

Who Wants to Live Forever?

Towards a Chinese Thanatechnology

Kai Wei

A dissertation submitted to the University of Dublin in
partial fulfilment of the requirements for the degree of
MSc in Management of Information Systems

9th September 2016

Declaration

I declare that the work described in this dissertation is, except where otherwise stated, entirely my own work, and has not been submitted as an exercise for a degree at this or any other university. I further declare that this research has been carried out in full compliance with the ethical research requirements of the School of Computer Science and Statistics.

Signed: _____

Kai Wei

9th September 2016

Permission to lend and/or copy

I agree that the School of Computer Science and Statistics,
Trinity College may lend or copy this dissertation upon request.

Signed: _____

Kai Wei

9th September 2016

Acknowledgements

I would like to thank all the staff and lecturers of Trinity College for their help and support over the last two years.

I am thankful to my family, parents, Yanwen Wei & Lixue Yan; my uncle, Qingquan Yan; parents-in-law, Yunxun Hua & Hong Li; my wife Ye Hua and my son Jeremy Bohua Wei for their ongoing support and love. I am ever grateful to you all.

To my best friends, Hui Zhang & Yue Fan, many thanks for all the support provided.

Special thanks to my supervisor, Diana Wilson, for her knowledge and wisdom as well as her patience and guidance throughout this dissertation. Without her advice and support, this dissertation would not have been possible. Her advice and help are deeply appreciated.

Abstract

All cultures have rituals and observances concerning the dead. These range from the appropriate treatment of the corpse up to, and including, delegated methods of mourning. In order to pass knowledge of the dead down through the generations, some cultures have established means and ways revolving around remembrance of, and communication with, the departed. These customs and practices allow people to record, collate, retrieve and read the stories of the dead over thousands of years. Thanatology is the study of such customs and practices and the technologies used are known as thanatechnology. Like all other cultures, the Chinese have traditions regarding death. This research seeks to investigate whether current thanatechnologies based on avatars and social media data are appropriate for the Chinese culture.

Carrying a critical humanism perspective, this dissertation goes through the major philosophies in the Chinese culture environment to review their opinions on the subject of dying, death and bereavement. It analyzes the current projects featuring thanatechnologies using avatars and social media data and concludes that the Chinese culture should be willing to accept thanatechnologies provided certain rules are followed. It also raises a question "Why are there still no similar projects?" and tries to interpret it.

Table of Contents

Chapter 1 Introduction	1
1.1 Research Background.....	1
1.2 Research Questions.....	3
1.3 Relevance of the Study	3
1.4 Scope of this Research	3
1.5 Beneficiaries of this Research.....	3
1.6 Dissertation Roadmap.....	3
Chapter 2 Literature Review	5
2.1 Introduction	5
2.2 Thanatology	5
2.3 Thanatechnology	6
2.4 Social Media and Thanatechnologies	9
2.5 Avatars Generated by Social Media Data	17
2.6 Ethics Related to Social Media and Thanatechnology	21
2.7 Summary.....	22
Chapter 3 Methodology	23
3.1 Introduction	23
3.2 Purpose of Research	23
3.3 Critical Humanism	23
3.4 Chinese Critical Humanism.....	24
3.5 Proposed Framework.....	35
3.6 Limitations and Lessons Learnt	38
Chapter 4 Analysis	39
4.1 Introduction	39
4.2 Contemporary Thanatechnologies	39
4.3 Findings and Analysis	43

4.4	Viable Model	47
4.5	Summary.....	49
Chapter 5 Conclusions and Future Work.....		50
5.1	Introduction	50
5.2	Research Findings	50
5.3	Limitations of the Research.....	52
5.4	Areas of Future Research	52
5.5	Final Conclusions.....	53
References		55

