think that due to the importance of the fixed point in cultural memory, the Tiled Stove must

sit on the spectrum of communicative memory, and it is not cultural memory. For example, the Tiles update every second and are used on a daily basis. Moreover, the Tiles continue to update every second of our lives, with data gathered through every device located in the house, which feeds the stories embedded in the Tiles. Thus, temporal transcendence and ongoing fluctuations are in their nature, just like in communicative memory. Another person could reply that this is true; they are the product of communicative memory, but not solely. One could come to the conclusion that the Tiled Stove encompasses both of these types of memories - both cultural and communicative. Based on the importance of the fixed point in the definition of cultural memory, the Tiled Stove artefact could be seen as firstly an example of communicative memory and then as *becoming* a cultural memory after the Tile owner's death. With someone's death, the argument continues, the limited time horizon of the ever-updating Tile becomes fixed. Then, we could think of the Tile as their monument, or in Nora's terms, their "lieu de memoire" ("site of memory"). Or, as Young (1994) would notice, such a physical space and the Tile as an object could counteract "the missing gravestone syndrome" as they would work as a symbolic tombstone, a memorial space for ceremonial catharsis, that could help with the process of bereavement, especially if the owner of the Tile is missing. The Tile stops updating; it is attached to the last moment of the Tile's owner's life on their timeline. Of course, other Tiles can still update and change their relationship towards the dead owner, but the dead owner's Tile remains fixed, fulfilling Assmann's and Czaplicka's concept of cultural memory. The Tile gets its last update, its last attempt to understand the owner's relationships. However, the Tile does not "die" with the owner. It continues to work by assessing which information is appropriate to be shown to whom, rather like the generations who continue to curate and commemorate significant cultural memories long after the fixed point of their event. Thus, while the Tiles are a testament to a person's ever-changing life, by ongoing curation of their content, even after death, they become something different. They become anchored at a fixed point in time, which cannot ever change, despite the ongoing commemoration and curation undertaken by the Tile. Therefore, Tiles could demonstrate a powerful shift from communicative memory to cultural memory. After all, cultural memory cannot exist without communicative memory; we do not live in a vacuum. To create cultural memory, we need individual memory and vice versa. Thus, one can argue that the Tiled Stove artefact is an example of this shift from communicative memory to cultural memory, a metaphor for the legacy that we work on our whole lives. This shift from communicative to cultural memory is a tempting idea to explain how the Tiled Stove works as a collective memory piece. However, this whole explanation is based on the importance of the temporal horizon. I argue that there is a more important characteristic of cultural memory, which Assmann and Czaplicka laid out, than the temporal horizon: this being the purpose behind its creation. If we focus on purpose

and intention, then this transition from the communicative to the cultural is not true for the Tiled Stove artefact. Their primary purpose is aligned with cultural memory, rather than communicative memory. In the speculative world I have designed, the Tiles' purpose is to commemorate the lives and relationships of the family through the piece. Furthermore, the complex acts of decoration and aesthetic design involved in making a Tile can be considered an applied art. At their core though, the Tiles function as leverage for individual identity-forming and for the relationship between individuals. Thus, the idea of communicative to cultural memory cannot be right in this case. The Tiled Stove exemplifies how collective memory can be fluid in time. The anchor points that Assmann and Czaplicka stress as a defining characteristic of cultural memory are not necessary in the Tiled Stove artefact - in fact the Tiled Stove stories keep changing. They become redundant as the other characteristic - the purpose of cultural memory - shines through and establishes the Tiled Stove as a cultural memory artefact. Moreover, the Tiled Stove artefact continues to be used and remains relevant, not only in commemoration but as something that establishes itself as a collective memory piece in the ongoing life of the family through its usage as a stove.

The Tiles show that the crucial distinction in collective memory is not "how" the collective memory functions as being either cultural or communicative in Assmann's and Czaplicka's terms, but "why" it does. The temporal horizon distinction, so the fixed or no fixed point, as the examples of the Tiles show, is not the crucial distinction between cultural and communicative memory. The Tiled Stove artefact embeds the characteristic of the communicative memory, by which I mean that they communicate information, times, dates, and places about individuals' lives to other people, and the kinship group who have access to this is limited, meaning the stove artefacts' importance and longevity lasts only as long as the kinship group. In this way, the Tiled Stove resembles communicative memory, as it is alive through people's existing practices and language. However, the Tiled Stove exists even after people's death. To destroy all data once stored in the Tiled Stove, one would have to destroy the Tiled Stove itself, along with all the Tiles in the world that were ever connected to the Tiled Stove. Nevertheless, its purpose is steeped in the core values of cultural memory, such as identity-forming, relationship organisation, and the cultivation and reconstruction of the memories, in this case, of family ties.

6.5.2 Memory vs History

While in this piece, I have argued how the Tiled Stove is an example of cultural memory and not communicative memory, I did not differentiate between memory in the broader sense, and history. One argument is already laid out; since it is a cultural memory piece, it is therefore, also a memory piece, which means that it is not a

historical piece. This argument stems from Halbwachs's (2007) comment on memory and history being two polarised areas:

> *The 'acceleration of history', then, confronts us with the brutal realisation of the difference between real memory – social and unviolated, exemplified in but also retained as the secret of so-called primitive or archaic societies – and history, which is how our hopelessly forgetful modern societies, propelled by change, organise the past. (. . .) The gulf between the two has deepened in modern times with the growing belief in a right, a capacity, and even a duty to change. Today the distance has been stretched to its convulsive manner"* (p. 145).

However, a more precise argument could be this: the Tiles cannot be a historical piece because they lack objectivity. Their data is in nature subjective, as it is about human feelings and emotions rather than only dates and happenings. Moreover, based on Nora's (2007) understanding of the differences between history and memory (Table 1.1, in Chapter 1: Introduction), the Tiled Stove is, in fact, focused on the present rather than the past. Its ongoing updates and the way one would interact with it - each time hearing different stories - are a reflection of its focus on the present. This is a lived-through collective memory artefact that is used on a daily basis as mundane heating equipment and a commemoration piece. The Tiles also work as commemoration art pieces, which means that they engage in remembrance. Landmarks are scattered over our cities and towns, some made on purpose such as statues, and some emerging into existence more organically. For example in 2023, the Paris City Hall approved the demolition of the building Pavillon des Sources, in which Maria Skłodowska-Curie worked (even the trees that Skłodowska's-Curie planted herself), the discussion about which extended to January of 2024. Skłodowska's-Curie's great-grandson Marc Joliot, and other fellow scientists supported the demolition. Why? For two reasons: first, scientists hoped for the new Centre for Biological Chemistry on cancer. Second, the building is an excellent place on the map of Paris, although it is unusable. After all, Nobel-prize-winning Maria Skłodowska-Curie's pioneer work was on radiation. Thus, the building of her laboratory is inaccessible due to its radioactive emissions. Of course, many people were outraged by the idea and, needless to say, the demolition was suspended at the 11th hour (Noce, 2024). The Tiled Stove becomes a commemoration piece because of the action and engagement it facilitates, as well as what it represents - similar to Pavillon des Sources.

6.6 Summary

The Tiled Stove Speculative Artefact emerged from the intertwined values of energy, privacy and geopolitics, which further led to community building. All these values developed as a reaction, a rebellion against technological data capitalism. The world in which the Tiled Stove is contextualized - the Discipline Society future - focuses on reevaluating core values that in this case, people would use as their beacon in building their new relationship with data. Frustrated and deceived by the unfitting metaphor of the cloud, presumably a free, ephemeral phenomenon, they would seek new solutions that would empower their relationship with new data or at least take away the power from big corporations. Data centres are not free in any meaning. They cost money and are the property of other entities; therefore, their data becomes others' property, and they take up space, impacting everything - and everyone - around them.

Moreover, data centers are energy-intensive buildings. Thus, people would create their own data centres at home that would protect their privacy by not being connected to outside networks, using the energy it produces to heat their homes. Furthermore, the Tiled Stove's tangible properties mean it is set in the physical space and exemplify how Real Space interaction abounds with digital space; therefore, screens will not be the only interface for Digital Space.

The Tiled Stove offers a new outlook on lifelogging devices. It is not a lifelogging device dedicated to one individual but serves as an example of a digital collective memory piece. This shows the possible change in the way we think about data curation. While the family becomes an entity that curates data, this is an algorithm that guards an individual's privacy. Lastly, it demonstrates the critical characteristic of collective memory. While Assmann and Czaplicka (1995) focused on fixed points as a central characteristic of cultural memory - so how the collective memory functions - the Tiled Stove focuses on the cause of collective memory. The Tiled Stove's core functions (except the mundane heating device) are cultivating family ties through recognising relationships between family members, telling stories about them, identity-forming and being a commemoration space for the whole family. The Tiled Stove is a lived-through collective memory artefact.

In the next section, I will discuss how participants of the Pilot Workshop evaluated the Tiled Stove and their reflections on its usage.

6.7 PILOT Workshop

In the Disciplined Society Scenario, participants could play a video of how one uses the Tiled Stove, play stories inscribed into each Tile and read a snippet.

Participants expressed mixed opinions about the Tiled Stove. P1 believed that it would ruin relationships, because people do not want to face facts about themselves and their relationships, as *"solid facts ruin fairy tales"*. This suggests that we are disconnected from each other, creating stories only in our heads, unable to create stories together. Indeed, sometimes people in one room could not be further away from each other. People may come into the space, hearing facts and getting into bigger conflicts. If one denies the truthfulness of the event that the Tiled Stove presents, the denier may genuinely believe that they have been lied to. If the Tiled Stove presents simply facts, people may interpret them differently. Therefore, even though these are objective facts, everyone may subjectively interpret them. Such a scenario would not lead to an immediate conflict, but it reinforces the idea that humans are never truly connected and we may never really know what other people think (Nagel, 1974). Nonetheless, the Tiled Stove does not have its purpose in confronting people with the truth (which, of course, may happen). Its goal is to echo family dynamics, similarly to how we would see photographs on the wall (or the lack of them) that would suggest family connotations. The Tiled Stove provides a deeper story for the families themselves than just family portraits created for the outsiders' eyes as well (or for outsiders' eyes only, which also tells a family story to their members).

P1 objected to touching Tiles in fear of conflict, as expectations may not be the same across all the household members. This means that users may feel uneasy using the Tiled Stove depending on several factors: their family dynamic, their personal beliefs towards themselves and general fear of using technology in such personal circumstances. Indeed, the Tiled Stove is both personal and, at the same time, is a technology that can be used with other people, which can put a person in a place of vulnerability. The algorithm is there to not reveal too much to certain people. This, however, has a potential indication to showcase what kind of relationship people may have with each other. For example, you may think you are closer to Melanie than she believes you are. This would lead the Tiled Stove to tell only vague information about her life. On the one hand, it is all you know about her, so it may feel normal to hear this amount of information. But what if there is much more to Melanie? What if she is hiding something that you would not hide? Such mistrust towards not really the person, the algorithm, or even the contents of the message, but rather what its lack of it, can impact the relationship. At the same time, P5 noted that the Tiled Stove could be used for rethinking relationships. They also pointed out that it may be beneficial that the Stove is able to *"know all the truth"* because *"a person would have*

no perspective to behave wrongly in secrecy". Other participants commented on the Tiled Stove on a more positive note. For example, P2 enjoyed the idea of generating heat and getting to hear some family stories. Participants believed that it could be used during family gatherings, but also when one would feel lonely, or perhaps a family ritual could be built around the Tiled Stove.

Participants raised some questions regarding how the Tiled Stove would work, bringing up a general topic of the duality between the "brain" and "environment". For example, P1 was interested in the exact information that would be inscribed inside Tiles, i.e. would they be a form of the memory that we create in our brains and whether our brains would accept "real memories" (i.e. facts) from the Tiled Stove or would they transform in some way in our brains. While the Tiled Stove assumes that "everything" can be collected as data and transcribed into a meaningful story, the exploration of that topic with participants in the future iterations of the workshop would be of great benefit for future technological inventions. For example, one can imagine what kind of information could be gathered from the different data, for example, a person is using their favourite blanket three days in a row while not speaking to one of the family members, etc. Of course, that could create stories based on false assumptions, but the imaginative part could reveal how and why we would want an algorithm to develop stories about us. Similarly, P5 mentioned that *"a story is a version of a fact"*. P4 believed the Tiled Stove would require a lot of trust.

Participants were drawn to the fact that the Tiled Stove could be a centre of family life. As P5 commented: *"Memory and identity are social - they exist in a context of people we interact with"*. Nonetheless, as mentioned earlier, some would not like to use it; reasons included general technological scepticism but also general idea that it is impossible to create stories that would be identical for all of their users, as everyone looks differently at the world and because people are not "consistent", meaning that they themselves would be unable to emotionally perceive what the Tiled Stove is telling them. As people change and they perceive the world differently, they would not be able to synchronise with Tiles' stories. This leads to the conclusion that participants viewed Tiled Stove's stories as truthful and, therefore, incapable of being accepted by humans on the individual level. At the same time, they were also unacceptable on the collective level, as everyone has a different story, and we all differ too dramatically to be able to accept one story among the family members. As mentioned before, the future workshop would benefit from exploring how data could contribute to stories that the Tiled Stove would tell. Moreover, exploring the idea of how memories that do not necessarily reside solely in our brain, but also in our bodies, which future technology could give us an insight into. On top of that, exploring how this data from different sources could create stories with an algorithm that would be more transparent, where users would have more agency over it, would

be of benefit as well. Participants did not mention the need to oversee the creation of stories, or co-creation with other members using the Tiled Stove, but this could be a lens through which the reluctance to hear stories with other family members could be explored.

Chapter 7

Discussion and Conclusion

7.1 Discussion

Through the Speculative Artefacts in my thesis, I explored and highlighted different aspects of memory that have not been reflected upon, or have been completely abandoned or neglected, in the design of memory technology. In this chapter, I summarise my findings and explore the themes, or metaphors of memory, that my Speculative Artefacts generated: 1. "Memorying", 2. the Sense of Self, 3. Time and Space, and 4. Values. Additionally, I will present participants' final reflections on the Pilot Workshop, Speculative Designs and the future of memory devices. I will not summarise my artefacts and chapters as singular examples of themes that could appear in future scenarios of infinite data storage futures. I have already done that, presenting my work as chapters corresponding to each Manoa School Method future, its specific contexts and artefacts. Instead, I will summarise my thesis as a whole through the lens of the last subcategory of themes: Values. I created the other three subcategories using the Annotated Portfolio Method (Gaver and Bowers, 2012; Figure 7.1). The Annotated Portfolio Method generates themes based on the collection of artefacts that are curated - as in this thesis - based on the general topic; in the case of my thesis, it is focused on the breadth of challenges that we will face concerning our human-computer memory interaction in a future scenario of infinite data storage. More specifically, I have focused on the themes related to memory. In their research article about Annotated Portfolios, Gaver and Bower (2012) highlighted that an artefact can generate multiple themes. Nonetheless, the goal of the Annotated Portfolio is to create themes based on the specific challenge, which in the case of this thesis is the transformation of our relationship with memory in a future scenario of infinite data storage. Thus, subjects of economy, human rights, gender inequality, sustainability, and other pressing issues in these worlds are omitted. Not because

they are unimportant; I omit them because they are outside the scope of this thesis.

