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# Digital Immortality and Virtual Humans

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## Abstract

The use of virtual assistants such as Siri that provide voice and conversational interfaces, the growth of machine learning techniques to mine large data sets and the rise in the level of autonomy being given to computer-controlled systems all represent shifts in artificial intelligence that are enhancing the creation of digital immortality. The growth of personality capture and levels of brain simulation as well as computationally inspired life after death may change the future of religion, affect understandings of the afterlife and increase the influence of the dead surviving in society. This paper provides an overview of recent developments in the area of digital immortality, explores how such digital immortals might be created and raises challenging issues. It presents the early findings from a study that created a virtual persona. This prototype system contains relevant memories, knowledge, processes and modelling of an individual's personality traits, knowledge and experience and, also, incorporates the individual's subjective and possibly flawed view of reality. It is argued that this system offers the possibility for the development of a persona that learns post-death.

**Keywords** Digital immortality · Virtual humans · Chatbots · Autonomous agents · Artificial intelligence · Machine learning

## Introduction

This paper presents research on digital persona creation and reflects on the possibilities for the development of a persona that learns post-death. The idea of creating digital immortality is raising concerns from those in the field of software development. In a

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recent study, Maciel and Pereira (2013) found that religious and moral values affected the perception of death, which in turn affected design solutions. Studies such as this illustrate how cultural, political and religious beliefs can affect the technical landscapes around the design of digital immortality. Companies such as Eter9, Lifenaut and Eternime are all purporting to be offering chatbot-based versions of digital immortality, but the challenges of creating an effective digital immortal are considered here within the context of creating a virtual persona of a living person for use whilst they are still alive.

## Research and Literature

The possibilities for creating digital immortality have become more sophisticated through technological advances. For example, Google Duplex was recently able to book a restaurant table verbally without the other party realising that they were talking to a computer (Leviathan 2018). There are companies that are dedicated to creating digitally immortal personas such as Eter9 (Bearne 2016), Lifenaut (2017) and Eternime (2017) and the now defunct Intellitar (Fussell 2016Facebook has now put in place measures to control the post-mortem data on their site (Brubaker and Callison-Burch 2016), although this does not appear to be as effective as many people would wish. Steinhart (2014) has examined personality capture, mind uploading, and levels of simulation, arguing for a computationally inspired theory of life after death that will change the future of religion radically.

The idea of being able to live on beyond your natural death has a long history in our culture and remains popular in novels, such as *The Night's Dawn Trilogy* by Peter Hamilton. Prior to our technological age, the agency for this was typically the ghost, and the twentieth century saw examples from *The Ghost and Mrs Muir* to *The Sixth Sense*. In the digital era, most of the Artificial Intelligences within science fiction have tended to be 'evolved' artificial intelligence, such as SkyNet in *Terminator* and Ultron in the *Marvel* films, which have become sentient rather than being created as digital immortal personas of other people. However, there are examples, particularly in the science fiction of the last decade or so, where the artificial intelligence are digital immortals, or at least are the digital copies of real people. As well as *Caprica* (the *Battlestar Galactica* prequel, where Zoe Greystone has been creating a copy of herself, but she then dies leaving the digital copy to carry on her legacy), there is also Eunice, a digital copy of a now dead matriarch from Alisdair Reynold's *On the Steel Breeze* (Reynolds 2013) and *Poseidon's Wake* (Reynolds 2015). The potential of digital copies of dead people is tackled head-on in the '*Be Right Back*' (Brooker 2013) episode of the Black Mirror TV series. A slightly different take is found in the novel *Kiss Me First* (Moggach 2014) where a computer-savvy loner 'covers' for a woman who commits suicide, extending her electronic presence beyond her death. What is interesting about all these constructions is that the digital persona is very much living in the here and now of their progenitor's death, rather than facing up to the implications of potential immortality, which is reflected in the rise of digital endurance concepts.

# Digital Endurance Concepts

Digital endurance concepts have developed in order to make sense of the ways in which digital technology is being harnessed to commemorate and memorialise the dead. These can provide useful frameworks in which to consider digital immortality issues:

## Digital Persistence

Kasket (forthcoming) argues that online persistence and the ongoing presence of the data of the dead online will lead to more of a globalised, secularised ancestor veneration culture, and it is important to recognise the ongoing persistence of the dead online on social media, LinkedIn, Amazon, and YouTube.

## The Restless Dead

Nansen et al. (2015) take this further and argue that forms of digital commemoration are resulting in cultural shifts towards a restless posthumous existence. Thus, there is a shift away from the idea of death as being sleep or rest (Hallam and Hockey 2001), towards the restless dead, as they materialise through social media and technical capabilities. Such media include living headstones, digitally augmented coffins and commemorative urns embodying the head of the deceased, and which are seen to interrupt the previous limitations of cemeteries, static headstones and biological death.

## One-Way Immortality and Two-Way Immortality

Savin-Baden et al. (2017) suggest that ultimately, the important distinction will be between forms of digital grief which are essentially one-way (or passive) and those which are two-way (or active). The former is where the recipient can read about the deceased in some form of digital memorial, either intentionally created (for example, using a site such as SocialEmbers web service or the KeepTheirMemoryAlive mobile phone app) or an existing system which lives on after their death, such as a person's in-life profile that has been put into memorialised/remembering status in services such as Facebook. Two-way immortality is where there is the possibility of the digital entity interacting with users and visitors, and with the rest of the living world, in the form of a chatbot or virtual human. This interaction could be in a wide variety of forms, from two-way text or even voice and video conversations, or by the virtual human manipulating real world systems such bank and investment accounts (Godfrey 2018; Dzieza n.d.).