List of Tables and Figures

Figure 1.1 - Egyptian Hieroglyphics.	1
Figure 1.2 - Chinese Oracle Bone Scripts.	2
Figure 2.1 - Egyptian Mummy and Coffin ca. 1300 BC.	7
Figure 2.2 - Chinese Jade Burial Suit ca. 127 BC.	7
Figure 2.3 - Terracotta army for Qin Shi Huang.	8
Figure 2.4 - An example of Memorialized Accounts on Facebook.	11
Figure 2.5 - Print screen of some messages a Chinese girl left on her deceased boyfriend's Weibo Account.	12
Figure 2.6 - Print screen of messages other people left on this man's Weibo Account.	13
Figure 2.7 - Sample Online Grave from a Chinese Website.	14
Figure 2.8 - Post from Weibo account @逝者如斯夫 dead memorializing a deceased.	15
Figure 2.9 - Picture shown a sample product on a gravestone by Vidstone.	15
Figure 2.10 - Picture of an image of the deceased shown on the Spot Message app when approaching the tomb.	16
Figure 2.11 - Print screen from http://sociotope.me/	19
Figure 2.12 - Print screen from associated youtube video.	20
Figure 2.13 - Print Screen from Associated Youtube Video.	21
Figure 3.1 - A Buddhistic Altar Placed at Home.	26
Figure 3.2 - David Beckham's tattoo - 'Life and death are destined by fate, rank and riches decreed by heaven.'	30
Figure 4.1 – Interface to create the Lifonaut avatar using social media data.	42

List of Tables

Table 3.1 - Table of the Framework Summarized.	37
-----------------------------------------------------	----

List of Abbreviations

AI	Artificial Intelligence
GPS	Global Positioning System
HCI	Human Computer Interaction
LCD	Liquid Crystal Display
MUD	Multi-User Dungeon
VR	Virtual Reality
VRT	Virtual Reality Therapy

Chapter 1 Introduction

1.1 Research Background

All cultures have rituals and observances concerning the dead. These range from the appropriate treatment of the corpse up to, and including, delegated methods of mourning. For many people, grieving may be the saddest experience in their lives. As death separates lost loved ones from the living, traditions arose whereby a form of contact could be maintained. In order to pass knowledge of the dead down through the generations, some cultures have established means and ways revolving around remembrance of, and communication with, the departed (Figure 1.1 and Figure 1.2). These customs and practices allow people to record, collate, retrieve and read the stories of the dead over thousands of years. They are, in effect, information systems.

In the hope of not being forgotten by later generations, people built great pyramids and complicated tombs (Sofka et al., 2012). For those cultures that believed in the concept of an afterlife, people learned how to preserve bodies so that they can last for centuries. All the necessary requirements for the afterlife were buried with the dead: food, drink, furniture, tools – even people. The study of such customs and practices is called thanatology and the technologies used are known as thanatechnology.

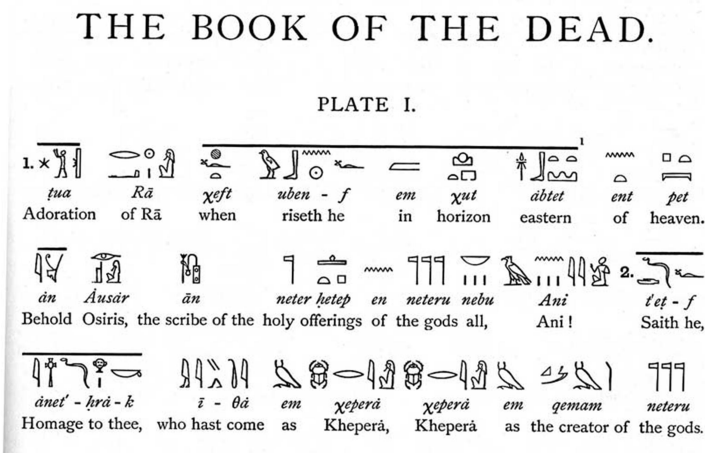


Figure 1.1 - Egyptian Hieroglyphics.

Web source (2016m)



Figure 1.2 - Chinese Oracle Bone Scripts.