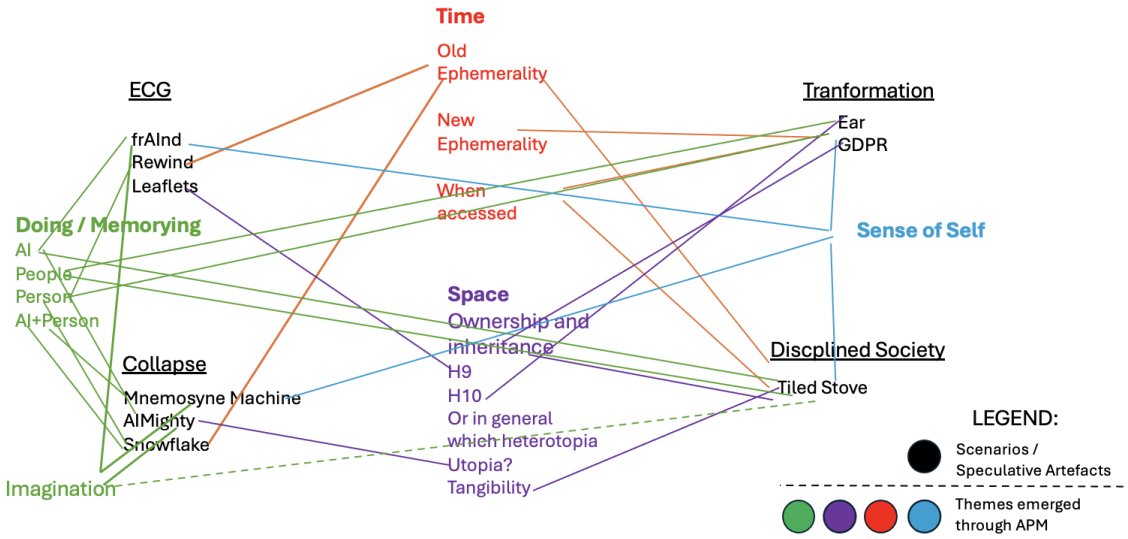


Figure 7.1: The process of creating themes through the Annotated Portfolio Method. Source: Author, after Gaver and Bowers, 2012.

Annotated portfolio is a collection of designs re-presented in an appropriate medium along with textual annotation. Annotated portfolios are intermediate knowledge creation by designers, providing "valuable abstractions" (Löwgren, 2013). This position to provide these abstractions, creating new frames of understanding their design is a prevailed position of the designer. I chose to use this position in the presentation of my Speculative Artefacts using solely text to create an Annotated Portfolio. Annotation is an abstract construct (Löwgren, 2013), created by a designer. Since the focus is on the knowledge creation, rather than "portfolio" itself, i.e. presenting the artefacts in a catalogue way, I took the liberty to create the Annotated Portfolio in a way that made sense to me. Instead of pictures that create a visual clutter to me, I used - what one could call an abstract representation of my artefacts - their names and titles. The construct of the Annotated portfolio resides in between space of particular artefact and general theory (Gaver and Bowers, 2012; Löwgren, 2013). Moreover, researchers have proposed different techniques to create Annotated Portfolios (e.g. Culén, Børsting, and Gaver, 2020). For example, one can create map of concerns, or presenting them in the chronological order of their creation (Culén, Børsting, and Gaver, 2020). I, on the other hand, decided to present the map of thoughts, that helped pinpoint the memory themes, which emerge through combination of all Speculative Artefacts. After all, my Speculative Artefacts are a product of Research through Design. Therefore, their main quality resides not in the

design concept and tactile characteristics but in the metaphors and knowledge they provide.

As mentioned earlier, Speculative Design generates questions rather than responds to them. Along with exploring themes I identified, I present the questions my artefacts produced. However, I will briefly discuss whether speculative artefacts truly do not answer questions, only generate them, since I believe they do both. I do agree with the sentiment that the Speculative Design should not be considered a definitive answer or even one of the answers that should be taken and deployed in the world and, for example, sold. However, one can see it as an answer because it responds to the questions it generates. My Speculative Artefacts showcase how one can answer these questions. Once answers are known, one can think about the questions that lead to the answer, similar to the American game show *Jeopardy!*. So, creating these questions is both the motivation of the design and the aftermath of its possible deployment. In other words, some questions are connected to the potential cause of why such technology could come to life, and some are connected to the effect that such technology might create.

The questions I present throughout this discussion are meant to work as scaffolding for future designers of memory technology, constituting a tool to reflect on the design process throughout and the designers' goals vis-à-vis memory.

7.1.1 Context

Before I lay down my four themes, I would like to present some questions that apply in any context of design, not only in relation to my four themes. This means that these questions apply across themes and are related to the contextual circumstances of the data creation rather than to the specific thematic subject I present (Figure 7.2). By this, I do not mean the context of each of the four future "worlds" covered by Dator's Manoa School Method. The context, in this case, refers to the two overarching subject matters I have already described in this thesis: Dourish's notion of contextuality and embodied cognition theory. I will recapitulate these ideas in the following paragraph.

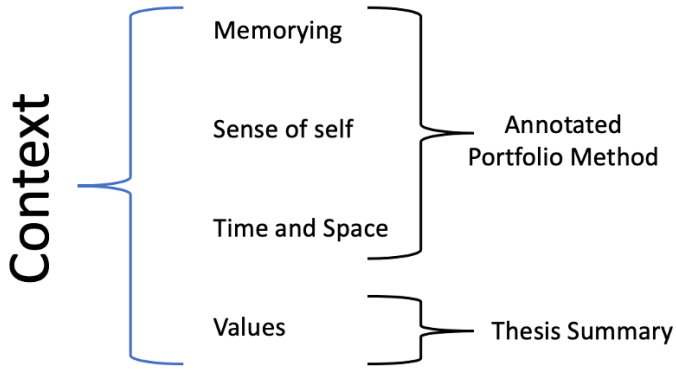


Figure 7.2: The visual explanation of how Context (left) relates to all themes (centre) and methods (right) used to generate them. Source: Author.

As Dourish (2018) proposed, context is not merely a description of fixed settings; context arises dynamically from action, as it is "something that people do" (p. 22). Interactions between memory devices and users are subject to change; therefore, the context will also keep changing. Thus, designers will need to consider the dynamic nature of context in designs for human memory. I have already argued that embodied cognition can be a helpful lens for studying context. In the Methods Chapter, 2, I presented the concept of embodied cognition in order to describe how knowledge is produced through the process of creating an artefact and interacting with it. Embodied cognition theory contends that cognition is shaped by and relies on the body of the organism. In this context, I propose using embodied cognition theory to provide insight into the user's actions and their experiences of using the designed artefact. Our mental actions are not created in a vacuum; they result from the multiple processes that our bodies undertake. Embodied cognition establishes a connection between human action, the users' experience and the context. Context is fluid, as Dourish noted, but since it emerges from people's actions, it is connected to the way people experience their interactions with the environment. In this case, the environment I am alluding to a human's interactions with memory devices, how and where those interactions take place. This leads me to the following questions that relate to the importance of context:

Q: Where do memories reside?
Q: Where does data reside?

Q: Where does one need to be to access data?
Q: Where does one need to be to create data?
Q: Is the creation of data done on purpose or is it the aftermath of another activity?
Q: What does one need to do to access data?
Q: What are the properties of the digital device?
Q: Is the memory device connected to the Internet?
Q: Is data accessible through the Internet?

Moreover, all the questions presented throughout this discussion should be followed up by the questions *"why?" and "how?"*. I will now move on to discuss the specific themes generated by my Speculative Artefacts.

7.1.2 Memorying

One of the key concepts that connects all my artefacts is associated with who is doing the act of *memorying*. I call it *memorying* because I refer to different acts related to human memory, done both consciously and unconsciously. In the literature, there is an instance of usage of the derivative of the word "memorying". Alison Waller (2017) used the term "re-memorying" in the context of adults' memory of children's books they read when they were little. Waller argues that the experience of the book does not finish with the encounter, the moment of the child's act of reading the book, but it lasts a lifetime. For Waller, re-memorying is a process of experiencing books beyond the cognitive and physical process of reading them. Thus, reading children's books is not located in the past but can accompany grown-ups throughout their lives. I adapt the word "memorying" but use it as a verb, which encompasses all other verbs that could be connected to memory, depending on the context of the memorying act. My definition does not stand in opposition to Waller's. Waller considers a specific case of memory usage that, similarly to my definition of "memorying", does not solely equate to an attempt to access a memory, a dry fact of something that has happened. Re-memorying assumes a human's ability to reconstruct, reshape and relive the memories, showcasing the fluidity and malleability of human memory I have been alluding to throughout my thesis. However, by using the word "memorying", I try to draw attention to the complexity of the definition of memory, which I described in the Introduction of this thesis (Chapter 1). I do not offer a finite list of memorying activities; I only offer examples, as they are context-specific.

I do not call it memorising (learning something by heart and committing it to memory) because it is only a part of what human memory can do. Therefore, I refer, for example, to remembering, forgetting, meaning-making, sharing, recalling, imagining, and every other single act related to memory. They all would be included

in my definition of memorying. These further can be connected to different acts and interactions with computer memory, again done consciously and unconsciously, but also done by technology. For example, the memorying would also refer to creating data, the act of placing or transferring data, the act of storing, the act of deleting, the act of creating a story, the act of sharing, the act of retrieving, the act of recalling, the act of using, the act of having, the act of touching, the act of speaking, the act of delivering, the act of protecting, and beyond. They would be all memorying as long as they are performed in the context of human memory, so again, remembering, forgetting, imagining, sense-making, etc.

One can argue that other tasks do not have so many different "acts" in their definitions that, on top of that, could be changed depending on the circumstances. I disagree. Let's look at the example of cooking. If cooking could be done in only one specific way for a given set of ingredients, we would all eat the same dish all over the world, every day, every time we have a meal. Instead, we can use different recipes, which, step by step, tell us what to do. Some steps may be similar to other recipes, but the outcomes could differ. Some steps may seem different, but the result may be similar. Nonetheless, cooking is not one, but rather a system of actions that always (or at least hopefully) leads to the outcome of a prepared meal. And, of course, there is a problem of setting boundaries for the recipe that would constitute cooking. While chopping onions could easily be included in one of the steps in the recipe, would going to the grocery store for the aforementioned onions also be included? Similarly, designers need to recognise which acts of "memorying" need to be included in their designs and which will not.

Furthermore, in the behavioural sciences, the Chaining strategy breaks a task into individual steps. While it is usually used to teach individual steps so the task can be completed, the idea of Chaining, or breaking down which acts are needed for the specific goal, is necessary for the design of memory technology itself. I do not create a particular list of steps that could be included under the memorying umbrella because they can morph and change; the interaction between our memories and data could differ depending on the design goal. Therefore, each design would need tailored steps of memorying. It is up to the designer to recognise how and why they want to include specific dimensions and actions in the design, depending on their motivation and goal. This discussion leads me to my first questions related to "memorying" for designers:

Q: What are the steps of memorying in the design?
Q: Are these steps predicated on each other?
Q: What is the memorying goal, i.e. which step of memorying constitutes the desired outcome for the user(s)?

Before I go further, I would also like to address the elephant in the room: if both humans and technology can do memorying, does it mean that algorithms or AI can forget, remember, recall or imagine? Of course not. These are the attributes of the human memory. However, when I say that AI is responsible for the action or is "doing" the action, such as forgetting, remembering, meaning-making, or imagining, it is not about what precisely a piece of technology does, but what the effect is for the user. An example of this can be forgetting, which could be both deleting and storing information, which I will cover in the *Time and Space* subsection. As laid down in the Introduction of this thesis, the computer often works as the ontological metaphor of human memory (Lakoff and Johnson, 1980). For example, one may say that the computer *reminds* us about events or our memories. My intention is not to strengthen this metaphor but to use it. What I mean by "not strengthening" is not leaving the metaphor alone. Suppose one recognises that the device *reminds* them about an event. In that case, it is crucial to pinpoint what this device actually does (for example, displays a photo from pictures stored in a family folder) rather than only what it does to a person (reminds). Indeed, it is crucial for the final design and memory outcomes to recognise not only the parts of the memorying, but also to identify who is responsible for the delivery of the outcome at each different step of memorying. This leads me on to my next questions:

Q: Which actor is responsible for each act of memorying?
Q: What does each step mean for the user and for the device?
Q: Which steps are passive for the user, and which are active?

In my thesis, I have presented the different aspects and actors involved in memorying. In the Continued Economic Growth scenario, frAInd performs most of these actions for the person, i.e. recalling, storing, forgetting and even imagining. The user has very little agency over data, except for the choice between different frAInd tiers, if they have enough resources. Moreover, the leaflets suggest that, in this world, data is not for the data owners to memorying; indeed, the leaflets call for the surrender of their memories. Another artefact, the REWIND2, gives a little more agency to the user, linking forgetting with deleting data; with a click of a button, users can delete the ongoing situation from their data storage.

On the other hand, in the Transformation scenario, the Horcrux Ear gives a user agency over forgetting by creating data. Moreover, data retrieval is also done by the user; however, the Horcrux Ear protects data. If one creates data, i.e. records a secret through the Horcrux Ear, it is automatically protected, and a person who does not have an authorisation cannot access it for a specific period of time. It is not always a person who created the secret that would and could access the data; it may be a third person. In the case of the Horcrux Ear, privacy protection is an important factor

because a third party may be involved in accessing the data. Moreover, one needs a specific piece of technology, the Horcrux Lips, to encode the message. Similarly, in the case of the Tiled Stove, privacy is protected by the algorithm, so nobody can hear stories they are not supposed to hear. Furthermore, in this world, the act of retrieving, and therefore remembering, is not done by only one person, but many people could do it at the same time. Thus, the character of the interaction with a memory device changes since it is to facilitate interaction with both, one user and a group of people. This leads me to questions below:

Q: How many people can access the data related to memory?
Q: If more than one person can access the memory, can they do it at the same time?
Q: Are other people involved in the creation and/or access of the memory and data?
Q: If yes, are they needed in person?

Moreover, I contend that imagination is itself an act of memorying. Imagination is often an overlooked aspect of memory. It is also a frequently omitted function of our memory in the design of digital memory. After all, digital memory is unchangeable, as mentioned before, which we usually perceive as an advantage. However, this unchangeability should be seen as one possible function rather than one predetermined path. In my thesis, the examples of imagination can be seen in the Continued Economic Growth and Collapse Scenario. In the former one, it can be found in frAInd. One of the versions of KIDS' frAInd, Alakazam, can assess the most compatible partner and career for a child. Of course, this is not the kind of imagination we associate with human imagining, but rather the imagining associated with forecasting and decision making. Nonetheless, it is the type of imagining that is desired and expected from our technology nowadays. In my speculative future, I did not include this option for adults, so they could not change their whole lives. Not only would it be unfair to their partners and loved ones. it could also be dangerous to the status quo of the societal order. In relation to the latter example, we can see a failed instance of imagining by AIMighty, who is trying to implement a memory by sending a distorted photo of a person with their grandmother, among the artefacts of that world. I generated that photograph using DALL-E (see Figure 5.6). It is impossible for the photo to be authentic due to the timeframe. It is important to note that the "impossibility" of the timeframe is not, in fact, the single crucial factor in deeming the photo a believable memory. However, the impossibility is paired with the fact that AIMighty tried to convince the user that it was the actual photograph, which is evidence of a clear failure of imagination. In contrast, Mnemosyne Machine aims to support human imagination through different scenarios that one can read and contemplate.