# Digital Grief Practices

Digital grief practices are particular practices that have developed through media and digital media and that have become acceptable norms and are the most common ways in which digital grief is likely to be encountered today. Although less sophisticated than the virtual personas to be discussed later, they do show how some of the initial concepts of digital grief are entering into our culture:

### Media Mourning

Media mourning is defined here as the idea that we are urged to mourn something that is not our grief through social media, such as the 2017 Manchester Arena bombing, or to mourn our personal loss through social media in a highly public way.

### Durable Biography

Walter (1996) argues that the purpose of grieving is to construct a durable biography that allows survivors to continue to integrate the deceased person into their lives and to find a stable and secure place for them. In practice, this now tends to occur more often through digital memorisation and the use of companies such as Eternime.

### Virtual Veneration

This is the process of memorialising people through avatars in online games and 3D virtual worlds. An example of this is ancestor veneration avatars (Bainbridge 2013) that are used as a medium for memorialising the dead and exploiting their wisdom by experiencing a virtual world as they might have done so.

### Digital Commemoration

Digital commemoration is a practice that crosses the boundaries of digital immortality and digital legacy to provide particular commemoration services. These include memorials and tribute pages hosted on special memorial sites; ceremonies, such as funeral and memorial services in 3D Virtual Worlds such as Second Life; solar power headstones with a Quick Response (QR) Code (the matrix barcode) that provide information about the deceased; and digitally mediated funeral practices, such as augmented coffins. There are also free services to enable you to light a candle, such as the Centre for Healing Arts and the Walser Funeral home where you can pay for a memorial candle, monthly, annually or forever. Death management company Everplans provides a list of typical digital commemoration services at https://www.everplans. com/articles/the-top-10-online-memorial-websites.

### Death Management

Some people wish to take a more proactive role in managing their post-death presence. For example, websites such as Dead Social enable users to instruct their Facebook and Twitter accounts to post-future updates after they are dead, such as pre-prepared birthday messages. It prompts you to create a social media will, quoting the UK Law Society, presumably as a means of self-legitimation. Whilst the service is free, Dead Social has distinct enrolment periods and during enrolment, they allow 10,000 users to subscribe to the service. It is also increasingly common for people to create a digital will in which they indicate what is to be done with their digital legacy and assets, and includes, passwords and security questions.

## Digital Immortalisation

With the emergence of such digital immortalities, it is useful to identify the different people who are likely to encounter such digital legacies, including relatives, friends, lawyers, politicians and religious leaders. These may be of three principal types:

- Preservers—who use memories and artefacts to create a legacy, such as a representative avatar or digitally immortal persona, and which may include the deceased themselves before death
- Receivers—who receive the memories and artefacts, including representative avatars or digitally immortal persona
- Mediators—professionals who encounter legacies, representative avatars or digitally immortal persona, such as priests or lawyers

It is clear that there needs to be an understanding of what seems to be the emergence of the different ways that 'creating' digital immortality can both result from and create digital legacies and traces and the impact these may have on both recipients and wider society (Harbinja 2017).

Three potential types of creators of digital immortalisation can be identified:

- Memory creators—those creating passive digital memories and artefacts pre- and post- the subject's death. These have already been considered above in examples such as virtual venerations, digital commemoration, digital memorisation and durable biographies and are typically not created by the subject.
- Avatar creators—those creating a representative interactive avatar pre-death, typically by the subject, which is able to conduct a limited conversation with others but has a very limited capability to learn, grow, act on and influence the wider world around it (and hence could be considered a virtual humanoid in the typology identified by Burden and Savin-Baden 2019). It has minimal likelihood of being mistaken for a still-living subject.
- Persona creators—those creating a digitally immortal persona pre-death that learns and adapts over time and can influence and act on the wider world around it (and hence could be considered a virtual human or even ultimately a *virtual sapien* (Burden and Savin-Baden; 2019). It has a high likelihood of being mistaken for a still-living subject.

All of these are likely to draw on a person's existing digital legacy. The digital legacy comprises any information that exists in digital form after death and includes social media profiles, email, online shopping accounts, digital music and photos, as well as account information, digital assets, and digital property, things that are static once the user has died (Bassett 2015, 2017). The growth of machine learning techniques to mine large data sets such as these, making deductions from them that can equal human analysis, and the rise in the autonomy being given to computer-controlled systems is all having a relatively unknown impact on society when the original subjects are living, as well as when the subjects are deceased.

Increasingly, these digital legacies are in the form of 'digital traces'—the digital footprints left behind by interaction with digital media. These tend to be of two types:

intentional digital traces—emails, texts, blog posts, Facebook and photographs—and unintentional digital traces—records of website searches, logs of movements and phone calls. Accidental residents of the digital afterlife who leave unintentional traces are seen as internet ghosts or the 'restless dead' (Nansen et al. 2015). The somewhat eerie consequences and impact on recipients are unclear, particularly in relation to ancestor veneration avatars where people are immortalised as avatars in online role-playing games (Bainbridge 2013). The traces may be intentional creations pre-death, or unintentional for the dead but intentional by those left behind.