Web source (Nelson, 2009)

As the centuries have gone by, and information technologies have advanced, so too have thanatechnologies. After the shootings at Virginia Tech in 2007, Facebook began the custom of 'memorial pages', to allow the grieving to leave messages on the pages of the dead (Bassett, 2015). Ambrosino (2016) has predicted that at some point, there will be more dead Facebook users than living ones. Such memorial sites now abound, for example iLasting.com, Legacy.com and imorial.com. Many such sites are commercial. This simple 'digital headstone' has now evolved into the 'digital zombie' (Bassett, 2015) where, using social media data and artificial intelligence algorithms, the dead 'live' on in the digital society. Companies, such as Eterni.me and LifeNaut, based in America seek to commercialise this evolution. This new and growing phenomenon raises many questions, not least ethical ones.

1.2 Research Questions

Like all other cultures, the Chinese have traditions regarding death. The research question seeks to investigate whether current thanatechnologies based on avatars and social media are appropriate for the Chinese culture.

1.3 Relevance of the Study

The purpose of this research is to analyze the current thanatechnologies through a Chinese Critical Humanism perspective. The result of the analysis will provide knowledge of such technology within the Chinese culture. It will also generate understandings on whether and what kinds of thanatechnologies are suitable to China.

1.4 Scope of this Research

This dissertation focuses on thanatechnology and in particular thanatechnologies based on social media data. Chinese philosophies on critical humanism are also looked at.

Although the research centres on China and its cultural attitude towards death and technology in particular, it offers a cultural framework and a potential viable model which may transfer into other situations.

1.5 Beneficiaries of this Research

This research will benefit technology companies that are or will be developing various kinds of thanatechnology services which have an interest of entering the market of World's second largest economy (2016ao) with the World's largest internet user base (2016v).

This research will also provide information for researchers doing researches on thanatechnology towards the Chinese culture.

1.6 Dissertation Roadmap

Chapter 2 is the literature review. The literature review starts with a brief history of thanatology and the concept of thanatechnology as well as the new meaning added onto it by the recent development of the technologies as well as internet based social media

services. It continues and explores the newly immersed technology to create avatars based on social media data to simulate the look and mind of the user.

Chapter 3 looks at the research philosophy and methodologies chosen for this study. It continues to discuss the philosophies towards dying, death and grieving from a critical humanism point of view in the Chinese culture environment. A framework is summed up to cover the points discovered from the research for the ease of reading.

Chapter 4 presents analysis on four current thanatechnology cases based on the framework summarized in Chapter 3. A viable model that will be suitable to the Chinese culture environment is proposed.

Chapter 5 concludes by looking at the current situation of thanatechnology in China. It raises up the question “Why are there still no similar projects?” and tries to interpret it. Finally, six directions for future studies are presented at last.

Chapter 2 Literature Review

For ten years here I wander and there you lie.
I don't think about you often, yet how can I forget you!
With your grave a thousand miles away, where can I confide my loneliness?
Even if we met, could you recognize me, with dust all over my face and hair like frost?
Last night I had a dream in which I returned home.
By the window, you were combing your hair.
We looked at each other silently, with tears streaming down our cheeks.
There's a place which every year will be my misery, the moonlit night, the hill of short pines.

Jiang Cheng Zi - Su Shi (1037 - 1101), 1075 AD

The poem was written on the 10th anniversary of the poet's wife death to memorialize his wife (Wikipedia, 2016a).

2.1 Introduction

This literature review considers the concepts and technologies surrounding the description and phenomena of death, dying and bereavement. It reviews current thanatechnology from a critical humanist perspective. It first discusses the term thanatechnology and then looks at the most recent developments under the current technology environment, particularly in social media and using social media data to generate avatars.