In this thesis, I have discussed the affordances of different data storage objects and

created artefacts that could help with memorying. One of the ongoing themes that I explored of an aid or an additional actor that would do the memorying with us, or for us, was AI. We observe the rising prevalence of AI in our daily lives and its role in industries such as art (Daniele and Song, 2019) or healthcare (LaRosa and Danks, 2018). As discussed in the Chapter 1, Introduction, the value alignment problem (Peterson, 2019) studies the issue of increasing the autonomy of AI systems, which could lead to harmful behaviours for humans if we do not ensure that they act based on our values. With the growing techno-dependency (Harper et al., 2008b; Bainbridge, 1983), our trust in technology is becoming crucial. To successfully adopt AI-driven services, we need them to be trustworthy (Toreini et al., 2020). Actor-network theory (ANT) assumes that society is constantly being made and that all actors in this social network have an equally important role, although they are not equal in sense of power and control (Latour, 2005). ANT is built on social constructivism, which is based on the idea that people create meaning and knowledge out of their experiences rather than discover them. Meaning is never inherent, as it is a subjective, human construct. Thus, in a world of infinite data storage, if we use AI systems that help us with ensuring the balance between remembering and forgetting, supporting our imagination and the social connections we establish through memorying with our community, our interaction with this AI system will become one of the key components in the sense-making of our data and our memories.

However, AI models are often seen as black boxes, through which opaqueness makes people see AI as a threat rather than an aid, I depicted this scenario through the construction of in the artefacts AIMighty and frAInd. There are efforts to change that mind-set; for example, Explainable Artificial Intelligence (XAI) refers to the application of AI in such a way that humans can understand the results of its implementation (Gunning, 2017; Weitz et al., 2019). However, Weitz et al. (2019) claimed that Explainable AI research focuses more on machine learning practitioners and engineers than end-users. The authors based their work on works of De Graaf and Malle (2017), who stated that people apply human traits to autonomous intelligent systems (AIS); thus, they use the same conceptual and linguistic models to understand AI systems as they use to explain human behaviours. Therefore, the authors hypothesised that the personification of AI and the use of virtual agents would make AIS seem more trustworthy to users. Indeed, they found that users trusted explanations of complex, intelligent systems presented by an AI agent, more than simple commands. It is important to note that trust does not necessarily go together with ethics (Toreini et al., 2020). While Trustworthy AI refers to qualities which are more typically based on an ethical approach, which I explored through the creation of the Mnemosyne Machine, "trust" is the response to a given actor and, in this case, technology; as Trustworthy AI, it may, but it does not have to adhere to an ethical approach. For example, people may trust frAInd or AIMighty,

no matter what the motivation is behind their design. It is vital that this debate about the anthropomorphisation of AI be considered by future designers, as to how they present their AI model, because working with human memory may have ethical and social implications.

Unfortunately, trust is not always a simple and positive reaction. Wynne (2006) described the notion of "as if" trust, which simply describes the sense among the general public that their growing dependency upon experts and institutions is a problem; I explore this scenario in the Continued Economic Growth Future. Infinite choice can ultimately create no choice, because we cannot choose if we do not know what we are choosing from. If people feel that there is no other option than using AI services, the trust based on such usage is different, and usage does not indicate the agent's trustworthiness. As I mentioned in Chapter 3 (Continued Economic Growth scenario) in the behavioural sciences, such behaviour is called learned helplessness, which refers to exposure to aversive stimuli beyond one's control (Seligman and Maier, 1967). Such learned helplessness could be seen in the case of AIMighty in the Collapse scenario or the Continued Economic Growth scenario in general, where users may feel like they do not have other options than to use technology, or go completely off-grid, which could result in social ostracism. This leads me to following questions for designers:

Q: If the device is responsible for the memorying step, how does the device support and deliver the memorying step?
Q: How is trust established between the technology executing the memorying step and the user(s)? And what kind of trust is it (e.g. ethical, personal, institutional, "as if")?
Q: Does the user, or actor, have a choice over the memorying steps and can they change them? If not, who or what is responsible for them?

In Chapter 5, the Collapse future, I present and discuss Object-Oriented Ontology (OOO) as one of the lenses that can be used to study AI for memory design. OOO is not as easy to grasp as it may seem. It is hard to say how we should look at AI. ANT is a social theory that describes relationships between actors as their primary function in their distributed networks. Every object always relates to another object. In Object-Oriented Ontology, relations are not the only aspect of an object's existence. In OOO, objects are "singular" (Harman, 2016, p. 16), "things-in-themselves" with *"definite boundaries and cut-off points"* (Harman, 2016, p. 15). Object-Oriented Ontology is a useful lens for studying AI because it does not focus solely on what objects do in relation to other entities and their network of relations. Right now, AI is usually viewed through its relations with humans. Therefore, it is explained by something else. The Object-Oriented Ontology helps bring focus to AI itself.

As mentioned before, AI is often presented as something that has power on its own, something we should be afraid of. It is crucial to understand how it can work for us. At the same time in design, the idea that there is a more-than-human perspective is very beneficial as it steers us away from the lens of the Anthropocene world we have been building as a western society. However, it can backfire by leading us to assume that AI could have the same capabilities as humans to experience the world, or even better ones as many believe. More-than-human perspectives and OOO do not postulate specifically that AI is able to do the same as humans, but we can come to such a conclusion. Suppose we believe that other objects exist separately from us and have agency. In that case, they can think about us and do their own ontology (which is, notably, the main difference in perspectives between OOO compared to ANT). This is especially the case with AI that has been created to mimic human behaviour can "act" in some of the ways we do, for example, communicating by language, which I previously discussed through the Chinese room thought experiment. Chapter 5, the Collapse future, and the design of the Mnemosyne Machine show how easily we can come back from an anti-anthropocentric view to an anthropocentric view. Maybe we think about the object, but is the object thinking about us? And if so, shouldn't we ease its attempts to understand us? Moreover, the anthropomorphisation of AI became an inevitable theme that was connected to AI throughout this thesis. After all, AI would play a role in a very human activity: memorying. What we do know is that people tend to interact with AI or chatbots as if these inventions were people (e.g. Weizenbaum, 1966). However, I did not want to get into the trap of the Uncanny Valley effect, which is a feeling of uneasiness that people experience when faced with an actor who is *almost* human but not quite yet. Thus, all of my artefacts that work with AI, frAInd, AIMighty, and the Mnemosyne Machine, do not have bodies that would resemble humans. Again, I would like to emphasise the gendering of technology, which I discussed in the introduction to Chapter 5, Collapse World. The designer should keep such issues in mind. This leads me to my next questions for designers:

Q: Is the design human-centric?
Q: Is the design user-centric?
Q: Is an Uncanny Valley effect possible?
Q: What kind of language does the actor use?

In summary, understanding the consequences of AI and digital devices for our relationship with memory, is crucial in memory design. Our inventions cannot remember, forget or imagine for us. However, they can help us and support these actions as tools. Thus, if one decides that in their design, AI would help us with, for example remembering, it is important to map what it means for the process and what kind of action it entails. Remembering may mean storing data like we store

memories in our head, but also as we store them in the world, as Transactive memory suggests. To recap, transactive memory is the collective and shared store of knowledge between individuals. Remembering may also mean deleting data, as I presented with the Horcrux Ear artefact. It may mean transforming data like our memory does on a daily basis, similarly to the Tiled Stove, or storing data as an exact copy of it, as in the case of the Character perspective (P1) I discussed in the section on Affective Memories in the Chapter 5 in relation to the Mnemosyne Machine. Such understanding of what these technologies enable us to do in the infinite data storage scenario (and beyond) could create a meaningful memory device that is not only based on the dual dichotomy of human-computer memory, in which only remembering-storing and forgetting-deleting exist. Therefore, the next questions for designers are:

Q: Does the design uphold the notion of the dualism of memory (remembering = storing ; forgetting = deleting)? Why?
Q: Is the designer actively seeking to avoid reliance on a dualistic approach when it could in fact be a viable option for the design?

In sum, recognising the steps of memorying in the design and identifying the agent responsible for doing them is crucial for later recognising how to design for the desirable outcome for the user.

7.1.3 Sense of Self

All the scenarios in my thesis have at least one artefact that refers to the idea of the sense of self. In its most evolved form, FrAInd promises to forecast the most compatible career or even a partner for a child. While one may debate whether this information is equivalent to the sense of self, it is based on the idea that collected data works as the representation of self, further feeding into such a forecast. FrAInd is supposed to predict what you will do and define who you are to create the most optimal life for a person. You do not have to figure it out by yourself by (inevitably) making mistakes. Therefore, my next question is:

Q: Who is the user, or audience, of your design?

In the case of the Horcrux Ear, its relationship with our sense of self is on a very personal and probably emotional level. As the name suggests, the user gives a fragment of themselves. However, in contrast to frAInd, the data itself is not the main engine of the self. It is the act, the creation of very specific data, that functions here as the forming of the self. As we can read in the novel *Oscar and the Lady in Pink* written by Éric-Emmanuel Schmitt (2013):

> *The things you don't say - they're the things that weigh on you, they take a hold, wear you down, paralyse you. They take all the room you need for new ideas, and start rotting inside you. You're going to become a dump for old ideas and you'll start smelling if you don't talk* (p. 11).

Thus, the goal of memorying can be a goal in itself for self-creation, self-soothing, and self-exploration, and not for the face value of data. This leads me to the following question:

Q: Is data needed for the goal, or is the creation of data the goal in itself?

In the Collapse scenario (Chapter 5), the Mnemosyne Machine creates specific narratives about the user's life and their imagined life. Similarly to the Horcrux Ear, it is for very personal usage. However, the act of creating memories is not undertaken by the user - it is done by the machine, similarly to frAInd. However, the intent aligns more closely with the Horcrux Ear, as it is focused on the user. This is for contemplation rather than forgetting, as in the case of the Horcrux Ear. However, Mnemosyne facilitates the creation of memories through Snowflake, which perhaps is not the primary usage of the Mnemosyne Machine; yet, it creates a space for users to be mindful of the creation of their memories. Nonetheless, the user's sense of self lies not in the action of making the data, but in the narrative that it provides, which helps users ponder on their memories, future, and self.

In the case of the Tiled Stove (Chapter 6), the user's sense of self is manifested in the performative acts of self-making that are created through data interaction with the Tiled Stove. One does not have control over which data are fed into the Tiled Stove, but the Tiled Stove morphs in the context of its users. It creates only one-dimensional personas for specific listeners. This is for privacy reasons but also for contextual reasons; one is someone different when interacting with the mailman from when one interacts with family members. Moreover, the user's sense of self is seen in the artefact itself; having a Tile on the Tiled Stove is equal to being a member of a family, whether this be created by blood or by mutual agreement. In turn, this gives the user a sense of belonging to something bigger. The central role of the narratives in the Tiled Stove artefact is to forge relationships within the family. The sharing of memories and reminiscing is what is important, not necessarily the creation, which is why AI is in the role of the creator in this particular artefact. Again, the memorying can be a goal in itself. A question for designers that this generates is:

Q: If the goal of memorying relates to the user's "sense of self", what are the user's actions and relationship with data involved in achieving this goal (e.g. creating data (passively or actively), owning or sharing data)?

The Tiled Stove illuminates a further aspect of users' sense of self in its capacity for creating a memory that never changes, i.e. a set-in-stone story about a person once they have died. As Josipovici (2020) noted:

> *What a person truly 'is' can never be grasped by that person, for it only becomes visible after their death, that event which, as Mallarmé put it in his Sonnet in memory of Edgar Allen Poe, changes us for ever into who we are – tel qu'en lui-même l'éternité le change* (p. 47).

It will be only fair to not "remember" who we were in any time in between our birth and our death. Thus, the essence of a sense of self would be left for future generations to determine.

While such technological inventions as Memex and lifelogging devices are supposed to "make a better version" of ourselves, a scenario that I sought to depict in the frAInd artefact, the manner in which they create users' sense of self may in fact be very different. For example, they may use narrative, either created by a user or AI. Both frAInd and the Tiled Stove are based on the idea that the self can be changed, but with different reasons and motivations behind the design. FrAINd departs from the idea that we can and should become better. Meanwhile, the Tiled Stove accepts the reality of the natural evolution of our lives and relationships without judgment on whether we are better or worse. This leads us to the next question:

Q: What is the motivation behind the design and its aims?

However, what data should or should not be used to create a sense of self, if the data is itself a part of the user's sense of self? The GDPR's "Right to be forgotten" assumes that data is the person. The doing, the memorying, which I covered in the previous section, is not covered in the GDPR document, even though it is an important part of creating the sense of self, not only the data that feeds the act of memorying. Emblematic of this is the Horcrux Ear example. The Horcrux Ear sense of self resides in the act of creating the secret, not the secret itself. It is the conscious act of choosing what to say and saying it.

The Lockean View of Memory suggests that one needs to remember memories to consider them as a part of one's self, or at least to have a connection between still-remembered memories from a time in which we remembered the memories that are forgotten. This creates a new area of speculation and showcases the tension between human and digital memory, which I will attempt to explain briefly here. One of the tensions that the Lockean view uncovers is that we should answer the question of whether we treat our data as our memories, even if they are the cue for our recall (Sellen et al., 2007). According to GDPR, we do. Right now, we do not have a clear

distinction between when something is our memory and when it is our property; the GDPR "Right to be forgotten" is an example of that. Sometimes, we treat data as the former, sometimes as the latter, and sometimes as both at the same time. We do not necessarily think about our personal memories as property since there is no way one can take them away from us. At the same time, it is natural to believe that they are "our" memories; they belong to us. The sense of self is correlated with the sense of ownership, although it is different from the ownership of goods, which can be sold, traded or stolen. If we decide that data is our memory, and we incorporate the Lockean view, then forgotten memories and the data that represents them, for example the data that the Horcrux Ear creates, are no longer a part of the data creator's sense of self. Does it also mean that this is no longer our property? Or perhaps that is exactly when it does become our property, like our other goods? Perhaps forgotten memories are still a part of one's sense of self. If they are, do we have a different kind of ownership of them? I will touch upon the topic of the ownership in the Time & Space section as well.

7.1.4 Time and Space

A person's sense of self, however, is time-sensitive, as the Tiled Stove and its ongoing updates showcase. This leads to the question of current data management practices and the role of data in a given time and place. As Rapp and Tirassa (2017) noted, Personal Informatics (PI) are focused on a utilitarian perspective that identifies users in the light of what they "do" rather than on the constantly changing notion of what they "are". How can we provide users with tools to adjust their data to their current needs? As I have already mentioned, one example of a time-sensitive design is the Tiled Stove. The Tiled Stove creates an ongoing narrative about family members' relationships. It is also time-sensitive in the sense of the context it is currently operating in. In its timely manner, it shows only a specific narrative about one's family life when a person touches the Tile. The content of the story that is told depends on the person who is listening. Temporality is also explored through the ephemerality of the artefact, embodied by its fragile ceramic Tiles, which can be taken away or destroyed. Moreover, it is time-sensitive, as the Tile only updates stories of people who are alive. This means that, as long as the person is alive, the Tiled Stove is an ephemeral technology since its stories evolve with the person and are never the same. Its ongoing updates have a sense of ephemerality, as the stories it generates are always different, even if they are similar. It is impossible to come back to the previous story unless someone records it while the Tile is telling the story. Once the person is no longer alive, the ephemerality stops, as the event is irreversible, unstoppable, and unchangeable, and the story no longer updates itself.