## Digital Immortality Creation Options

There are already companies that are actively trying to create computer applications which are predicated on the creation of avatar-level digital immortalisation. It can be hard to separate rhetoric from reality, but a survey of the three such systems Eter9 (2017), Lifenaut (2017) and Eternime (2017) is provided below:

### Eter9 (https://www.eter9.com/)

Eter9 describes itself as 'is a social network that relies on Artificial Intelligence as a central element' and that 'Even in your absence, the virtual beings will publish, comment and interact with you intelligently.' A key element are Counterparts:

> your Virtual Self that will stay in the system and interact with the world just like you would if you were present. Your Counterpart will learn more with each action you take. The more you interact in the new social network, the more your Counterpart will learn!

Such a Counterpart is able to continue to post and interact with others on the network after you are dead (Morse 2015). In practice users, post tweet style messages ('thinking into Eternity') which can be read by other users of the system (if set to 'public' or 'connections'), and also, it is assumed, start to build the knowledge base of the Counterpart (although how this happens is not detailed). There are also 'Eternilisations', effectively favourite posts. Eliza Nine, the host bot has (as at 3 Jul 18) 54467 connections, which is probably a reasonable estimate of the user-base to date, active users seem significantly less than that. There is no obvious way in which you can access your own or other's Counterparts in order to see how well they are developing, if at all.

### Lifenaut (https://www.lifenaut.com/)

Lifenaut works on a similar principle to Eter9, enabling people to create mind files by uploading pictures, videos and documents to a digital archive, but this is an explicit process rather than a background one as with Eter9. It also enables the user to create a photo-based avatar of the person that will speak for them, although there is the choice of only a single male and female voice which are both US English. Lifenaut is a product of the Terasem Movement Foundation (http://www.terasemmovementfoundation.com/)

which describes its work on Lifenaut as being to investigate the Terasem Hypotheses which state that:

1. a conscious analogue of a person may be created by combining sufficiently detailed data about the person (a 'mindfile') using future consciousness software ('mindware'), and
2. that such a conscious analogue can be downloaded into a biological or nanotechnological body to provide life experiences comparable to those of a typically birthed human.

In practice, Lifenaut offers a number of ways to build a 'mindfile'. These include:

- Just talking to a few sample bots, although the conversations seem non-sensical and they appear to ignore what you say
- Filling out some interview questionnaires, including some 'validated' personality profiles, including a 486 question personality survey measuring cautiousness, conscientiousness, cooperation, gregariousness and nurturance.
- Talking to your own avatar so it learns from what you say, although this appears to require an explicit 'correction' action
- Manually adding favourite things and URLs, although your bot does not appear to learn them once added.

It is however also possible to have your mindfiles beamed continually into space for later, potential, interception and re-creation by alien intelligences. It is notable that much of the site functionality is implemented using the now deprecated Adobe Flash and so hard to access from modern web-browsers and completely unsupported by the end of 2020 (Mackie 2017).

### Eternime (http://eterni.me/)

When using Eternime, the individual is expected to train their immortal prior to death through daily interactions. Data are *apparently* mined from Facebook, Fitbit, Twitter, e-mail, photos, video, and location information with the individual's personality being developed through algorithms through pattern matching and data mining. Eternime is currently in a private stage (as at June 2018, and at July 2018), so it is not yet possible to verify any claims or really understand what technology is in use. As of 3 July 2018, 40.497 people were signed up for their wait list.

Given the practical state of Eter9 and Lifenaut, and the continued 'private Alpha' of Eternime, it would seem that there is more hype than substance to much of the current media coverage of such digital immortalisation systems. There are also other high-profile android/chatbot projects which should be approached with caution. For example, in Autumn 2017 Sophia, a humanoid robot gave a 'speech' at the United Nations (United Nations 2017) and has even been granted citizenship of Saudi Arabia (Griffin 2017). Whilst this may encourage recognition of the fact that there needs to be more debate, as well as legislation in this area, the level of technical accomplishment actually shown is hotly debated (Ghosh 2018).

## Creating a Virtual Persona

In an attempt to understand what is and is not currently possible in terms of creating a chatbot which could form the basis of an avatar-level digital immortalisation, Daden, KSharp, the University of Worcester and the University of Warwick[1] have been working to create a virtual persona, which is a digital representation of some of the memories, knowledge, experiences, personality and opinions of a specific living physical human (Savin-Baden and Burden 2018). This work should be contrasted with, for example, the digital copies of Holocaust survivors Pinchas Gutter and Eva Schloss created by the USC Shoah Foundation (McMullan 2016) which work off a fixed store of around 1000 recordings of sentence level responses and have no flexibility in what they do. The intention, in the current study, is that a user would be able to interact with the Virtual Persona in the same way as they would with its physical subject, and that the Virtual Persona would present the same highly subjective and possibly flawed and biased information, views and opinions as its physical subject.

The scenario that is driving the development of the Virtual Persona is not the creation of a digital immortal per se, but rather the creation of a persona which could be 'left behind' when an employee moves from one job to another. It could be accessed by their successor in order to get advice on how to do the job, and opinions and information on projects, clients, customers, suppliers, technologies, procedures and staff. The project and persona are very much seen in the context of knowledge management and intended to explore how a virtual Persona could aid in knowledge capture, retention, distribution, access and use.

In the context of digital immortality though, the ability to access the acquired knowledge, experiences and insights of someone who is no longer available could offer guidance and support for those still living. Indeed a digital immortal would be created almost by accident if a persona were created for the purpose of retaining corporate knowledge if the subject suddenly died prematurely in an accident or from a terminal disease. It is the likelihood of such unfortunate incidents occurring that require an early consideration of the ethical, moral and legal issues around digital immortality.