2.2 Thanatology

Thanatology comes from the Greek for Thanatos, who is the embodiment of death. It is the scientific study of death, dying and bereavement. It covers not just the physical mechanism of dying, death and post mortem (and therefore is a part of forensic science), but also the wider psychological and social aspects of the phenomena, for example belief systems, customs and practices, as well as bereavement rituals. It is these latter aspects which are the focus of this dissertation. All cultures have rules regarding death. Many share common ideas, while others are distinct. For example, many religions share ideas of an afterlife, resurrection or reincarnation, heaven and/or hell. These concepts contain

an idea of 'soul'. Distinctions can be found, however, and again in religions, on the (super)nature of 'spirits' or 'ghosts' (souls not at rest). Modern Christian doctrine is now against the idea of 'ghosts'. Many belief systems have rules regarding grieving and remembrance: the month's mind in Catholicism, the *Jahrzeit* in Judaism, and in Chinese culture, sacrifice or offerings to the dead ancestor.

2.3 Thanatechnology

Sofka (1997) defined thanatechnologies as technologies that are used in the death, dying and bereavement processes as well as research into the discipline. At the time this book was written, technologies were limited to interactive videodisc and computer programs. She soon broadened the definition in a more recent book to all types of technology for communication that can be used in the research of thanatology, dying, death and grieving (Paul Gilbert et al., 2012).

Webster (2012) interpreted thanatechnology as using technology to study death. Thanatechnologies are not new. They have existed throughout human history. The most advanced technologies were always used for, and by, the rich and powerful deceased. In ancient Egypt, Pharaohs were turned into mummies (Figure 2.1) to ensure their immortality in the afterlife (2016d). Ancient Chinese also put on a jade suit (Figure 2.2) for the emperors after they die in the hope that their bodies can be kept from decaying (2016w).



Figure 2.1 - Egyptian Mummy and Coffin ca. 1300 BC.

Web source(Aling, 2003)



Figure 2.2 - Chinese Jade Burial Suit ca. 127 BC.

Web source (Zhu, 2016)

Perhaps the most famous Chinese example of such practices is the Tomb of the Terracotta Army. Chinese people have always tried to keep the deceased in a life similar to what they have lived. It is recorded in <Shiji> or <Records of the Grand Historian> (2016ag) that it took 700,000 laborers 30 years to build the tomb for the first emperor in the Chinese history, Qin Shi Huang. The mausoleum is the size of a mountain and recreated hills and rivers (using mercury) inside it as well as palaces and statues of his serving ministers to try and recreate the life for him in another world. The emperor's wives who did not bear children and a large amount of laborers were also buried alive as well as around 7000 terracotta soldiers all for the purpose of serving the emperor in his afterlife (Figure 2.3).



Figure 2.3 - Terracotta army for Qin Shi Huang.

Web source (2016aq)

For the poor, there are cheaper ways of communicating with the dead. There is a day for the dead in both the Mexican and Chinese culture (2016j, 2016ad) which family members and friends would gather and pray for their deceased relatives and friends.

Séances (2016af) and witchcraft (2016an) which aim to communicate with the spirit of the deceased appeared in many cultures in history which are generally considered by many other cultures as superstitious and against modern science.

Paul Gilbert et al. (2012) write of many modern technologies used for death, dying, and grieving (e.g. Bereavement communities on Internet, virtual memorials and cyber funerals). Many of them are highly dependent on two aspects: the internet and social media. This dissertation will mainly focus on the thanatechnologies involving social media technologies.

2.4 Social Media and Thanatechnologies

It has been over a decade since Mark Zuckerberg founded Facebook in 2004. Social media is now part of many people's lives. The number of average daily active users on Facebook has reached 1.13 billion for June 2016 (2016i). These users generate petabytes of data everyday (2016t).

Decision makers in many companies now try their best to make good use of this data while management teams want to define better policies over the use of social media apps by the employees.

Aral et al. (2013) considers social media as fundamentally changing the way we communicate, collaborate, consume, and create. The authors also believe that social media represent one of the most transformative impacts of information technology on business, both within and outside firm boundaries. A study from Chui et al. (Chui et al., 2012) shows that the economic impact of social media on business could exceed an estimate of \$1 trillion mostly through efficient communication and collaboration within and across organizations.