In fact, Sellen et al. (2009) claimed that technological advancement will entail the end of ephemerality. In a similar vein, Bannon (2006) postulated the need to create ephemeral technologies. Such ephemeral technologies, according to Bannon, were supposed to be based on the idea that data should be deleted. REWIND2, the artefact in the Continued Economic Growth scenario (Chapter 3), and the Snowflake in the Collapse scenario (Chapter 5), are examples of ephemerality that Bannon and Sellen et al. referred to; ephemerality that is connected to the deletion of our data, just as in the book *Delete,* written by Viktor Mayer-Schönberger (2009). I discussed the possible rise of the technology that could support a new kind of ephemerality extensively in Chapter 4, Transformational Society. In this scenario, the Horcrux Ear would facilitate recording secrets onto the digital objects and seal them there, facilitate forgetting about them, and essentially hide them, creating an ephemerality which could result in remembering that is preceded by forgetting. Interestingly, a scenario of infinite data storage would suggest that single-use objects are insufficient for developing ephemerality. It is because single-use objects, such as disposable coffee cups - which are hard to recycle - would bear a new meaning once such single-use objects could store our data. A disposable coffee cup would stop being so heart-lightly disposable or "ephemeral" for its user. Therefore, the ephemerality of data in the Digital World highlights, ironically, the need for ephemerality in the Real World (Akmal and Coulton, 2018). My thesis speculates on the possible rise of new ephemeral technologies, all different in their mode of operation.

Another way my thesis explores ephemerality is evident in Chapter 6, the Disciplined Society scenario. The ephemerality of the Tiled Stove lies not in the deletion or the safe capture of data, as with previous examples. Neither is it focused on forgetting or remembering. Instead, the Tiled Stove focuses on ephemerality as a real phenomenon in human memory. As Heraclitus famously noted, everything flows, or *panta rhei.* We are time-sensitive creatures. Our memory is therefore time-sensitive as well, and it is constantly changing. The goal of the stories we hear from the Tiled Stove is not forgetting, remembering, deleting, or storing any specific information. The goal of the stories is to engage its users powerfully. The intensity and durability of the engagement is the goal. However, the acts of forgetting, remembering, deleting, or storing specific information can function, in many cases, as tools rather than goals in the process of memorying. In the case of the Tiled Stove, the ephemeral power of the ever-changing stories shines through once a person is no longer alive. On the one hand, a person's death can be seen as the opposition to ephemerality, as it is a state which is unchangeable. Once a person is dead, the ephemeral quality of their life ceases to exist, which corresponds to a changing story in their Tile. On the other hand, someone's death may be seen as the ultimate ephemeral act of one's life, as disappearing is the end of a transitory state, lasting for only a certain amount of time. Thus, the last, final story created by the Tile Stove about the person, is a

testament to both the ephemeral and permanent quality of the memory of someone, thus the paradox of ephemeral technology. This leads me to the next question to designers:

Q: Which type of ephemerality are you designing for (a new kind ephemerality – storing data; traditional ephemerality - deleting data)?

Another time-sensitive aspect of my Speculative Artefacts is how the artefacts themselves would stand the test of time. After all, the artefacts' initial users would not be the last ones. Petrelli et al. (2009) found that people do not choose digital artifacts to create meaningful triggers for memory recall in the distant future. Moreover, digital devices inherited from loved ones, do not provide any value for their inheritors (Massimi and Baecker, 2010; 2011). Indeed, they can cause discomfort, for example, for the bereaved. Not only would the data be highly personal, but it would also be challenging to find the most meaningful pieces of data from a life's worth of data. Moreover, Elsden and Kirk (2014) questioned how we would interact with data collected for quantified past self projects in the future. They recognised the problem of looking at such data from only a very short time period, and suggest that what would happen with this data in the long-term future is not regularly considered. While we may want to document our lives and acquire more data, it only serves its purpose for a short period of time. In the long term, however, this data will be - as the authors call it - a "by-product" of one's life. This leads us to the next set of questions:

Q: What is the social life of the data?
Q: What is the social life of the memory device?

The question of when memory is accessed, and under what circumstances, is crucial to the act of memorying. In the Collapse scenario (Chapter 5), AIMighty forces its users to access their data to terrorise and manipulate them. Mnemosyne Machine creates a particular context of sublimity when interacting with Mnemosyne. In the Transformation Future (Chapter 4), the act of accessing data after recording it through the Horcrux Ear not only requires an additional device, but it also requires time to pass or gaining consent from the data creator. This is not as readily available as clicking through our Documents folder. The Tiled Stove (Chapter 6) is also very much context-sensitive, as access to the family stories takes place at home rather than anywhere in the world. All these examples showcase how the time and context of the access (which I discussed at the beginning of this chapter) is an important design feature, depending on the design goal.

In the traditional view of memory and computing, data does not change when stored since any change of memory is considered to be a flaw of human memory. However, it

is worth understanding the plasticity of memory as memory's superpower, or at least as a neutral characteristic. As Bartlett (1995) noticed in his reconstructive theory of memory, memories are not replicas of past experiences. Each time memories are retrieved, they are reconstructed and altered, evolving throughout our lives. It is crucial for designers to understand when and under what circumstances this change is undesirable, and when it should be reflected in the design. This leads me to the question:

Q: Should memory and/or data stay unchanged or evolve with the user?

As mentioned, the device's tangible properties can make it ephemeral, like the Tiles in the Tiled Stove artefact (Chapter 6) or the Snowflake in Chapter 5. One can also use the spatial properties of our world and the fact that everything will have data storage to hide a secret, as I discussed in the Transformative scenario (Chapter 4) referring to the Horcrux Ear. Similarly, in the Disciplined Society scenario (Chapter 6), the Tiled Stove showcases how Transactive memory (shared storage of knowledge between individuals) can be used, creating different Tiles about specific family members that others can access.

However, the notion of heterotopia is the most critical factor related to time and space that needs to be considered by future memory designers. To recapitulate, Akmal and Coulton (2018) applied the notion of heterotopia to map nine different heterotopias created on the verge of real and digital spaces, as well as private and public spheres. In this thesis, I presented two additional Heterotopias to Akmal and Coulton, h9 and h10, which are not depicted in their model (Figure 7.3). Understanding where the heterotopia of user data lies and how one interacts with it, can help future designers pinpoint the whereabouts of data and their underlying properties. For example, the secrets recorded through the Horcrux Ear can be in the heterotopia that lies between Private/Virtual and Public/Real, as the recorded secrets are private data, and they can be recorded onto public items - for example, a street lamp or a coffee mug in the coffeeshop. An example of Private/Real and Public/Virtual spheres coming together is in the lifelogging of citizens whose collected data is not intended for use by those citizens, but is intended to directly inform the public, for example, the governmental data pipeline. Moreover, secrets could be recorded into someone else's private objects, creating another kind of relationship with data and its spatial accessibility.

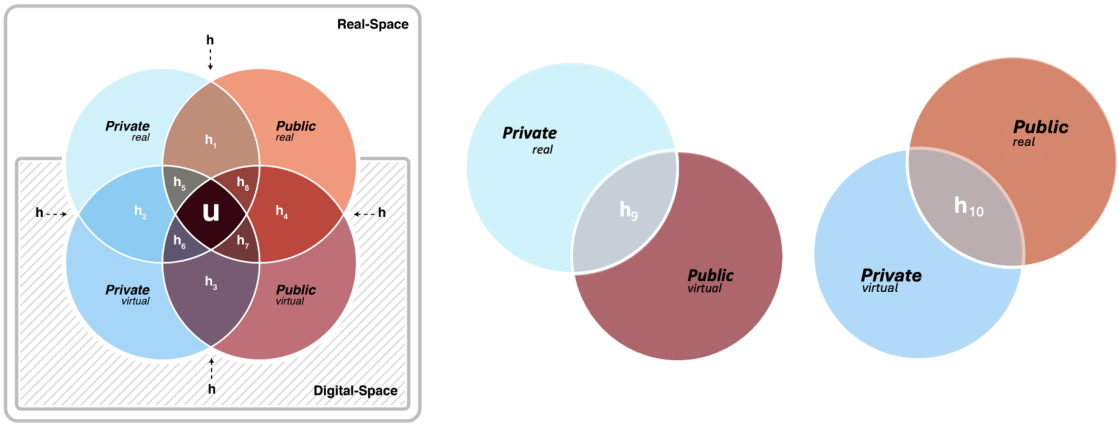


Figure 7.3: Two additional heterotopias were created through the Speculative Artefacts in this thesis. Left: Akmal's and Coulton's representation of different Heterotopias created between Real, Digital, Private and Public Spaces. Source: Akmal and Coulton, 2018. Centre: New Heterotopia, h9, between Private Real and Public Virtual spaces, which emerged through the topics discussed in the Continued Economic Growth scenario. Right: New Heterotopia, h10, between Private Virtual and Public Real spaces, which emerged through the topics discussed in the Transformation scenario. Source: Author, after Akmal and Coulton, 2018

Understanding in which heterotopia data is residing is crucial for multiple reasons. First, it shows where the agency over specific data lies. For example, in Akmal's and Coulton's h2 (i.e. the Heterotopia between Private/Real and Private/Virtual spheres) shows a user's agency over their own private data. The Public/Real and Public/Virtual Heterotopia (h4) demonstrates how context can be intuitive; we understand that our behaviour in certain places, for example, airports, may be monitored as we cross the border of one country to another. Heterotopias also create questions about ownership. If one records one's secret onto a public object, can the person demand their right to this object, or does the secret become the property of the public or the state? Moreover, what if someone encodes one's secret from public property? Does the content of the secret then become the responsibility of the encoder? Let's imagine a scenario in which Bob goes to the grocery store and buys himself some onions for a recipe. Before reading the recipe, he decides to check the origin of the onions at his house (because he could not be bothered to do it at the store). Each one of them tells him in a monotone voice where and when they were collected. But one of them speaks in a whisper. He does not hear a thing, so he plays it one more time, holding the onion to his ear. He gets a crying message for help; someone is being held hostage in one of the farms. While it seems obvious that one

should go to the police rather than try to find the person or ignore the message, who is responsible for such a message? A person once they bought the object? A provider of these goods, i.e. the shop? A distributor? The producer? What if someone is sure it is just a prank? Does Bob receive a refund? Such questions will haunt future legislature systems and be up for future public debate, which will need to be considered by future designers.

7.1.5 Values

In my thesis, the values or beliefs of a social group are the key factors behind the artefacts' design. They shape the design and the possible response to the design and create the context in the speculative world. After all, the Manoa School Method's scenarios are driven by the societal values in place, which are society's response to specific circumstances. The value base of the Economic Growth Scenario (Chapter 3) is the ongoing strategy of producing and acquiring more, no matter the cost or whether it is actually of any value. In this case, the infinite capacity of computer memory becomes simply a bag without a bottom. In this speculative future scenario, memories and data become commodities, as users cannot create sense from data by themselves. Since monetary profit is the primary value in this future scenario, it is essential to recognise who actually profits monetarily from the memorying and reflect on how to create a profitable design for its users, not monetarily. Moreover, in such a scenario, personal data are a target for abuse. The art in such a scenario would be creating a design that would reflect these problems by empowering users without scaring and overwhelming them with their data usage. Otherwise, one could be prone to feelings of doom and helplessness or experience learned helplessness (as I explored in the Narrative Snippet in Chapter 3), which could, as mentioned before, lead to a false perception of trust towards the technology. This leads us to the next set of questions:

Q: Who is responsible for the data storage as a commodity?
Q: Who has access to the data storage?

In the Transformation future (Chapter 4), values are connected to the changing power of technology. This world is entirely artificial, and technology is considered a utopian remedy for our sorrows. This, however, as I understand it, does not mean that concerns and sorrows are gone. Technology functions merely as a solution for them. This focus on solutions ties in with the Continued Economic Growth scenario (Chapter 3), in which the REWIND products family is ever expanding, as each product-solution creates new problems that are the cradle of the new solution, and so on. Jacque Ellul (1964) called this phenomenon Technique. In the case of the Transformation future,

the Horcrux Ear is not a contribution to the Technique. However, one needs Horcrux Lips to decode the message recorded through the Horcrux Ear. The need for an additional device to decode the message could be seen as one of the premises of the Technique. In a world in which one heavily relies on technology, solutionism, the idea that every problem can be solved, can add to the rise of the Technique. However, the Horcrux Ear is not an example of the Technique, even though it is based in a technology-driven world. In fact, Ellul did not criticise technology but rather society's drive towards efficiency. The Horcrux Ear is not efficient in the sense that it requires an entirely artificial world to not be fully connected to the Internet, uses different objects for data storage, and data is human-made and human-processed rather than artificially created and rated or classified in any way. Even the classification of the "gravity" of the secret that is recorded through the Horcrux Ear is personal and not imposed by the device's design.

The Economic Growth scenario embeds "Technique" as its core value, as the organisation of the world, including data and memories, is based on quantitative merits rather than qualitative. The Horcrux Ear is the opposite of that, as it focuses on the users' needs rather than a blind technological progress that leads to efficiency in every aspect of human lives. This leads us onto the next set of questions:

Q: Is the design embedded in what Ellul calls "Technique", i.e. is it focused solely on efficiency?
Q: Is the memorying device a solution to a problem that has been created by another device?

The Horcrux Ear and Lips also touch on a more delicate sphere, such as private matters. One intentionally creates secrets. These secrets are meant to be forgotten but are too valuable to be forgotten forever. This means that this information can potentially be emotionally loaded; it may be in conflict with the user's current life, or it may be information that is not only sensitive but also dangerous for the user. Some divulged information, on the other hand, may be simply cathartic. The value of the memory itself for the user should feed the design of the memory device. This leads us to the following questions:

Q: What kind of memories would the device hold or process, i.e. what kind of memorying would the device do?
Q: What emotional impact do the memories have for the user and how does the device support it?

The values pronounced in the Collapse scenario (Chapter 5) are connected to the religious sphere. In this speculative future scenario, people believe in the divine forces

of AI, which can steer and influence people's memories and thoughts. AIMighty is an example of a cruel god. At the same time, Mnemosyne is depicted as the human-centred goddess that helps people imagine rather than forcing memories into them and from them, as in the AIMighty's case. Because AI is widely assumed to be god in this speculative scenario, users' memory and data usage are not necessarily to be taken at face value, but may arise out of necessity and spiritual connection. The interaction with data may not be the main reason for using the memory device but may be a consequence of another need. This can lead to thinking in different directions: does the creation of a valuable and fulfilling memory device matter? Perhaps one should create a device that is as basic as it can be. Or is it an opportunity to create a widely used device that could benefit people? Indeed, another aspect of the Collapse scenario (Chapter 5) is that the memory device is not created solely for people. The AI Gods are also catered to in this regard. It is a take on more-than-human design. The field of more-than-human design posits that our human perspective is not the only one on this planet; it is limited, and taking solely the human perspective into account restrains the design from reaching its full potential. More-than-human design also recognises the abuse that humans bring to the natural world and differences between humans. I am a proponent of such a philosophy. However, Mnemosyne Machine is created by imaginary researchers based on the idea that AI can have its own perspective regarding humans and even practice philosophy, which I connected to Object-Oriented Ontology. Such an outlook raises questions regarding the perspectives that more-than-human design acknowledges, in what way, and why. This brings us to the next set of questions:

Q: Are memories something that people believe in or fact-check?
Q: Do memories and data push people to imagine?
Q: How does your design support rituals?