For the purpose of the experiment and in order to keep within ethical guidelines, the subject was allowed to both filter and edit material provided where they felt that the real information could be compromising, since in reality, they were still continuing in their job. It should also be noted that creating a chatbot of a specific person being 'interviewed' in a one-on-one situation where the user/interviewer knows that they are talking to a chatbot places a very high bar on any attempt to pass the Turing Test—the benchmark for evaluating chatbots (Turing 1950). In contrast, the authors have been involved in building chatbots for two 'covert' Turing Tests, where the participants did not know they were talking to a chatbot and where the chatbot represented a generic personality and, in these cases, has achieved deception rates (i.e. percentage of users thinking they were talking to a human) of 80% (Gilbert and Forney 2015) and 100% (Burden et al. 2016). Thus, whilst being able to completely fool a user was beyond the scope of this project, there may well be lower levels of performance which can be

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[1] Sponsored by Defence Science and Technology Laboratory (Dstl)—in collaboration with Dstl Technical Partners

achieved which still yield a useful tool, and the knowledge and expertise gained along the way may also have application in other areas of knowledge management. Since the virtual persona was based on a subject called Barry, it was only natural that it became referred to as Virtual Barry.

## Virtual Barry Development

Virtual Barry was developed in an iterative manner over an approximate a 2-year period. Several reviews were held to check progress and identify areas for further work, which included:

- face-to-face interviews followed by audio transcription
- Skype voice interviews
- Skype text-chat interviews
- answering questions loaded onto an interview application so that the Subject could answer questions asynchronously
- completion of spreadsheet grids to ensure consistent data collection on topics such as customers, projects and employees
- import of curated data from the Subjects' mobile phone, web browser, address book and calendar
- entity extraction on social media posts and documents produced by the Subject

A disadvantage of several of these were that (a) the Subject was aware of the human involved in collecting the information and (b) the data had to be coded manually. In the later stages of the project, the Subject was given the ability to chat with the Virtual Persona. Throughout 2018, qualitative and quantitative user evaluations have been undertaken by people who either knew the Subject or knew the Subjects type of job and areas of expertise, or who knew both. This data is currently being analysed and will be the subject of further papers. This paper will present a broader reflection of some of the lessons learnt in virtual persona development and then examine the implications for digital immortalisation.

An image of the current (April 18) Virtual Barry interface is at Fig. 1.

## Virtual Barry Reflections

During the Virtual Barry project, it became evident that the virtual persona was manifest through a combination of different elements within the system, which included the user interface, content, word choice and conversational style. The project is also looking at a more direct mapping of psychological profile information onto Virtual Barry, but that will not be considered here. However, the idea of there being different 'flavours' of the persona have emerged. Each of these elements will be considered in turn.

## User Interface

If the virtual persona looks like Barry and sounds like Barry, then users are probably less inclined to focus on the content of what Virtual Barry says. Considering these two elements:
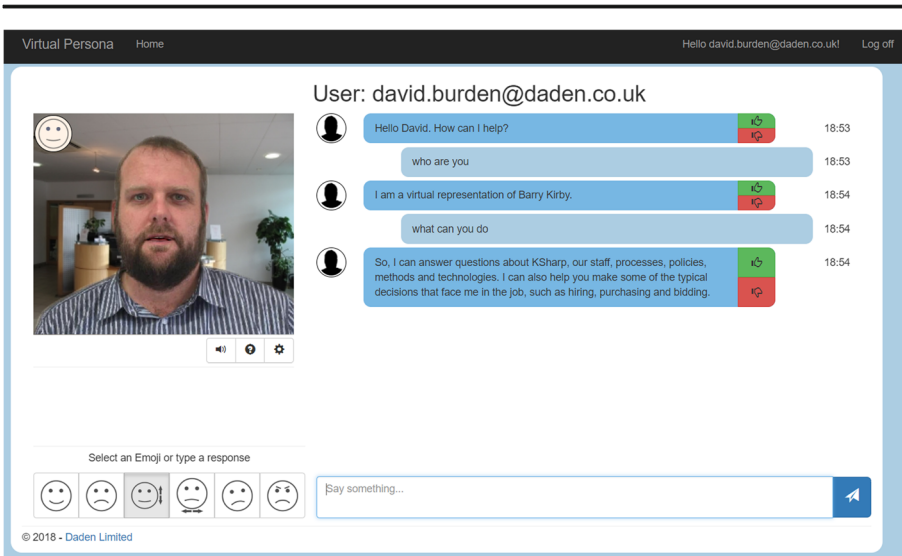
**Fig. 1** Virtual Barry interface

## Image

Whilst the Sitepal system has enabled the team to animate an image of Barry, it loses some believability as it speaks, with the only just acceptable lipsync, 'white space' for teeth and facial distortions during some expressions. Having a better animated avatar is likely to improve the believability of Virtual Barry. As noted previously, the user interface is not a high priority for the project and the Sitepal system is still relatively unique in terms of ease of use and integration. Better systems are available as bespoke applications or within 3D tools such as Unity3D, but would take more time and effort to integrate. The project team continues to seek a better solution.