Obar and Wildman (2015) attempted to provide a more detailed definition by identifying four commonalities among current social media services:

1. Social media services are (currently) Web 2.0 Internet-based applications
2. User-generated content is the lifeblood of social media
3. Individuals and groups create user-specific profiles for a site or app designed and maintained by a social media service

4. Social media services facilitate the development of social networks online by connecting a profile with those of other individuals and/or groups (Obar and Wildman, 2015)

Billions of individuals form up this society. Therefore, any platform that can provide a person the means to socialize could be considered social media. All digital information created by every person in this society could be regarded as social media data which would include information that users intentionally generate as well as data that passively collected through websites, mobile phones or even routers without the user's informed consent.(Girardin et al., 2008)

Social media content has been used to predict the future (Asur and Huberman, 2010). The authors used the rate of chatter from almost 3 million tweets from Twitter.com to forecast box-office revenues for movies in advance of their release. Their results outperformed those of the Hollywood Stock Exchange in accuracy.

Twitter provides an analytic tool (2016c) to help analyze the activities and information of user accounts. The purpose of this analytic function is to assist individual users to gain more followers, attract more attention and to empower the growth of different businesses with useful statistics.

A survey (2016a) shows that internet users now spend an average of 2.5 hours per day on social media sites and micro-blogging. With the help of these advanced technologies, nearly everyone is able to create their autobiography. Furthermore, for the first time, human beings possess the technology to record the details of their daily events over their entire life. It is estimated that a total of 1 Pb would be required for the recording of a lifespan at 4.3Mb/s (Bell and Gray, 2000).

But the intensive use of these social media services also leaves behind a huge amount of data when the users die. Google has provided a feature to allow users to plan for their data after their death, for example send login information to selected people or delete the account (2016ai). This Inactive Account Manager (2016b) from Google will start its checking process once an user is inactive for a period of time and will carry out the procedure (sending passwords or email contents to designated email addresses etc.) the user pre-set once Google confirms the death of the user. Yahoo Japan provided similar

service also (Fifield, 2014). There are also third party companies which aim to help people make plans of their digital assets after their death (2016h).

At the same time, not all technology companies provide these services. Twitter, Instagram, LinkedIn and Apple may close the account of the deceased by request while there has been several law cases against companies like Apple which refused to provide passwords for the account of the deceased (bzamayo, 2016).

Some claims over 8000 Facebook users die every day (2016k). As more and more Facebook account users die, more and more expressions of grief appear as replies or messages on the accounts of the deceased. In 2009, Facebook created the formal idea of Memorialized Accounts which allows its users to choose between deleting the accounts or leaving them as memorialized ones after their death (Figure 2.4).

Facebook also made it clear that the memorialized accounts will not show up in “public spaces such as in suggestions for People You May Know, ads or birthday reminders”(2016am) and friends and family can still see the shared content as well as sharing memories on the memorialized Timeline depending on the settings of the account (2016am).

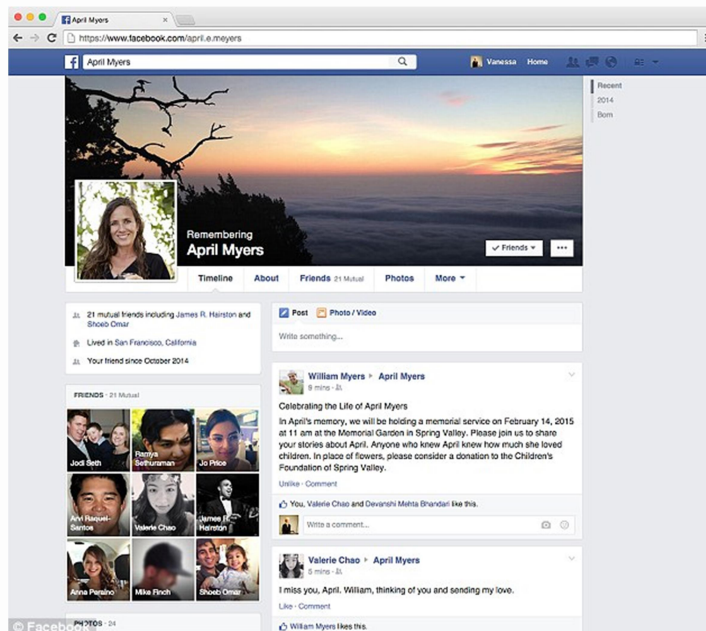


Figure 2.4 - An example of Memorialized Accounts on Facebook.