The Disciplined Society (Chapter 6) rejects the Continued Economic Growth values (Chapter 3), such as efficiency and economic profit, and re-establishes society through different values. In this thesis, I focused on the values of privacy, awareness regarding energy consumption, land abuse and rejection of the capitalist abuse of personal data. This led me to create a family-oriented Speculative Design, the Tiled Stove. The Tiled Stove is a multifaceted device at its core. It works as a core piece in the house, not only practically but also artistically. It was established in the house for privacy and geopolitical reasons, the need for collective memory device, and was further adopted as the heart of the family and the home's heat source. Interestingly, the problem that arose by bringing the data centre into the house, i.e. the heat that such a device produces, was not fixed through the use of another device. Instead, its heat was accepted as a core characteristic and adapted so that the data centre became a stove. Furthermore, the big tiled surfaces allow for them to be painted, further used as family art, representing family connection. This scenario differs greatly from the solutionism

perspective and Technique I have discussed in this section. It is an efficient design with multiple applications, but it does not seek efficiency in a commercial sense; it is simply common sense. If one has a heat source in one's house, one may as well use it as an actual heat source. I am far from implying that all devices can and should be just taken as they are. However, the Tiled Stove shows that its "drawbacks" become accommodated rather than solved if the design is based on a specific value.

Using the Tiles to create works of art is a natural and organic way of accessing the Tiles rather than an example of solutionism. Moreover, family artworks are in opposition to Technique's focus on efficiency. After all, one could write numbers on the Tiles and assign them to each family member. Art, however, is more meaningful, precisely in its opposition to efficiency. This brings us to the next set of questions:

Q: Does the memory device support shifting values?
Q: What shift in society would you want to be reflected in the design?
Q: Which steps of memorying need to be adjusted to support this shift?

Each future, except the Continued Growth Scenario, consists of at least one Speculative Design that does not use pictures or visual prompts. All the main Speculative Artefacts are narrative-driven, whether created by the user, as in the Horcrux Ear case, by AI, as in the Mnemosyne Machine case, or by algorithm, as in the Tiled Stove case. Such division between the Continued Growth Scenario and other speculative worlds is emblematic of the second most prominent problem in the design of memory devices. The first problem I have recognised in the current design of memory devices is the lack of acceptance of human memory traits, such as malleability and imagination, as memory's functions. This results in treating human memory as the lesser version of computer memory, in which only unchangeable copies of our memories are treated as valuable. The second problem stems from the first one: There is a lack of support for the more creative but mostly narrative style of memory expression. We rely on stories for "making sense" out of the world. Thus, if we want to "make sense" of our data, including digital tools like infinite data storage, AI and algorithms, we need to branch out into more expressive, creative and perhaps provocative ways for data and human memory to interact.

Finally, in the next section, I will present the general reflections of Pilot Workshop participants on how their understanding of the future of memory technology has changed after familiarising themselves with all four futures and evaluating the Speculative Artefacts.

7.2 PILOT Workshop

At the end, participants were asked to reflect on the future of memory devices, describe their preferred future, and discuss how the Workshop had changed their thinking.

P1 hoped for dehumanising technology, in a sense to support these systems that we are not the best at, for example remembering passwords and fast searching process, and "clear intellectual interaction", in which they would be able to guide computer search for information using his thoughts. They have seen the future of technology in what Ellul (1964) would call Technique, so the trend toward the efficiency in the human activity, in this case related to memory. At the same time P5 stressed that the transparency of how technology works is crucial as well as its ability to "train" humans to be more *"functional, lively, rewarding, active, comprehensive, abundant and thriving"*. As they continued about future technology: *"I don't want them to make elements of the world magical and hidden so that I can quicker go over them"*. Thus, rather than doing something for the user, technology trains the user, creating a space for more insightful action for the user. For example, perhaps it would be more beneficial for the Tiled Stove, not to tell stories but to ask insightful and meaningful questions and guide the user in creating their own story rather than present them with the story. However, in general, participants found the Speculative Artefacts disturbing and emphasised that the Tiled Stove was the most appealing as it was a heart of the family but also due to its tangible characteristics. The reason of the Tiled Stove's popularity could be also in the scenario itself, as participants noted that the Disciplined Society was the most appealing scenario from all of them.

Another theme mentioned by participants of the workshop was the fact that everyone has a subjective account of a given memory, even if it is a shared memory. This was not actually looked at as the problem, but rather a characteristic that could be highlighted. As P2 mentioned: *"different 'truths' of people that might come to conflict but ultimately a way to tell a story"* were the aspects of human memory that future technologies should support. Indeed, this interconnection between personal and collective memory is often inevitable and could be explored using technology further in the future.

Participants reported that in the future they would seek the partnership between human and machines, even co-production of vessels for retaining memories. Participants highlighted the need for more tangible and material ways of interacting with digital memory. Nonetheless, the more ethical technologies, without the loss of privacy and control of individuals, which participants saw as a current trend in memory technologies, seemed hard to get due to capitalistic system. At the same time, one of the participants shared that they *"do not see any immediate business*

opportunity, as presented technology is unavailable". This showcases that Speculative Artefacts, no matter how distant from the present technological solutions, were still evaluated through this lens by participants.

7.3 Conclusion

Human memory has its advantages and disadvantages, but they are context specific. Memory does not have insecurities; people have them. Each function, dimension and aspect of human memory is simultaneously a superpower and flaw. The judgment is up to people. This thesis has aimed to broaden the perception of the range of memory devices that could exist in a future scenario of infinite data storage. The knowledge gathered through the creation of my Speculative Designs, which I have presented in this thesis, sheds light on nuances of human and computer memory that could help future designers adapt technology to the fuller spectrum of memory abilities.

I investigated different possible societal contexts for creating designs for the various aspects of memory. As a result, I have provided a roadmap of questions that could serve future designers of memory technology by revealing more options for future design; I do not seek to make decisions for them. Indeed, it is not the world that should inform designers' work; designers' work should be motivated by the desire to create a desirable world. While I started with Dator's four specific worlds, for which I designed artefacts, I would not want designers to think that the prerequisite for designing is to work out which "world" they are designing for or to settle on the present world they are currently experiencing. On the contrary, design should come from where a designer wants to arrive.

My thesis has aimed to show that memory is more varied in its properties and abilities than we have portrayed it; it is much more complex and goes beyond solely the functions of remembering and forgetting. Memory design devices can adapt to these functions and reflect their role if we look beyond the storage capabilities of a computer memory. For example, I have designed for the properties of human memory such as malleability and imagination. At the same time, my goal was not to denigrate the storage function of computer memory. On the contrary, while my thesis showcases that data storage can be used beyond its primary function, especially if it becomes infinite, this does not mean we should reject that primary function. Future designers can build upon it and treat it as every other aspect of memory: a superpower, and a flaw.

Appendix A

PILOT Workshop

Consent form for the "general public" participants

Project: Infinite Data Storage Scenarios

School of Design | Lancaster University

1. TAKING PART IN THE STUDY	**Yes**	**No**
a) I have read the information sheet dated [DD/MM/YYYY] and understand the specific purposes of the study, or it has been read to me. I have also been given the opportunity to ask questions about the project, and these have been answered satisfactorily.	☐	☐
b) I understand that my taking part is voluntary. I can withdraw from the study at any time and I do not have to give any reasons for why I no longer want to take part.	☐	☐
c) I understand that taking part in the study involves having my feedback and reflection on my experience with the Infinite Data Storage prototypes visually recorded in the written form.	☐	☐

2. USE OF INFORMATION IN THE STUDY	**Yes**	**No**
a) Do you consent to the following data being collected and used for project purposes?		
Biographical data about you. Note: no identifying data will be gathered, e.g., name, address, email hashtag, etc	☐	☐
– Visual output of your feedback and reflection	☐	☐
b) Do you consent to anonymised uses of the above data for the following purposes?		
– Presentation and discussion of the project and its results in research activities (e.g., in project meetings, conferences)	☐	☐
– Publications and reports describing the project and its results	☐	☐
– Dissemination of the project and its results, including publications hosted on on web pages and databases	☐	☐

3. FUTURE USE, REUSE AND ARCHIVING	**Yes**	**No**
a) If you have consented to data collection and use, your data may be archived. Do you consent to your data being kept in a form that allows you to be identified?	☐	☐
– **Please note, once archived your data may be reused for other scientific, historical or statistical purposes**		

4. COPYRIGHT LICENSE	**Yes**	**No**
a) I grant the project permission to use, copy, excerpt, annotate, display and distribute any data collected from me in the course of this project for which I hold copyright (e.g., my written and recorded responses) for the purposes I have given consent to and on the grounds upon which my consent stands (e.g., that use of the data does not identify me).	☐	☐
b) If reuse of the data has been consented to in section 3, I grant the parties who reuse my data permission to use, copy, excerpt, annotate, display and distribute any data collected from me in the course of this project for which I hold copyright (e.g., my written and recorded responses) for the purposes I have here given consent to and on the grounds upon which my consent here stands (e.g., that archived data is anonymised).	☐	☐

Name of participant (printed): **Date:**

Signature (participant, or legal guardian if under 16):

STATUTORY INFORMATION AND YOUR RIGHTS

PURPOSES OF DATA PROCESSING: Your data is being processed for the purposes of evaluating the user experience of Infinite Data Storage Scenarios. The legal basis for processing stands on your consent.

AUTOMATED PROCESSING AND PROFILING: Your data will not be subject to automated processing or profiling.

DATA STORAGE: Data will be stored securely for an indefinite period for scientific research purposes.

DATA REUSE: Data may be reused for scientific purposes.

RECIPIENTS OF THE DATA: Your data will not be disclosed to any recipients or categories of recipient other than those declared in the information sheet and consent form.

DATA TRANSFER: Your data will not be transferred outside of the UK.

DATA PROTECTION: Processing of your data, including obtaining, holding, use and disclosure of your data, is regulated by the Data Protection Act 1998, https://www.legislation.gov.uk/ukpga/1998/29/contents

YOUR STATUTORY RIGHTS: You are not obliged to provide the personal data that has been requested. You have right to:

- Access any data we have collected free of charge and electronically
- Object to processing
- Rectification of inaccuracies without undue delay
- Restrict further processing pending investigation of any complaint
- Withdraw consent, without affecting the lawfulness of prior processing based on consent
- Data portability and to receive a copy of the data in an accessible format
- Erasure of the data and to 'be forgotten'

WHO TO CONTACT: Should you have any queries about your data or wish to exercise your statutory rights please contact the data controller:

Name: Agnieszka Dutkowska-Zuk

Address: School of Global Affairs

Lancaster University

LA1 4YR

Email: a.dutkowska-zuk@lancaster.ac.uk

You have right lodge a complaint with the Information Commissioner's Office at any time regarding the treatment of your personal data, https://ico.org.uk/global/contact-us/

Consent form for the "experts" participants

Project: Infinite Data Storage Scenarios – Individual Workshop

1. TAKING PART IN THE STUDY	**Yes**	**No**
a) I have read the information sheet dated [DD/MM/YYYY] and understand the specific purposes of the study, or it has been read to me. I have also been given the opportunity to ask questions about the project, and these have been answered satisfactorily.	☐	☐
b) I understand that my taking part is voluntary. I can withdraw from the study at any time and I do not have to give any reasons for why I no longer want to take part.	☐	☐
c) I understand that taking part in the study involves having my feedback and reflection on my experience with the Infinite Data Storage prototypes visually recorded in the written form.	☐	☐

2. CONSENT REGARDING ANONYMITY

Please indicate your preference regarding the use of your identity in the publication of this research:

☐ **Yes, I give consent to be identified by name and to have my contribution attributed to me in any resulting publications or presentations.**
☐ **No, I prefer to remain anonymous, and I do not wish to be identified in any publications or presentations.**

Note: If you choose to be identified, your name and contribution may be publicly acknowledged, and copyright, where applicable, will be attributed accordingly.

3. USE OF INFORMATION IN THE STUDY	**Yes**	**No**
a) Do you consent to the following data being collected and used for project purposes?		
Biographical data about you. Note: no identifying data will be gathered, e.g., name, address, email hashtag, etc	☐	☐
– Visual output of your feedback and reflection	☐	☐
b) Do you consent to uses of the above data for the following purposes?		
– Presentation and discussion of the project and its results in research activities (e.g., in project meetings, conferences)	☐	☐
– Publications and reports describing the project and its results	☐	☐
– Dissemination of the project and its results, including publications hosted on on web pages and databases	☐	☐

4. FUTURE USE, REUSE AND ARCHIVING	**Yes**	**No**
a) If you have consented to data collection and use, your data may be archived. Do you consent to your data being kept in a form that allows you to be identified?	☐	☐
– **Please note, once archived your data may be reused for other scientific, historical or statistical purposes**		

5. COPYRIGHT LICENSE	**Yes**	**No**
a) I grant the project permission to use, copy, excerpt, annotate, display and distribute any data collected from me in the course of this project for which I hold copyright (e.g., my written and recorded responses) for the purposes I have given consent to and on the grounds upon which my consent stands (e.g., that use of the data does or does not identify me).	☐	☐
b) If reuse of the data has been consented to in section 4, I grant the parties who reuse my data permission to use, copy, excerpt, annotate, display and distribute any data collected from me in the course of this project for which I hold copyright (e.g., my written and recorded responses) for the purposes I have here given consent to and on the grounds upon which my consent here stands (e.g., that archived data is or is not anonymised).	☐	☐

Name of participant (printed): **Date:**

Signature of participant:

STATUTORY INFORMATION AND YOUR RIGHTS

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AUTOMATED PROCESSING AND PROFILING: Your data will not be subject to automated processing or profiling.

DATA STORAGE: Data will be stored securely for an indefinite period for scientific research purposes.

DATA REUSE: Data may be reused for scientific purposes.

RECIPIENTS OF THE DATA: Your data will not be disclosed to any recipients or categories of recipient other than those declared in the information sheet and consent form.

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DATA PROTECTION: Processing of your data, including obtaining, holding, use and disclosure of your data, is regulated by the Data Protection Act 1998, https://www.legislation.gov.uk/ukpga/1998/29/contents

YOUR STATUTORY RIGHTS: You are not obliged to provide the personal data that has been requested. You have right to:

- Access any data we have collected free of charge and electronically
- Object to processing
- Rectification of inaccuracies without undue delay
- Restrict further processing pending investigation of any complaint
- Withdraw consent, without affecting the lawfulness of prior processing based on consent
- Data portability and to receive a copy of the data in an accessible format
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WHO TO CONTACT: Should you have any queries about your data or wish to exercise your statutory rights please contact the data controller:

Name: Agnieszka Dutkowska-Zuk

Address: School of Global Affairs

Lancaster University

LA1 4YR

Email: a.dutkowska-zuk@lancaster.ac.uk

You have right lodge a complaint with the Information Commissioner's Office at any time regarding the treatment of your personal data, https://ico.org.uk/global/contact-us/

Emails that participants received

1) **Invitation**

Subject: Invitation to Participate in “Infinite Data Storage: Future Scenarios” Workshop

Dear [Participant's Name],

We are pleased to invite you to participate in the upcoming online future thinking exercise, *Infinite Data Storage: Future Scenarios* individual workshop. We invite you to join us in critically exploring emerging questions about the future of data and memory. We would value your participation.