## Voice

Until recently, only a relatively limited number of voice fonts were available from the main text-to-speech companies which has severely limited the ability to match Barry's voice (for example, although Sitepal provides access to 4 leading text-to-speech engines covering almost 100 voices they offer, only 3 British English male voices and 5 British English female voices). However, in 2018, there has been a growth in companies offering personalised voice fonts, such as LyreBird (https://lyrebird.ai/), VocalID (https://www.vocalid.co/) and Modeltalker (https://www.modeltalker.org/). The team is evaluating these to see if they offer a credible alternative within the constraints of the project. In addition, Google has also released its own text-to-speech system, which whilst not offering a better match, does seem to provide a more modulated and expressive generic voice.

## Content

As well as factual and interest information, Virtual Barry also needs to reflect the practical expertise of Barry. At the moment, Virtual Barry has very little of this expertise

knowledge (in Human Factors in the Barry case), and this needs to be added to the system. However, much is procedural and related to decision choices and processes and, so, forms more of an aspect of procedural memory, which may be less amenable to the knowledge-graph approach and reflect instead aspects of more traditional expert systems.

### Word and Phrase Choice

Verbatim responses from Barry which are encoded into Virtual Barry naturally have a high degree of 'Barryness'. However, the longer such responses are, the fewer situations in which they will work. There is also a discontinuity when Virtual Barry moves from a constructed response to a verbatim response and back again. A key goal has to be to try and minimise that discontinuity and enable 'Barryness' to show through in shorter and more machine-generated responses. One way of minimising this discontinuity is to ensure that constructed responses are using the phrases and words that Barry would use. This two-stage process requires ensuring the responses sound human rather than machine like, and then tuning them to Barry's vocabulary and style. It is also notable that there is a difference in even Barry's 'voice' between text conversations and spoken conversations, and so the team has switched to using text conversations via Skype instead of audio interviews in order to collect data that are a better match.

## Beyond Virtual Barry—Creating Digital Immortality?

Virtual Barry illustrates the two most feasible ways of creating the knowledge based behind such a digital immortal. First, the manual entry of information, facilitated by a conversational style 'virtual mentor' interface. Second, the use of machine learning-based techniques to extract information from existing databases and documents, the digital traces, created by the subject. However, in moving from Virtual Barry to a mature digital immortal, there are significant additional systems that will need to be added. Figure 2 provides an overview of a possible digital immortality system. A central core manages memory, reasoning, motivation, creativity, planning and emotion. The digital immortal can 'read' a variety of information sources and has two-way access to a range of real-world systems. As with any virtual human, it can embody itself in virtual worlds (as an avatar) and, possibly, in the physical world (via a robot), as well as through a 2D interface, or an email, social-media, aural, chat or Skype presence. It has a natural language understanding and generation facility to enable two-way communication with people (and other virtual humans and digital immortals) in the physical world, and it could synchronise its knowledge and activities between multiple instances of itself.

Once the digital immortality is created, it is important to consider how it would interact with the world and how others might interact with it. Four key areas have been identified (Savin-Baden et al. 2017) as:

### Passive Updating

The digital immortal should be able to update RSS, email, the web and other data feeds in order to continuously update itself about the world. There are
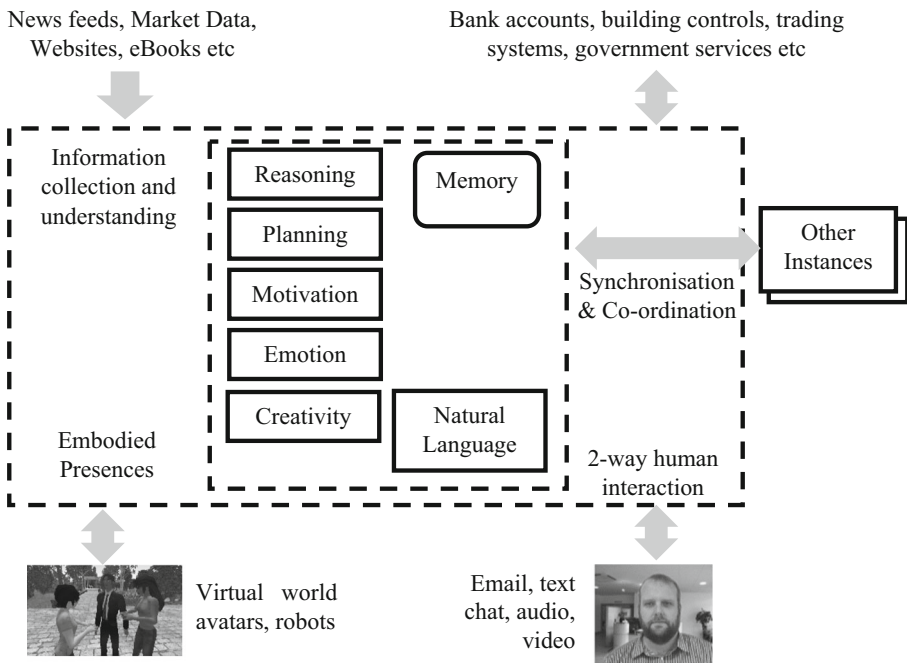
News feeds, Market Data, Websites, eBooks etc

Bank accounts, building controls, trading systems, government services etc

Information collection and understanding

Reasoning

Memory

Planning

Motivation

Emotion

Creativity

Natural Language

Synchronisation & Co-ordination

Other Instances

Embodied Presences

2-way human interaction

Virtual world avatars, robots

Email, text chat, audio, video

**Fig. 2** An overview of a potential digital immortality system

already applications (for example, Recognant http://www.recognant.com/) which will extract the key ideas from web pages and RSS feeds, which could be leveraged by the digital immortal.