Web source(2015a)

It is said that the number of users around the globe will reach 2.95 billion by 2020 in which 650 million will be from China (2016a).

In 2014, a Chinese girl persisted for over a year in sending 1570 messages to her dead boyfriend's Weibo account. She shared the events of her life on the pages and how much she missed him (Figure 2.5). When her activities went viral, millions of people went to the account to read what she left and then began to pass on messages also. They praised the girl for her devotion, sent her prayers and also to ask for good luck from the deceased himself (Figure 2.6). This cultural aspect of Chinese grieving will be explored in the next chapter.



Figure 2.5 - Print screen of some messages a Chinese girl left on her deceased boyfriend's Weibo Account.



Figure 2.6 - Print screen of messages other people left on this man's Weibo Account.

It is recorded on the Chinese version of Wikipedia (Baiké, 2016) that there are over a thousand websites providing online cemeteries which allows people to setup a memorial page for their passed loved ones (2016s, 2016q, 2016aa, 2016r) (Figure 2.7).



Figure 2.7 - Sample Online Grave from a Chinese Website.

Web source (2016s)

With the fast growing pace of life and the convenience or need of travelling nowadays, people are more likely to be far away from where their ancestors are buried and are having less and less time apart from work, study and social life to visit graves. With these online graves, people can visit, memorialize and sacrifice to their beloved ones who have passed away in a much easier manner than before.

There is a special Weibo account, @逝者如斯夫 dead (What passes is like the running water), that has followed 2128 people in total up until 24 May 2016, all of them dead. This Weibo account reads through all the messages and posts of the deceased's account and writes a Weibo post of obituary to describe the life of the deceased, age, cause of death, personality and hobbies etc., as well as a direct link to the account of the deceased (Figure 2.8). By viewing this Weibo account @逝者如斯夫 dead, people can quickly get a grasp of the deceased's life and most important events. This has become a new way for people to memorialize the ones that have passed away (2016ak).



Figure 2.8 - Post from Weibo account @逝者如斯夫 dead memorializing a deceased.

Web source (2016ak)

Apart from social media platforms, some start-ups have also developed other forms of thanatechnologies using social media data.

Ifidie.org (2016u) is a free online service that allows you to store messages to friends and family, instructions, passwords, and informal wills. These will be delivered to the named people or operated under the user's preference.

Vidstone (2005) is a US based company that develops solar powered LCD screens to be attached to gravestones that can play videos or pictures of the deceased (Figure 2.9). Any person walking by can watch the tribute of the deceased and pay respect. Some even call this project the "Youtube for the dead" (McNichol, 2006).



Figure 2.9 - Picture shown a sample product on a gravestone by Vidstone.

Web source (2016ar)

Ryoshin Sekizai is a Japan based tombstone company which has launched an android app 'Spot Message' in Japan in August 2016. The app allows users to upload augmented reality messages associated to a certain geographical locations that can be discovered by other users later (Eric, 2016). This app is based on GPS (Global Positioning System) and augmented reality technologies like the recently popular game Pokemon Go.

The primary goal was to allow people to leave pre-recorded messages which can be put at their grave or other locations after they pass away (Figure 2.10). These messages can be discovered by their living friends and family to memorialize the deceased as well as comforting the living (Otake, 2016). But that obviously is not the only usage. People can leave surprise messages at a place where their friends might pass by. Or, messages can be left in the woods for later backpackers to give them a little tour or guide.



Figure 2.10 - Picture of an image of the deceased shown on the Spot Message app when approaching the tomb.