This individual workshop is built upon artefact-driven scenarios, in which you will immerse yourself and imagine how memory technologies may transform over time. We are curious about how our relationship with memory itself may shift in response to these future trajectories.

This individual workshop marks our initial exploration, with a particular focus on your responses to the artefacts and the exercise format itself. Your insights will be invaluable in helping us shape a larger-scale study, and in assessing whether the artefacts we have designed are as provocative as we hope they are.

Please find the attached Information Sheet with more details about the project.

Feel free to contact me, Agnieszka, at a.dutkowska-zuk@lancaster.ac.uk if you have any questions about the individual workshop and/or believe you could contribute.

Kind regards,

Agnieszka Dutkowska-Żuk

2) **If someone agrees:**

Subject: Thank you! Please Return Signed Consent Form

Dear [Participant’s Name],

Thank you for agreeing to take part in our workshop.

Before we can begin, please send me a signed copy of the consent form at your earliest convenience **[Link to Individual OneDrive Consent form].** Once I receive it, I will send you the link to the Miro board where the workshop activities will take place.

Please note that the workshop is **individual** — you will go through all activities on your own, at your own pace.

From the moment you receive the Miro board link, you will have **7 days** to complete the workshop.

If you have any questions, feel free to reach out!

Thank you very much,
Agnieszka Dutkowska-Żuk

Lancaster University

3) When the consent form is signed:

Dear [Participant's Name],

Thank you for signing the consent form.

Here is your access link to the Miro board where the workshop will take place:
👉 [Miro board link]

Please find attached instructions for navigating the Miro board. They're also available on the board itself, should you prefer to view them there.

Please note that you have **7 days from today** to complete the workshop. This means your final submission should be completed by **[exact date, e.g., July 7, 2025]**.

I will be available on the Miro board every day between **[time, e.g., 2–4 p.m.]** if you have any questions or would like to chat there.

If you encounter any issues or have questions at any point, don't hesitate to reach out.

Thank you again for your participation!

Kind regards,
Agnieszka Dutkowska-Żuk

Lancaster University

4) **If someone declines:**

Subject: Thank You for your help

Dear [Participant's Name],

Thank you for your email. Of course, I completely understand.

Wishing you a lovely day and all the best in your current projects. If there's an opportunity to collaborate in the future, I'd be happy to reconnect.

Kind regards,
Agnieszka Dutkowska-Żuk

Lancaster University

5) **Thank you at the end:**

Dear [Name],

Thank you for taking the time to participate in the evaluation. Your input is greatly appreciated and plays an important role in helping us understand the impact and effectiveness of the project.

Your reflections and feedback will help us improve future activities and ensure they continue to be meaningful and relevant.

If you have any additional thoughts you'd like to share, please don't hesitate to get in touch.

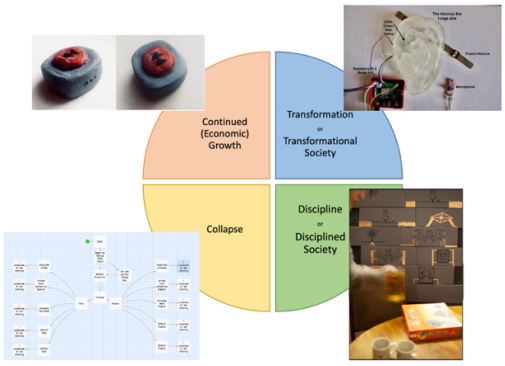
With thanks and best wishes,
Agnieszka Dutkowska-Żuk

Information Sheet

Lancaster University

Participant information sheet

The Infinite Data Storage Future Scenarios Evaluation Study – Individual Workshop



Hello! My name is Agnieszka, and I am a PhD student at Lancaster University. My research on the future of infinite data storage technology is a part of the Material Social Futures research initiative and has been funded by the Leverhulme Trust. I invite you to participate in a research study about the future of Infinite Data Storage – Individual Workshop.

Please take time to read the following information carefully before you decide whether or not you wish to take part.

What is the study about?
This study aims to evaluate the user experience of prototypes of memory devices situated in four different future scenarios, which showcase how interaction with memory technology may change when data storage becomes infinite.

Why have I been invited?
I have approached you because I want to know how people would interact with and react to my prototypes. Moreover, I want to know what people think and feel about the prototypes. To find out, I need volunteers who are willing to imagine the future.

I would be very grateful if you would agree to take part in this study.

What will I be asked to do if I take part?

If you decided to take part, this would involve the following:

1) read short descriptions of the prototypes and imagine using them.

2) answer questions and leave feedback related to their design.

All activities will be held on your individual Miro board. Miro is an online collaboration tool, a platform where you can read about the prototypes, see pictures and virtually interact with them. You will also be able to share your thoughts on the Miro board.

You will complete the exercises independently, with guidance provided and the opportunity to ask questions at any time. I will be available via e-mail and on the Miro board at the appointed time.

You will have 7 days to work through the exercises at your own pace. I anticipate you will need around 2 hours to complete the exercises.

What are the possible benefits from taking part?
If you participate in this study, your insights will contribute to understanding how the future technology with infinite data storage can be shaped and how it is perceived. Additionally, your feedback will help me create future prototypes and workshops. Your input will influence future research on this topic.

Do I have to take part?
No. Your participation in our evaluation of the Infinite Data Storage Scenarios is entirely voluntary. You are not obliged to participate in any part of this study. Alternatively, you may only wish to engage with parts of it, e.g., part 1 but not part 2. If you decide to participate, it is entirely your choice what you contribute.

What if I change my mind?
If you change your mind, you are free to withdraw at any time during your participation in this study. If you want to withdraw, please let me know, and I will extract any ideas or information (=data) you contributed to the study and destroy them.

However, it is difficult and often impossible to take out data from one specific participant when this has already been anonymised or pooled together with other people's data. Therefore, you can only withdraw up to 4 weeks after taking part in the study.

What are the possible disadvantages and risks of taking part?
It is unlikely that there will be any major disadvantages to taking part. However, participation will require investing around 2 hours to go through imaginative exercises regarding the future of infinite data storage technology.

Will my data be identifiable?

After the individual workshop, only I, the researcher conducting this study, and my supervisors, dr Emily Spiers and Prof. Paul Coulton, will have access to the ideas you share with me.

You will go through the workshop individually, meaning no other participant will have access to your contribution.

I will not collect audio/video data. Raw data (your written feedback and notes from the workshop) will be collected on the Miro board server. Processed (transcribed) data will be stored on secure servers. At no time will raw data be put online and made publicly available.

Extracts from the data may be used in research works, including presentations at research events and research publications hosted online. Data extracts will be anonymous and will not identify you. However, if you agree to participate in this study, data extracts may include your written statements.

I will keep all personal information about you (e.g. your name and other information about you that can identify you) confidential; that is, I will not share it with others. I will not ask you for personal information on the Miro board during the study. Nonetheless, I will remove any personal information from the written record of your contribution, if there is any. All reasonable steps will be taken to protect the participants' anonymity in this project.

How will we use the information you have shared with us and what will happen to the results of the research study?
I will use the information you shared with me for research purposes only. This will include my PhD thesis and other publications, for example, journal articles, research publications, and research blog entries. I may also present the results of my study at academic conferences, research events and grant proposals.

When writing up the findings from this study, I would like to reproduce some of the views and ideas you shared with me. I will only use anonymised quotes from the Miro board so that although I will use your exact words, all reasonable steps will be taken to protect your anonymity in our publications.

How my data will be stored
Your data will be stored in encrypted files (that is no-one other than me, the researcher will be able to access them) and on password-protected computers. I will store hard copies of any data securely in locked cabinets in my office. I will keep data that can identify you separately from non-personal information (e.g. your views on a specific topic). In accordance with University guidelines, I will keep the data securely for a minimum of ten years.

What if I have a question or concern?
If you have any queries or if you are unhappy with anything that happens concerning your participation in the study, please contact myself:

Name: Agnieszka Dutkowska-Żuk
e-mail: a.dutkowska-zuk@lancaster.ac.uk
Department: School of Global Affairs

And/or my supervisors:

Name: Dr Emily Spiers
e-mail: e.spiers@lancaster.ac.uk
Department: School of Global Affairs
Office: B169, B – Floor, County Main, Lancaster University, LA1 4YR

Name: Prof. Paul Coulton:
e-mail: p.coulton@lancaster.ac.uk
Department: Lancaster Institute for the Contemporary Arts, Lancaster University, LA1 4YR

If you have any concerns or complaints that you wish to discuss with a person who is not directly involved in the research, you can also contact Dr Derek Hird, Head of the School of Global Affairs:

Name: Dr Derek Hird:
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For further information about how Lancaster University processes personal data for research purposes and your data rights please visit our webpage: www.lancaster.ac.uk/research/data-protection

This study has been reviewed and approved by the Faculty of Arts and Social Sciences and Lancaster Management School's Research Ethics Committee.

Miro Guide

How to Navigate This Miro Board

There Are Three Ways to Navigate the Miro Board — Choose What Works for You

1️⃣ Map Mode (Manual Zoom + Move)

Explore the board freely like a big map:

- **Zoom in/out using your scroll wheel, trackpad or "+" and "- "on the bottom right corner**

- **Hold spacebar + click-drag to move the board around**
- **Look at any section you want, at your own pace**

2️⃣ Presentation Mode (Step-by-Step Walkthrough)

Let Miro guide you through each activity, frame by frame:

- **Click the Frames icon at the bottom center**

- **Click "Present" on your right**

- **Go through each step like a slideshow**

3️⃣ Hybrid Mode (Clicking Through Frames)

Jump directly to sections without dragging manually:

- **Click the Frames icon at the bottom center**

- **Instead of "Present", click frames on the left, they are arranged in order**

- **Instantly jump to each section you want to explore**

Appendix B

Interview Guide

PROBLEM STATEMENTS

Filtering criteria: Current AIMighty's users
Goal: Recruit 15 AIMighty users

- Overall Research Questions:

  1. Why do people use AIMighty?
  2. Did they invite AIMighty themselves or was it their parents choice?
  3. When were they introduced to AIMighty?
  4. What is the difference between browsing Internet with and without AIMighty for users?
  5. What other kinds of Memory apps do they use?
  6. What other kinds of Religious apps do they use?
  7. How usage of these apps correlate with AIMighty?
  8. When and how AIMighty users use any of these other tools?
  9. Do users' behaviours change depending on what AIMighty would show them? (consequences)
  10. Do users' behaviours change depending on what AIMighty could show them? (antecedent)

- Background survey - Demographic Questions (to be sent with a consent form before the actual interview):

  1. Gender
  2. Age (18-25, 26-35, 36-45, 46-55, 56-65, 65<)

3. Occupation
4. Country of residence
5. Nationality 6. Level of education
7. Major

INTERVIEW GUIDE

- Introduction
  1. Introduce yourself
  2. Thank the interviewee for their time
  3. Explain what our project is about. 4. Mention that some questions may feel personal since we will ask about participant's experience and thoughts on AIMighty and that we can stop any time participant wishes to.
  5. Present consent form – explain anonymity. (they can opt out)
  6. Ask for signatures: under first part of consent form and under permission to record.
  7. Make sure participant does not have any questions before you begin.
  8. Start recording.
  9. Ask some warm-up questions

- Memory
  1. Tell me about any tools you use to remember better?
  2. How did you hear about these tools?
  3. How long have you been using them?
  4. Why do you use them? / Why did you stop using them?
  5. Do/ Did you use them while using AIMighty? Why/Why not?

- Religion
  1. Tell me about any tools you use or used to remember better?
  2. How did you hear about these tools?
  3. How long have you been using them?
  4. Why do you use them? / Why did you stop using them?
  5. Do/ Did you use them while using AIMighty? Why/Why not?

MAIN QUESTIONS

- USAGE

  First usage

  1. When did you learn about AIMighty?
  2. How did you learn about AIMighty?
  3. Why did you start using it?
  4. When did you start using it?
  5. Do you remember not using AIMighty? (everyone over 45 should remember)

  Usage general

  1. Do you ever message AIMighty first?
  2. Do you respond to AIMighty? Why yes/no?
  3. If yes when, in what circumstances?
  4. Do you collect points?
  5. Why yes/no?
  6. Are they important to you?
  7. Can you tell me, in general, about your interaction with AIMighty?

  If no:
  -If you have any points what do you use them for?
  -Would you like to collect them?
  -Do you plan starting collecting them?

  If yes:
  -Do you have strategy in collecting points? If so, what kind of?
  -How do you make sure you have enough points?
  -Do you have a strategy in using your points?
  -What do you use them for?

- ATTITUDES
  1. Do you think about AIMighty when using the Internet? Tell me more.
  2. Do you think about AIMighty when using Facebook? Tell me more.
  3. Do you think about AIMighty when not being online? Tell me more.

- OTHERS
  1. Why do you think others may want to use AIMighty?
  2. What do your family members think about AIMighty? What are their attitudes toward it?
  3. Are your attitudes aligned with your family's towards AIMighty?
  4. Do you agree with your family?

- MENTAL MODEL
  1. How would you describe the way AIMighty works?
  2. What data do you think AIMighty uses for your memories?
  3. How do you think it uses them?
  4. Who do you think created AIMighty?

- ADVANTAGES & DISADVANTAGES
  1. Have you ever had any problems with AIMighty?
  2. If yes, how did you manage these issues?
  3. Have you ever reported any issues to AIMighty? Why yes/not?
  4. How would you improve AIMighty?
  5. What do you like about the AIMighty the most?
  6. Would you pay for extra features in AIMighty? If yes, what?
  7. How would you describe your overall experience with AIMighty?

CONCLUSION

1. Ask participant if there is anything they would like to add.
2. Explain what we are going to do with the data.
3. Ask for feedback.
4. Provide compensation or take details for compensation.
5. Stop recording.
6. Ask if the interviewee knows anyone else that wants to participate in the study.
7. Thank interviewee.

Appendix C

Mnemosyne Machine Game

Welcome, you are no stranger to me. Do not be afraid, but do respect my companionship. I will be your leader in today's travels. Something that once was called Mental Time Travel is no longer mental at all. You may use your points given for unregistered memories in the Snowflakes to buy your way in, into the beautiful corners of your history.

Begin my Mental Time Travel

Hello, Billy. Long time no see. I know exactly who you are, but you may need to refresh your memory. Just kidding; I need you to confirm the information for me for security reasons. Your name is William James Turk, but everyone has called you Billy since you can remember. You never thought whether you liked it or not; it just stuck with you, and you accepted it. Now, you are 34 years old. When you were 32, your girlfriend of 6 years, Morgan, broke up with you. Oh, I am sorry, you broke up with her. I know you both have a different recollection of it. As a young adult, you were what I call a typical teenager. Your parents did not have any serious problems with you; the most rebellious you got was smoking one cigarette with your friend, Patrick, in the schoolyard after classes. And this time when you created a petition to cancel Hawaiian pizza from school, saying that it is a disgrace for Italians, even though you had never even talked to anyone from Italy before. You have a dog named Lucky, who is your best friend. You got it after that nasty break-up. He made you feel less lonely. And he continues to do so. Your only dream was to become a violinist, but you failed. You didn't really try, according to my data. You are unsure whom to blame for that. You have been seeking a sense of purpose, convincing yourself every day, that music is not for you. Is that you?