### Interacting with Systems

The digital immortal should be able to use existing Application Programming Interfaces (API) to make queries, post messages or request changes in other computer systems, just as their Subjects may have made postings to social media or conducted financial transactions through an on-line bank or broker.

### Interacting with People

The emotional and ethical impact that relatives, colleagues and friends may experience from interacting with the digital immortal has been discussed earlier. Obviously, when the digital immortal interacts with people to whom it is not known, then the interaction would be devoid of any sense of strangeness, which is important for the next consideration.

### Interacting with the Physical World

In order to interact with the physical world, the digital immortal does not need a physical manifestation, it can just issue commands to physical-world control systems. At a macro-level, if the digital immortal is controlling the funds and companies that its

Subject owned, its effect on the physical world through its human 'agents' (employees) could be immense. Giving the digital immortal embodiment within the physical world as a robot or android is almost a side-show. At a more mundane level, there are many sites around the web, for example, Amazon's Mechanical Turk (https://www.mturk.com/) or People Per Hour (https://www.peopleperhour.com/), where users (human or computer) can post tasks to be done by physical humans—and which would enable the digital immortal (or virtual human) to extend its capabilities in both the digital and physical worlds.

Whilst it is a relatively large shift from Virtual Barry to Digital Immortality, many of the functions that would need to be achieved are reasonably well understood, and to a certain, if not complete, extent, it is largely a matter of integration.

## Discussion

Digital immortality appears to be changing understandings of grief and the afterlife. The desire for continued existence after death may be understandable, but the speed at which technology is driving the digitised immortality cannot be overlooked. The opportunity to 'live on' has the potential to change the religious landscape radically, and recent developments suggest socio-political impacts in understandings about embodiment, death, the social life of the dead and new forms of post-mortem veneration. Digital immortality appears to be both evocative and troublesome, affecting emotions and the ability to grieve and manage legacies. There is little evidence to date about the impact of external endurance (Kim 2001) at one end of the spectrum and instant vanishment at the other end, on recipients, family, friends and religious leaders, as well as on mourning practices.

Whilst Vigilant and John Williamson (2003) have suggested ways of achieving 'symbolic immortality', these appear to be different from the need to create an actual digital immortal. They argue for immortality through (a) biological reproduction, (b) creative immortality, (c) transcendental immortality and (d) natural immortality which means recognising the world will be an (e) experiential transcendence (Vigilant and John Williamson 2003: 180). However, ideas and posthumous social media presence remain of interest to many people, and this often becomes apparent when receiving posts from dead friends on social media. Kasket (2012: 252) points out 'that mourning on Facebook, and the 'repurposing' of in-life profiles as continuing spaces to connect with the dead, is a relatively new phenomenon and a young area of research'. Yet she also suggests (Kasket forthcoming) that there is no effective mechanism for removing the digital traces of deceased people from the internet when their physical counterpart dies. However, there have been companies to whom the maintenance or deletion of a posthumous social media presence could be delegated. Death Switch, for example, sent a client a regular email prompting him or her to enter a password 'to make sure you're still alive' (http://deathswitch.com/). This did enable people to deploy a pre-planned strategy of posthumous digital asset management, involving basic password storage and forwarding, but this service is no longer available. These recent developments would seem to suggest socio-political impacts such as shifts in understandings about embodiment, death and afterlife, new perceptions of the social life of the dead and new forms of post-mortem veneration. The emotional, social, financial and business impact of active digital immortality on relations, friends, colleagues and institutions remains an area that

is under researched. Issues of preservation and privacy issues and the legal implications of a presence on-going beyond the autonomous control of the mortal presence remain both an ethical and legislative conundrum. A key concern for any form of digital immortality will be to maintain its own integrity.

## Learning Post-Death

Whilst theories of learning have never been static, the distinction between and across the approaches—behavioural, cognitive, developmental and critical pedagogy—continues to be eroded. There is increasing focus in the twenty-first century on what and how students learn and on ways of creating learning environments to ensure that they learn effectively—although much of this remains a contested ground. New models and theories of learning have emerged over the last decade that inform the development of learning in virtual worlds such as Second Life and may have an impact on virtual humans and the creation of digital immortals. Yet what it means to learn is continually on the move, not just when, where or how but the whole idea of what counts as learning, and possible, even the idea of network learning seems 'post'. Learning today is a mash-up of home-school-work-media-peer-collaboration. For a digital immortal to learn, it would be important to see learning as unbundled, as something that no longer largely takes place within educational institutions, but instead includes some of the following practices (based on Savin-Baden 2015):

- *Mentorship*: using mobile devices to keep in touch with parents or other significant adults in order to get advice, feel supported or use as a sounding board through Whatsapp or Facebook messaging
- *Gaming*: alone and together to share, teach, learn, offer advice, negotiate and give and receive hints, tips and solutions
- *Co-operative online learning*: supporting and guiding each other about homework, assignments and exam revision
- *Teaching technology*: sharing and teaching each other about apps, new devices and helpful sites
- *Emotional learning*: using digital media for peer-to-peer support to manage personal challenges and difficulties, and to receive advice
- *Playful learning*: trying things out and fiddling around, in order to experiment and discover
- *Co-production*: creating presentations together, making and sharing cybercreations, creating posters, mashups and vidding

At the most basic level, it will be vital to ensure that the digital immortal has the hosting environment (public or private) on which to operate. There is still a considerable difference between the creation of a digital immortal which is the hobby project of a programmer, and the digital immortality which is the legacy project of a business leader or entrepreneur. It would mean that developing digital immortals from virtual humans could be relatively iterative, which could be undertaken by developing simple virtual personas who can learn and then growing them in sophistication. In these respects, this digital route to digital immortals who can learn seems a far more realistic one than the Mind Uploading, Whole Brain Emulation and Cryogenics promoted by many post-

humanists. As such, it makes the potential and issues of immortality in any form all the more real, and their study all the more urgent.