Web source (Eric, 2016)

2.5 Avatars Generated by Social Media Data

2.5.1 What is an Avatar?

The word “Avatar” comes from Sanskrit meaning the incarnation of the God on earth. (Lochtefeld, 2002)

Avatars have accompanied humans for over a thousand years. Ancient puppet shows and shadow puppet plays are an early form of avatars as they represented living and dead humans as well as deities.

The internet has played its part and also helped to create many forms of digital avatars. This paper will only discuss avatars that exist in digital worlds.

Klang (Klang, 2004) states an avatar is an online character which can be considered as a reflection of the offline self. Thus, in the digital world, an avatar becomes “A being you’ve created as a representation of yourself in this online environment” (Hemp, 2006). It can be either three-dimensional or two-dimensional or even text based.

Bell (Bell, 2008) provided more detailed explanation ‘any digital representation (graphical or textual), beyond a simple label or name, that has agency and is controlled by a human agent in real time’. Although, one can argue that with the development on Artificial Intelligence (AI) technologies, avatars will one day be autonomous in the future.

In short, avatars are embodiments of human beings in digital environments.

2.5.2 History of the Digital Avatar

Text based avatars first appeared in MUD (Multi-User Dungeon) role-playing games. In these MUD games, lines of text are used by the players to control their avatars. For these games, a player base of 200 was considered a stable player population (Mortensen, 2006). To create one of these avatars is relatively simple and only requires a username, password, and some parameter setups.

The three-dimensional graphical avatars are an obvious improvement when they became available in games like Second Life, Never Winter Nights and World of Warcraft. These

avatars possess more functions which include visual and audio representations of movement and actions.

There were also attempts of using three-dimensional avatars for web conferences which was restricted by the bandwidths and video compression techniques at that time (Kauff and Schreer, 2002). This has largely been overcome in recent years with improvements in these functionalities.

2.5.3 Usage of Avatar

Coleman and Shirky (2011) state that avatars can generate strong human signals which can cause humans to respond strongly as well. Based on this, avatars should be suitable for any field that requires communication with human beings. As of now, the usage of avatars can be found in entertainment, acting, eLearning environments, training and shopping.

Falloon (2010) summarizes that a lot of researchers claim that avatars in the online virtual environment have the potential to benefit those with difficulties on face-to-face communications and enhance the interaction and connectedness in the society. North and North (2016) and Moody and Bickel (2016) also point out that the lifelike avatars used for therapies in the health sector help to make patients pleased and are beneficial to Virtual Reality Therapy (VRT).

Gaggioli et al. (2003) described the result of their research on using avatars for virtual clinical psychology as promising, but they also raised some issues which include safety issues.

Oestreicher et al. (2010) looked at the project iBot2000 that targets of using avatars to present seminars and lectures in a virtual environment. They state that although the avatars are still not very interactive with present technology and that its function to answer questions is limited, it has a list of advantages and has a prominent future when the development of the technologies can overcome current restrictions. They reckon in the future, these technologies can be used as replacements of lectures which will help colleges to save expenditure while providing a more approachable service than humans.

Avatars can also be used commercially for different businesses. Bailenson and Blascovich (2011) argue that the use of avatars could profoundly alter our social behaviors and work

performance – for better or worse. Some studies (Holzwarth et al., 2006) suggests that avatars can enhance the effectiveness of a Web-based sales channel.

2.5.4 Avatars from Social Media Data

Stephan Wagner and his Sociotope (2016ah) use applicants' social media info created by Facebook, Twitter or Google+ (still under development) to create visualized molecular-like avatar which provides a direct view of applicants' personal data on these platforms as well as feedbacks on each activity (Figure 2.11). They can also use the sorting functionality to visually analyze their social activities in these applications.



Figure 2.11 - Print screen from <http://sociotope.me/>

A group of researchers from the University of Erlangen-Nuremberg, Max-Planck-Institute for Informatics, and Stanford University completed a fascinating live facial reenactment project (Thies et al., 2016a) that allows a person to manipulate another person's facial expression in real time. The system they built captures videos from two individuals in the same room through separate RGB-D sensors (i.e., Microsoft Kinect). It then uses the facial expressions from the source actor to re-render the video of the target actor (Figure

2.12). Their video result shows that the rendered video with newly-synthesized expressions are visually indistinguishable from a real video (Thies et al., 2015).