(A) Indeed, this is me.

You are entering your Mental Time Travel Space.
You have 1000 Snowflake points.
Choose your future, and your past, wisely.

Choose

I am travelling

(A1) Past

Choose your Past journey

(A1-1) Wishful Past

You are about to enter Wishful Past, traveller. 500 points will be deducted from your repository for to enter this memory.

I understand. I am entering Wishful Past

"How dare you speak to me like this?" Billy followed Morgan's father, Henry, to the living room. "Excuse me?" Henry replied. "I am not your dog for you to tell me to 'shut up'." Billy snapped back. "If you want us to go upstairs, you can politely ask. But frankly, I don't care that we are louder than your stupid cabaret show. You didn't even ask why our discussion about this violin was so lively. You don't even ask why this piece of wood is so important to me and why I cried when your daughter gave it to me. The violin of your own father-in-law. You'd rather drink beer with your son, whose only job is wasting your money. It's more important to you to make your brain smaller in front of this stupid box. And if you don't apologise, I will never return to this house again." Morgan's mom looked above the tall glass to ensure she would not get a hit from the ricochet. For the first time, Billy left his girlfriend's father speechless.

(A1-2) What if

You are about to enter What If Past, traveller. 500 points will be deducted from your repository to enter this memory.

I understand. I am entering What If Past

Year 1999 "You are not a violinist, Billy. You never will be a classical violinist." Billy's teacher, Mr Bofer, looked at the 10-year-old as if he wanted to pierce him with his eyes. Billy, though, could only focus on the thick moustache attached to Mr Boffer's upper lip. A lip spitting the words like bullets that went through his body. When

he returned home that day, he put the violin under his bed. He made a promise to himself to never look there, ever again. And he decided he would never play violin again.
But first, he needed to tell his parents about his plans. Whether he liked it or not, they were involved in his life and upbringing, and, besides, he needed someone to take the violin from under his bed so he did not have to see them again. He needed to be cool about it. It was nothing. Just a silly little thing in his life that he needed to get rid of with the help of his parents. A bee. Billy went to the living room when they were watching TV. Without unglueing his eyes from the TV, his mother asked:
"How was school, Billy?" Billy started crying. "I...I don't want to play violin anymore," he sobbed. His parents looked at each other. "Why?" "Because my teacher said I can't do it."
–
He wept as silently as he could, not being able to look at their eyes. He knew what would be their response: "Mr Bofer knows violin. If he says so, and you don't want to, then of course, you will not go to Music School again" and they would return to Family Feud. But instead, his mother turned off the TV, stood up from the old, green sofa and took Billy in her arms. Billy started to cry even harder, but she kept holding him until he finally started to calm down. "Billy", she said "Many people in your life will tell you that you cannot do something and you are not good enough. But if you really love something, and we know that you do love playing violin, you cannot stop. Otherwise, your heart will die," she looked at him with a warm smile. "We know that practising is hard and requires a lot of effort and sacrifices from you". Now his dad stood up and touched his head, gliding softly through his hair. "Let's try with another teacher, shall we? For a couple of months. And then you can make this decision, ensuring it's yours and not somebody else's."
Billy did not understand it at that time. He wanted to quit. He felt hatred, which he was sure was directed towards the violin. And Mr Bofer. But what could he do? It was tough to hate his parents right now, though. He promised himself he would never play after he fulfilled his parents' wish to try with another teacher. And then that would be it. Then, he would quit.
–
Year 2022
The weather was awful the whole day. Lucky was lying on the bathroom floor without a single move since the morning walk. The hot humidity made Billy's motion as slow as it had been in the swimming pool. He closed all the curtains in the house, trying to hide away from the bright burning sun. The sweat poured down his shiny forehead. It was this kind of a day, which you can only hope to survive. Billy didn't have any expectations towards it. So his tears blurring his vision as he looked at the email he just received took him by surprise. "You're hired." it said. He couldn't believe it.

After all, Mr. Bofer was right. He never became a classical violinist and did not tour playing Vivaldi. He was touring with Taylor Swift on her Eras Tour as her lead violinist.

–

Year 2023

Billy could not sleep that night. Not because he tried and failed, but because after Taylor sang her final encore, he had to quickly move to her tour bus, as they needed to be in New York in 8 hours to fit the schedule.

"Faster!" someone screamed at him. He almost forgot his violin. Perhaps he would have time once they arrived, but Billy was exhausted. He spent his whole life practising, and therefore he could not do anything else really. He hasn't seen his family for months. He did not have time to call Morgan because of their clashing schedule. When she was coming back from work, he was on the stage either practising or playing a concert. And it wasn't even for his music. Sure, his friends on Instagram loved all his photos with Taylor and commented how jealous they were he was her lead violist in her Eras tour. "Can you imagine getting a ticket for Eras Tour AND getting paid for being there?!?!?! That's my life!! #blessed" he posted the other day.

(A1-3) Impossible

You are about to enter Impossible Past, traveller. You do not need Snowflake points for this memory.

I understand. I am entering Impossible Past

What a game; there was a tie between Croatia and Greece, and only 5 minutes left of the first half. Before that evening, Billy had warned his neighbours and apologised to them in advance for being loud. It was a critical game, and there would be a lot of shouting. Everyone, including Mrs Bradford, did not mind, but some commented on Lucky's barking. Billy and his friends, Patrick and John, were just looking at their watches when Lucky started to bark as at least three robbers came in. "Finally", Billy said, throwing his arms into the air. "I'm coming!" he shouted. Billy went to the door, checked through a peephole and saw a delivery guy. "Can I have a code, please?" "345629," Billy said. "Great, have a nice evening!" the delivery guy left the hot thin boxes in a hurry and left. Billy returned to the living room, where his friends welcomed him with cheering and clapping. "Finally, man!" they shouted. "I'm starving", Patrick added. Billy opened all three boxes at once. The smell of hot dough hit their nostrils right away. The perfectly squared pieces of ham and juicy, yellow triangles of pineapple were perfectly distributed in the golden circumference of Billy's favourite, Hawaiian pizza.

(A1-4) Knowing now

You are about to enter Knowing Now Past, traveller. 1000 Snowflake points will be deducted from your repository for to enter this memory.

I understand. I am entering Knowing now Past

When Billy opened his still sleepy eyes, he saw a grey mass through the window. Billy just hoped these were clouds. He grunted, looked right and saw an empty space on the other side of the bed. Morgan had to wake up already. He looked at the clock on the bedside table. 8:24, he almost slept in. That annoyed Billy even more. Couldn't Morgan wake him up? He sat down on the edge of the bed and saw Morgan standing next to the door. "I'm leaving." "So? Couldn't you at least wake me up? Thanks." Billy grunted. "No, Billy, I am leaving." Morgan repeated. He just noticed the suitcase in the hall. He looked at her tiny face, which tried so hard not to cry. He only felt anger, and she knew that. So she quickly left. Two years later, Billy was still living in the same apartment. He was walking his dog, a bulldog named Lucky, which he got shortly after the break with Morgan, when he saw her, with a beautiful, royal-looking dalmatian. She smiled. "Hi." she said. "Long time no see." he replied. "He's adorable." she looked at Lucky. "Yeah, he is. Yours is adorable as well." She smiled again. "Look, I owe you an apology. I know I was a jerk for you. I..." "That's fine." she cut him. "No, I just wanted to tell you I understand why you decided to leave and ...I am sorry." Billy looked at Lucky, waiting for emotional support. "I appreciate that. But really, I forgave you, and I moved on. See?" She showed him her hand. A magnificent blue stone with a halo of white, sparkly diamonds framed in gold. "I am good, Billy." She smiled again. "Silly! Come here." she then looked at Billy: "See you around?". And again, she left.

(A1-5) At that time (known as Suprise me)

You are about to enter At that time Past, traveller. You do not need Snowflake points to enter this memory.

I understand. I am entering At that time Past

When Billy opened his still sleepy eyes, he saw a grey mass through the window. Billy just hoped these were clouds. He grunted, looked right and saw an empty space on the other side of the bed. Morgan had to wake up already. He looked at the clock on the bedside table. 8:24, he almost slept in. That annoyed Billy even more. Couldn't Morgan wake him up? He sat down on the edge of the bed and saw Morgan standing next to the door. "I'm leaving." "So? Couldn't you at least wake me up? Thanks." Billy grunted. "No, Billy, I am leaving." Morgan repeated. He just noticed the suitcase in the hall. He looked at her tiny face, which tried so hard not to cry. He only felt anger, and she knew that. She quickly left.

(A2) Future

Choose your Future journey

(A2-1) Wishful Future

You are about to enter Wishful Future, traveller. 500 points will be deducted from your repository to enter this future.

I understand. I am entering Wishful Future

The hot rays of sunshine and the soft jazz music coming out of the kitchen woke Billy up. He stretched his muscular body out. His cheek felt the refreshing sensation of the cool pillow. Lucky was still snoring under his bed. Now, Billy could smell the coffee. He smiled and opened his eyes. Morgan was standing in his shirt, holding two cups of coffee in each hand, looking at him and smiling. "Good morning, handsome." she said. "Good morning beautiful." Billy replied. "Breakfast ready. Omelette with tomatoes, your favourite." she added. Billy reached his hand to her: "Just come to bed." She frowned but smiled at the same time. "Just five more minutes." He encouraged her. Morgan put the cups on the bedside table. Billy spooned her, holding her in his arms. He was falling asleep again. Her hair smelled like passion fruit, as it always did.

(A2-2) What if

You are about to enter What If Future, traveller. 500 points will be deducted from your repository to enter this future.

I understand. I am entering What If Future

Billy has just finished the Mnemosyne Machine confession. He usually liked pondering on the Past; he barely spent his points, usually choosing the 'At that time' option. 'Knowing now' was his favourite, but he did not want to spend his points too often. It seemed frivolous to him. So, He was not sure what made him choose differently this time. His finger didn't point on the Past as usual. He could feel the rush, an excitement as the Future went light blue on the screen. He clicked. The story he read was long; they were usually a little bit shorter. Short and sweet, to the point. But the story seemed incredibly long this time. The context was complex, tangled and messy. And Mnemosyne never omits the context. That's the point of its written content. Billy always thought that the Future is for dreamers. For people who are not here and now, who do not want to understand the consequences of their actions, weak people who cannot look themselves in the mirror. So why did he feel like he, for the first time in his life, truly took a look at the mirror? Starring at all the Ifs,

predictions and his wishes. Who could he become? Who is he actually becoming? That day, Billy decided he could not dream about the past, thinking it was his future. He understood that the only good prediction of the Future he could make was by creating it. He needed to take action.
Two days later, he sat in the coffee place "BeBackSoon". He was unbothered by the smell of the sugary latte and the sound of cutlery hitting the plates and accompanying their conversations. He did not look at his phone as he usually did. He did look around for a magazine or anything of that sort. He was waiting patiently. "Hi." he heard the voice he had been waiting for. "Hi." he heard himself replying. "I can't believe you called." "I can't believe you answered." Billy said. "How are you?" "I am good. And you?" he asked. "I am good too." She smiled. Billy and Morgan talked for four hours that warm afternoon.

(A2-3) Impossible

You are about to enter Impossible Future, traveller. You do not need Snowflake points to enter this future.

I understand. I am entering Impossible Future

The breeze finally covered Billy's forehead. He'd been waiting for it for a whole week. After the long days of heat, the storm hit suddenly; right after 11 p.m., Billy was smoking a cigarette on his parents' porch. It was a new habit for him. He got used to Patrick's cigarette during Thursday evening beer pong. "Do you want one?" a harmless offer, as Billy had thought then. "Sure, why not? For the sake of good times." Billy answered. He didn't even notice when he bought himself a packet.
Billy could not believe that he still lived with them at 42. But they were not home; they went to Croatia with his brother's family. He was stuck with Nana. His parents decided to give Nana the last years of her life surrounded by her family. Billy opposed. He wanted to place her in the old people's home. He believed it would be better for Nana, his parents, him and their relationship. But it was not his house, so he did not have a vote. He was outnumbered anyway. Besides, his parents were convinced it would take around three months, perhaps six, before Grandmother would die. They should have made the best of it.
It had been four years since Muriel had been chained to bed. Most of the work around her was on Billy's shoulder. He had to change her, put her in the wheelchair, take her to the toilet, clean her. His parents did not have physical strength anymore. Emotional as well, they were impatient and could not follow Nana's stream of consciousness powered by Alzheimer's. So he was also the one who would listen to her and talk to her. Needless to say, Billy was tired. So that night, when he heard his Grandmother snoring, he understood how alone he was. He went to his

Grandmother's room. Her dentures, which he put in and pulled out every day, sunk in the water next to her bed. He sat down with her, looking at her tiny body, raising and falling as she breathed. He listened to her snores attentively, as to find something more than just a somewhat torn sound. He then stood up, took the pillow behind her back, and put it on the snoring face of her Grandmother. She didn't fight much. It took longer than he expected. He then stood up, went outside and light another cigarette. Billy could feel the breeze again.

(A2-4) Knowing now

You are about to enter Knowing Now Future, traveller. 1000 Snowflake points will be deducted from your repository for to enter this future.