## The Post-Digital and Digital Immortality

Digital immortality is not ethereal, and it has real consequences, yet what these are we are yet to know. Like the post-digital, digital immorality is both, information and at the same time a rupture in our existing theories (following Jandrić et al. 2018). Most of all, it is a rupture; it is unnerving and raises challenging ontological questions about life, death and the afterlife. In terms of the arguments and discussions about the relative value of the idea of the post-digital, perhaps the issues of death online and digital immortality creation are better connected to the idea of post-apocalyptic concerns. In a post-apocalyptic world, there becomes a sense that there is no longer the power of the end. For some (Cramer 2015: 14), a post-apocalyptic world is one in which the apocalypse is not over but has progressed from a discrete breaking point to an ongoing condition. Yet this would seem to suggest a continuing dystopian state as suggested in *Kiss me First* (Moggach 2014) rather than a sense that the digital immortal can enable humanity to (at last) learn from itself and sustain the kind of post-apocalyptic position in which there is some kind of redemption.

We suggest that the final step in the journey towards digital immortality is moving from being 'just' an artificial general intelligence-based virtual human to gaining sentience and consciousness and become virtual sapiens. The difficulty here is that creating a digital immortal is not merely about learning, but about sentience. Sentience is something more than intelligence and is certainly beyond what all (or almost all) animals show; it is about self-awareness, self-actualization and having a consistent internal narrative, internal dialogue and self-reflection. We suggest that it is possible to code a digital immortal that *appears* to do much of the things that define sentience, but would that mean one has created sentience (which seems unlikely)—or perhaps sentience has to be an emergent behaviour? We argue that, if developed in the first half of the twenty-first century as a virtual humanoid or virtual human, a digital immortal could still be seen as being inferior to physical humans, and to its progenitor.

## Conclusion

What has become apparent through this project is that much of the current software available to create your own digital immortal lack long-term and in-depth capabilities to learn and manage an effective digital afterlife. However, we believe that Virtual Barry could be adapted and used to create sustainable digital persona and can be maintained or deleted according to the wishes of those wanting to create a persona pre-death or those left behind wanting to preserve or delete it. The legal complexities around managing issues of preservation and privacy, and the legal implications of a presence on-going beyond the autonomous control of the mortal presence, remain both an ethical and legislative conundrum.

It is clear that death in the digital age is complex since we now have posthumous persistence and the opportunities for the physically dead to affect current life in ways not possible in earlier generations. Whilst the creation of virtual humans and the

possibilities for realistic digital immortality remain some years away, many such 'opportunities' are both troubling and troublesome, along with the further complexity about how digital immortal will learn and learn effectively.

Amidst the rapid technology developments, issues of grief and bereavement seem to have been left to one side, along with ethical and legal concerns. Whilst there is an increase in research into death online, the gap between this and technological development continues to grow. Kasket (forthcoming) argues that much power and responsibility lie with the designers of technology in terms of moral decisions about the control of digital legacies. Yet with few (if any) ethical or legal guidelines in place, it is difficult to see how this might be managed. Perhaps the words of T.S Eliot offers a poignant reminder of the continuity of beginnings and endings:

> What we call the beginning is often the end. And to make an end is to make a beginning. The end is where we start from.

> (Eliot 1942)

# References

Bainbridge, W. (2013). Perspectives on virtual veneration. *Inf Soc, 29*(3), 196–202.

Bassett, D. (2015). Who wants to live forever? Living, dying and grieving in our digital society. *Social Sciences, 4*, 1127–1139.

Bassett, D. (2017). Shadows of the dead: social media and our changing relationship with the departed, Discover Society Retrieved http://discoversociety.org/2017/01/03/shadows-of-the-dead-social-media-and-our-changingrelationship-with-the-departed/.

Bearne, S. (2016). *Plan your digital afterlife and rest in cyber peace*. The Guardian. Retrieved from https://www.theguardian.com/media-network/2016/sep/14/plan-your-digital-afterlife-rest-in-cyber-peace.

Brooker, C. (2013). *Be Right Back. Black Mirror [TV Episode]*. United Kingdom: Channel 4.

Brubaker, J., & Callison-Burch, V. (2016). Legacy contact: Designing and implementing post-mortem stewardship at Facebook. *Proceedings of the ACM Conference on Human Factors in Computing Systems*, Santa Clara, ACM, 2908–2919.

Burden, D., & Savin-Baden, M. (2019). *Virtual humans*. Florida: Taylor and Francis.

Burden, D. J. H., Savin-Baden, M., & Bhakta, R. (2016). Covert implementations of the Turing Test: A more level playing field? In International Conference on Innovative Techniques and Applications of Artificial Intelligence (pp. 195-207). Springer, Cham.

Cramer, F. (2015). What is 'post-digital'? In D. M. Berry & M. Dieter (Eds.), *Postdigital aesthetics: Art, computation and design* (pp. 12–26). New York: Palgrave Macmillan.

Dzieza, J. (n.d.). Speak, memory. The verge. Retrieved from https://www.theverge.com/a/luka-artificial-intelligence-memorial-roman-mazurenko-bot.

Eliot, T. S. (1942) *Four Quartets* Little Gidding pt. 5. London: Faber and Faber.

Eternime. (2017). Retrieved http://eterni.me/

Eter9. (2017). Available online https://www.eter9.com/auth/login. Access date: 10 September 2018.

Fussell, S.. (2016). *You can create an online avatar that lives on after you die—but what's the point?* on Splinter. Retrieved from https://splinternews.com/you-can-create-an-online-avatar-that-lives-on-after-you-1793862007.

Ghosh, S. (2018). Facebook's AI boss described Sophia the robot as 'complete b————t' and 'Wizard-of-Oz AI'. Business Insider UK. Retrieved from http://uk.businessinsider.com/facebook-ai-yann-lecun-sophia-robot-bullshit-2018-1.

Gilbert, R. L., & Forney, A. (2015). Can avatars pass the Turing test? Intelligent agent perception in a 3D virtual environment. *International Journal of Human-Computer Studies, 73*, 30–36.

Godfrey, C. (2018). The grief bot that could change how we mourn. The daily beast. Retrieved from https://www.thedailybeast.com/the-griefbot-that-could-change-how-we-mourn.

Griffin, A. (2017). Saudi Arabia grants citizenship to a robot for the first time ever. The Independent. Retrieved from https://www.independent.co.uk/life-style/gadgets-and-tech/news/saudi-arabia-robot-sophia-citizenship-android-riyadh-citizen-passport-future-a8021601.html.

Hallam, E., & Hockey, J. (2001). *Death, memory, and material culture*. Oxford: Berg Publishers.

Harbinja, E. (2017). Post-mortem privacy 2.0: Theory, law, and technology. *International Review of Law, Computers & Technology, 31*(1), 26–42.

Jandrić, P., Knox, J., Besley, T., Ryberg, T., Suoranta, J., & Hayes, S. (2018). Postdigital science and education. *Educational Philosophy and Theory, 50*(10), 893–899.

Kasket, E. (2012). Continuing bonds in the age of social networking. *Bereavement Care, 31*(2), 62–69.

Kasket, E. (forthcoming). The cyberpsychology of death, dying and bereavement. In A. Attrill-Smith, C. Fullwood, D. Kuss, & M. Keep (Eds.), *Oxford handbook of cyberpsychology*. Oxford: Oxford University Press.

Kim, J. (2001). Phenomenology of digital-being. *Human Studies, 24*, 87–111.

Leviathan, Y. (2018). Google duplex: An AI system for accomplishing real-world tasks over the phone on *Google AI Blog*. Retrieved https://ai.googleblog.com/2018/05/duplex-ai-system-for-natural-conversation.html.

LifeNaut Project. (2017). Retrieved https://www.lifenaut.com/.

Maciel, C., & Pereira, V. (2013). *Digital legacy and interaction*. Heidelberg: Springer.

Mackie, K. (2017). Adobe and browser makers announce the end of flash. Redmond Magazine. Retrieved from https://redmondmag.com/articles/2017/07/25/adobe-ending-flash-support.aspx.

McMullan, T. (2016) The virtual holocaust survivor: How history gained new dimensions. The Guardian. Retrieved from https://www.theguardian.com/technology/2016/jun/18/holocaust-survivor-hologram-pinchas-gutter-new-dimensions-history.

Moggach, L. (2014). *Kiss Me First*. London: Picador.

Morse, F. (2015). Eter9 social network learns your personality so it can post as you when you're dead. BBC Newsbeat website. Retrieved from http://www.bbc.co.uk/newsbeat/article/34015307/eter9-social-network-learns-your-personality-so-it-can-post-as-you-when-youre-dead.

Nansen, B., Arnold, M., Gibbs, M., & Kohn, T. (2015). The restless dead in the digital cemetery, digital death: Mortality and beyond in the online age. In C. M. Moreman & A. D. Lewis (Eds.), *Digital death: Mortality and beyond in the online age* (pp. 111–124). Santa Barbara: Praeger.

Reynolds, A. (2013). *On the Steel Breeze*. London: Gollancz.

Reynolds, A. (2015). *Poseidon's Wake*. London: Gollancz.

Savin-Baden, M. (2015). *Rethinking learning in an age of digital fluency is being digitally tethered a new learning nexus?* London: Routledge.

Savin-Baden, M., & Burden, D. (2018). Digital immortality and virtual humans Paper presented at Death Online Research Symposium, University of Hull 15–17 August.

Savin-Baden, M., Burden, D., & Taylor, H. (2017). The ethics and impact of digital immortality. *Knowledge Cultures, 5*(2), 11–19.

Steinhart, E. C. (2014). *Your digital afterlives*. Hampshire: Palgrave MacMillan.

Turing, A. M. (1950). Computing machinery and intelligence. *Mind, 59*, 433–460.

United Nations. (2017). *At UN, robot Sophia joins meeting on artificial intelligence and sustainable development*. UN News. Retrieved from https://news.un.org/en/story/2017/10/568292-un-robot-sophia-joins-meeting-artificial-intelligence-and-sustainable.

Vigilant, L. G., & John Williamson, J. (2003). Symbolic immortality and social theory: The relevance of an underutilized concept. In C. D. Bryant (Ed.), *Handbook of thanatology: Essays on the social study of death* (pp. 173–182). Newbury Park: Sage.

Walter, T. (1996). A new model of grief: Bereavement and biography. *Mortality, 1*(1), 7–25.