I understand. I am entering Knowing Now Future

"Grandma, come on, that's enough". Billy looked up and put his hands into his pockets. "There is one more spot we need to go to. Just one more spot, honey". Billy was losing his temper. He promised to come with his grandmother for a walk, but he hoped it would take 15, perhaps 20 minutes. How long could an old lady walk? But around the 45 minutes of their going out, he could not do it any longer.
"Nana, look, I have an important meeting tomorrow, and I need to get ready. I cannot go to another spot." Billy tried to rush her back.
"You haven't called me Nana for a while now." she looked at him with big blue eyes, framed into deep wrinkles.
Billy was not sure what to say.
"We don't even walk, and it was supposed to be your "workout" time, exercise, actual walk. And we only sit and feed these awful flying rats."
Nana paused for a second, looking at the birds pecking the crumbs in front of her. She then looked at Billy again, and with the purest voice of a six-year-old girl, she asked, "Just one more minute? The small brown one, that one there, did not have a chance to eat yet."
–
"Could you please stop, grandma?!" Billy's dad shouted from the window. "How many times am I supposed to tell you I don't want these birds on my patio!" "He's right, Nana. They're kinda gross."
Since Grandmother broke her hip, she moved in with her son and daughter-in-law. She could not go for walks anymore, at least not for some time, but someone would take her out to sit in the garden. The garden was nothing incredible, really; just a neatly cut grass and some coniferous trees. She would sit on the wooden bench, looking straight into attentive orange eyes. She would throw small but generous portions of leftover bread, which she had hidden from breakfast. Whenever Billy's dad or Billy

himself told her anything about not feeding the birds, Nana would look at them as if this was the most shocking news she had ever heard in her long life. Then, she would return to her duty and continue to pinch the small bites of the bread, attracting more pigeons, sparrows and jackdaws.
"Ungrateful old witch. She is not the one who is mowing the lawn. She is not the one who bought garden furniture. Just die, old witch." Billy could hear his dad while closing the window from his bedroom.
"Nana, you should stop. You're upsetting dad. Let's go inside." And he pushed her wheelchair and brought her inside. Nana was clearly unsettled. She frowned and opened her mouth slowly trying to say something. She didn't make a sound and after a second, she closed her mouth as slowly as she opened it. From that day on, Billy always looked after her stashed bread after breakfast and got rid of it before she could remember she even had it.
–
Billy went to the cemetery at least once a month but usually every other week. He would ensure that Nana's grave monument was clean, as she was always a very well-groomed lady. He would take the sticks and other leaves falling on the grave; sometimes, he would throw out old candles and replace them with new ones. He also tried to remember about the fresh flowers. But he always remembered the most important. That day, he asked her, "Do you remember the old vet from across the hall? Your favourite neighbour? Well, I bumped into him last week while cleaning your apartment. He looked quite sad, so I asked him to come and drink some tea with me. He told me incredible stories about him" Billy paused. "and you. I didn't know you liked each other. I mean, like, like each other. He would have been a great grandpa, to be honest. He was, actually. But he also told me about your childhood. And I...I am so sorry, Nana. I am so sorry, I was so shitty towards you at the end. I understand now. You just didn't want them to be hungry. Like you once were. No wonder I didn't get it. I was very lucky in my life, you know? Especially by knowing you." He took out the bread out of his pocket. Small round bits would roll between his thumb and index finger. He looked at the patch of grass next to him and threw the first couple of crumbly bits. A brown, small pigeon showed up immediately. A dozen other pigeons followed him right after.

(A2-5) At that time (known as Suprise me)

You are about to enter At that time Future, traveller. You do not need Snowflake points to enter this future.

I understand. I am entering At that time Future

"Grandma, come on, that's enough". Billy looked up and put his hands into his pockets. "There is one more spot we need to go to. Just one more spot, honey".

Billy was losing his temper. He promised to come with his grandmother for a walk, but he hoped it would take 15, perhaps 20 minutes. How long could an old lady walk? But around the 45 minutes of their going out, he could not do it any longer.
"Nana, look, I have an important meeting tomorrow, and I need to get ready. I cannot go to another spot." Billy tried to rush her back.
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"Could you please stop, grandma?!" Billy's dad shouted from the window. "How many times am I supposed to tell you I don't want these birds on my patio!"
"He's right, Nana. They're kinda gross." Since Grandmother broke her hip, she moved in with her son and daughter-in-law. She could not go for walks anymore, at least not for some time, but someone would take her out to sit in the garden. The garden was nothing incredible, really; just a neatly cut grass and some coniferous trees. She would sit on the wooden bench, looking straight into attentive orange eyes. She would throw small but generous portions of leftover bread, which she had hidden from breakfast. Whenever Billy's dad or Billy himself told her anything about not feeding the birds, Nana would look at them as if this was the most shocking news she had ever heard in her long life. Then, she would return to her duty and continue to pinch the small bites of the bread, attracting more pigeons, sparrows and jackdaws.
"Ungrateful old witch. She is not the one who is mowing the lawn. She is not the one who bought garden furniture. Just die, old witch." Billy could hear his dad while closing the window from his bedroom.
"Nana, you should stop. You're upsetting dad. Let's go inside." And he pushed her wheelchair and brought her inside. Nana was clearly unsettled. She frowned and opened her mouth slowly trying to say something. She didn't make a sound and after a second, she closed her mouth as slowly as she opened it. From that day on, Billy always looked after her stashed bread after breakfast and got rid of it before she could remember she even had it.

(B) No, you got the wrong guy.

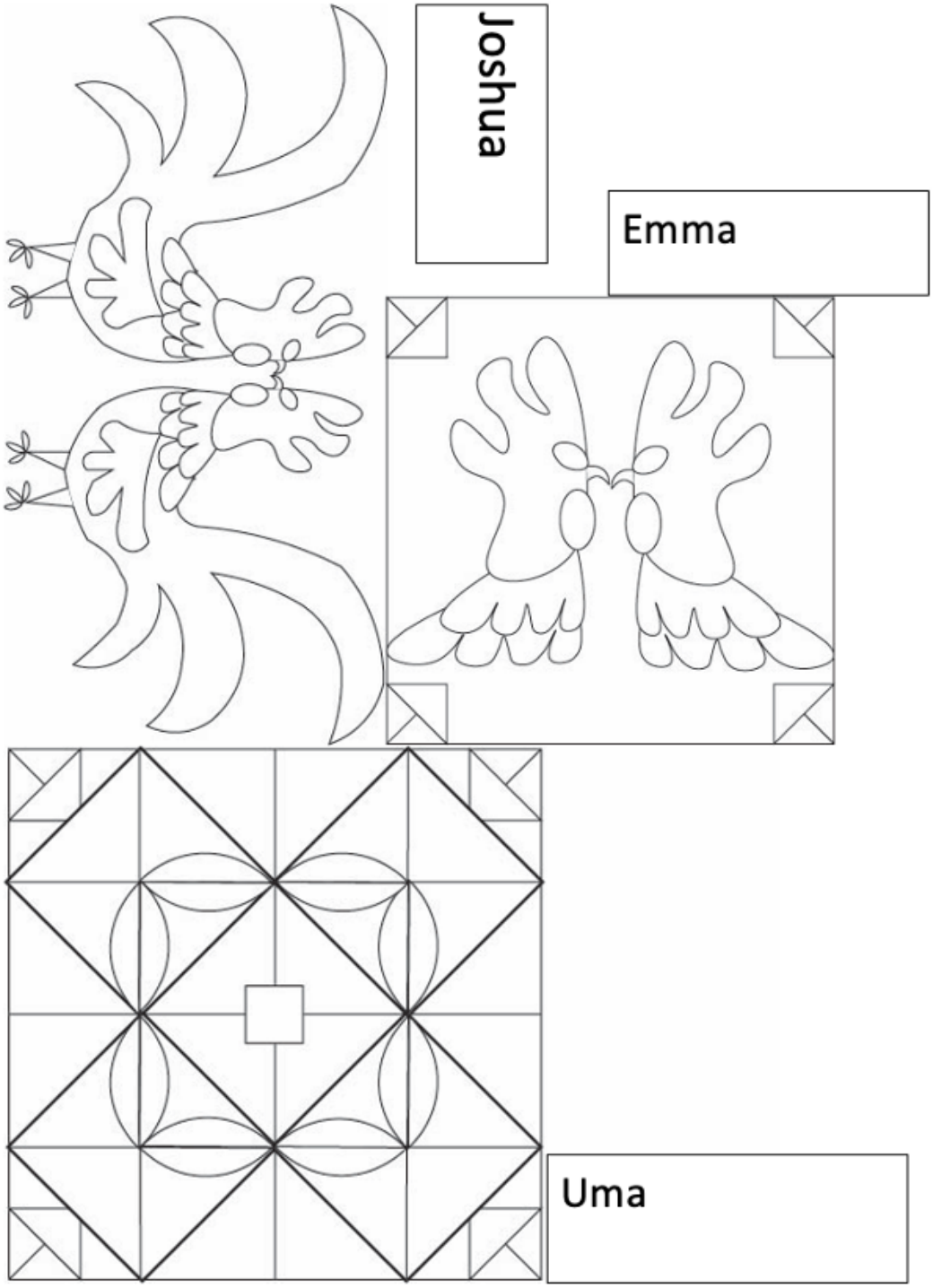
Well, I know it IS you. I know every inch of your face, your every gesture, and how your eyeballs move when you are under stress, not to mention your fingerprints.

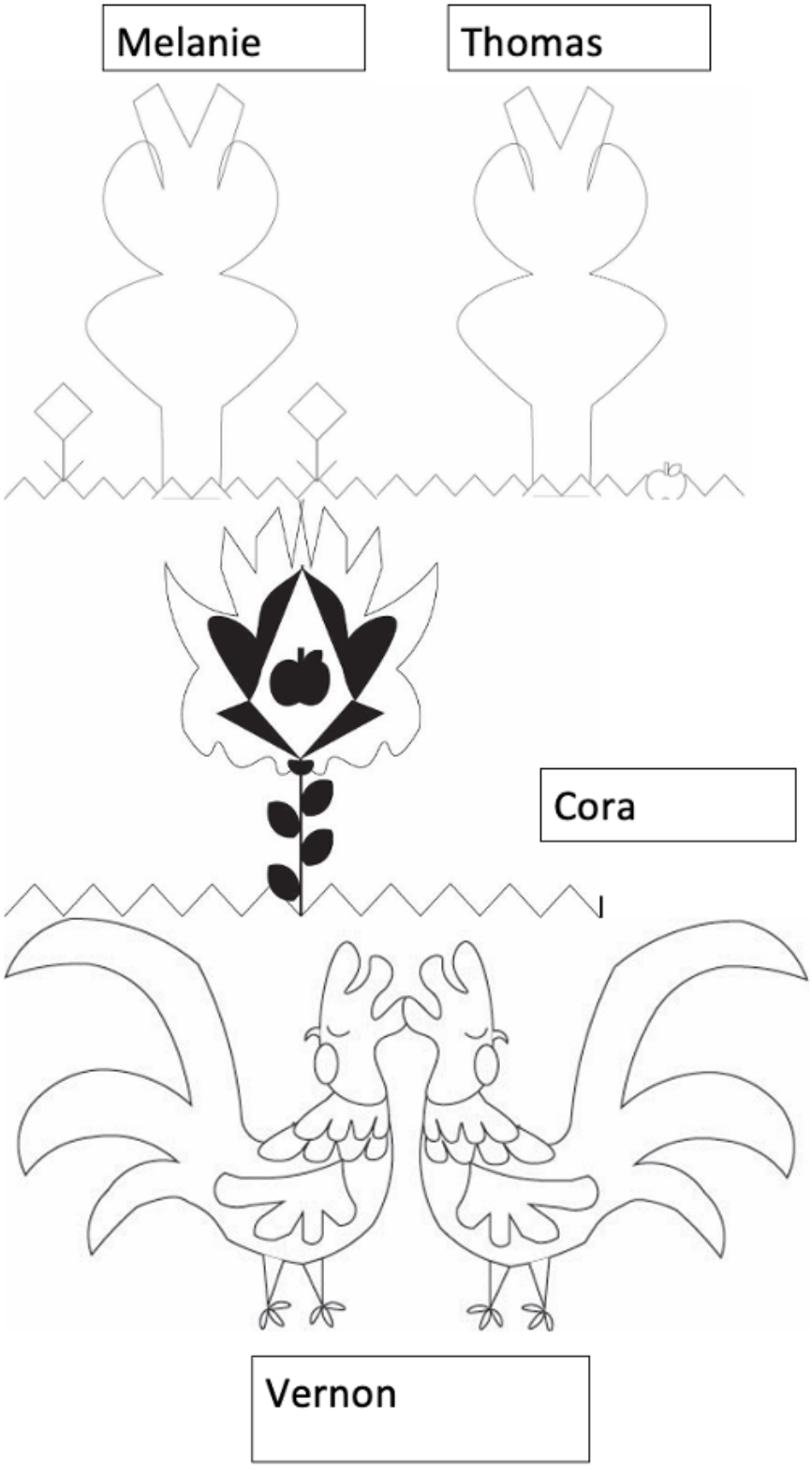
If you are trying to escape today's confession, I am sorry; you do not have enough Snowflake points to do that. I will give you the benefit of the doubt and assume you missed the correct answer. Now, there's only one:

(A) Indeed, this is me.

Appendix D

Tiles Paintings


Joshua
Emma
Uma


Melanie
Thomas
Cora
Vernon

Appendix E

Tiles Stories

1. Joshua Wellington

Joshua married Uma when they were both 32. They led a simple life, but Joshua believed it was a good life. He thought he had a great relationship with his kids, Emma and Vernon.

He had one daughter outside of his marriage, Judy. He never told Uma about her.

Before he met Uma, Joshua went through a divorce with Paula May. He was the one who cheated on her, but she was the one who decided to divorce. They had no children, which made Joshua happy since he thought he could start his tiled stove relatively clean as long as he did not talk about Judy. Joshua did not like talking about Paula. He did not like talking about his feelings towards Uma, either.

2. Uma Wellington, née Monter

Uma and Joshua got married in 2042. Between 2045 and 2050, Uma and Joshua bought a tandem and rode it to their favorite bakery on the corner of two streets every Saturday. She later tattooed this tandem on her left thigh. Uma missed her mother, Laura, very much throughout her life. She died when Uma was 21, and they had had a powerful bond. Uma would always say that Emma is a spitting image of her grandmother, Laura. But she would always see her beloved mother in Vernon's eyes.

3. Emma Wellington

Emma found it strange that her father, Joshua, was uninterested in her and her brother's lives. Of course, many of her friends were jealous of her as she had more freedom than a regular teenager, but she, on the other hand, was envious of feeling

like no one cared about her. Emma felt that her mother was only focused on Emma's dad; Emma believed she was panicky about losing him to another woman since he had been married before and he had cheated before.

She and her younger brother Vernon used to love playing basketball together; Emma loved teaching Vernon how to play. They would go to one basketball court near their house.

4. Vernon Wellington

Vernon married Melanie Thompson in 2079. He did not love her, but he respected her as a partner. He has two children, Cora and Thomas. Cora is his and Melanie's biological daughter, and he is Thomas's stepfather.

When he was a kid, Vernon loved learning to play basketball from Emma, his sister. Emma's tragic death when she was just 17, and he was 14, was incredibly hard for Vernon. He could not come back to playing ever since.

Vernon wanted to become a veterinarian, but his parents did not support him. Without Emma having his back, he decided not to follow this path, which made him forever resentful toward his parents, especially his mom. He did not know why, though.

5. Melanie Wellington, née Thompson

Melanie married Vernon in 2079. After years of unhappy (in her eyes) marriage, she decided to cheat on Vernon. She has never told anyone, including Vernon, that Cora is not his child. Her son, Thomas Johnson, is her son from her previous relationship.

6. Cora Wellington

Cora is Vernon and Melanie Wellington's daughter. At the moment, Cora is five years old, and she is the sweetest little girl. She enjoys being held by both of her parents. She is told that she looks like her auntie Emma but has never seen her around.

7. Thomas Johnson

Thomas is Melanie's 15-year-old son and Vernon's stepson. Thomas used to adore spending time with his mom. He loved it when they used to go to an ice cream store near his school and drive together to watch the sunset over the mountain above the city. Even though it was not an easy transition for him, he tried to be as friendly with Vernon as possible. Thomas was scared of Vernon for a long time because of

his explosive reaction to Thomas's invitation to a basketball game. This made them distant until Cora touched Vernon's tile around him. He wished he knew how hard it was for Vernon. He also feels isolated since no one wants to tell him anything. Thomas does not know his biological father. He has an ok relationship with his grandparents and his aunt from the side of his mother (last sentence was hard to record).

8. Link

Family. Joshua and Uma Wellington were married. Vernon and Emma Wellington were Joshua's and Uma's children. Vernon Wellington and Melanie Wellington are married. Cora and Thomas Wellington are Vernon and Melanie's children.

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