Figure 2.12 - Print screen from associated youtube video.

Web source (2016ae)

This same team continued with another project which allows a person to manipulate the facial expression of a target actor in a monocular video sequence in real time. As shown in Figure 2.13, any Youtube video with an actor (in this case Donald Trump) can be picked as the target. The facial expression of the source actor will be captured live by a webcam. The manipulated and animated facial expression of the target actor will be re-rendered in a photo-realistic fashion (Thies et al., 2016b). This is a very advanced technology, but it also brings concerns as well. Will videos ever be trusted again?



Figure 2.13 - Print Screen from Associated Youtube Video.

Web source (2016n)

From these projects it is not hard to predict that, with the help of these avatar technologies, AI (artificial intelligence) technologies, and the use of individual's social media data, digital avatars may be built that not only have the look and even the unique gestures of the user, but also same opinions on certain topics or even similar mindset and way of thinking.

2.6 Ethics Related to Social Media and Thanatechnology

Topics such as the usage of data, privacy, consent, tradition, and death can spark debate and discussion as to their explicit ethics. Every human being has their own moral standards which are the principles governing what is 'right' and 'wrong' for themselves and society. However, that does not mean one person's 'right' action in his/her own moral

standard is also considered to be right by other people. What action is 'right' and what is 'wrong' has been under discussion by every civilization throughout history. The definitions of 'right' and 'wrong' vary from different civilizations and change over time.

As the topic in this dissertation is relatively new, very few published works can be found. Due to the limitation of the size of this research, it is not feasible to look at ethics in every aspects and subjects involved in the topic, thanatechnology through avatars created by social media data. Considering the importance of ethics to any newly immersed technologies, the author urges more researches to be done in the ethics part of this type of technology in the future.

2.7 Summary

This literature review shows that all cultures have customs relating to dying, death and bereavement. Some of them developed different types of thanatechnologies in the hope of getting a better afterlife or getting immortal.

With the development of modern technologies, more and more thanatechnologies appear. This literature review focused on the ones using social media and avatar technologies and went through some of the most recent developments. It is quite obvious that with the technologies for big data processing and artificial intelligence (AI) getting better and better, the thanatechnologies using avatars and social media data will become more and more powerful.

It is also worth noticing that all these technologies are still far from mature, the scientific projects are still at their beginning stage. This makes it a great opportunity to start background research (e.g. ethics and cultural acceptance) for these newly emerged thanatechnologies which are not yet widely adopted at the moment.

Chapter 3 Methodology

3.1 Introduction

This chapter explains the rationale behind the philosophies chosen and the approach taken in this research. After presenting the major philosophies of China with regard to the beliefs and rituals about death, a framework is devised with which to evaluate current thanatechnologies and their appropriateness to the Chinese culture.

3.2 Purpose of Research

The purpose of this research is to analyze the current Thanatechnologies through a Chinese Critical Humanism perspective. The result of the analysis will provide knowledge on such technology in the Chinese culture environment. It will also generate understandings on whether and what kind of Thanatechnologies are suitable to China.

3.3 Critical Humanism

Humanism is a philosophical and ethical stance that emphasizes the value and agency of human beings, individually and collectively, and generally prefers critical thinking and evidence (rationalism, empiricism) over acceptance of dogma or superstition. Often it looks at questions like the meaning of life (Walter, 1997) and death. Plummer (2015) pointed out that almost all belief systems around the globe can be linked to humanism while critical humanism look at such belief systems from a critical point of view.

Bennett (2005) writes that humanists do not believe in anything that is supernatural and that science is the only tool they use to explain the meaning of life and death. Therefore, humanists do not have religions although they would respect the freedom of choice on religions for other people. Humanists are always in pursuit of the truth (Bennett, 2005) so concepts such as the afterlife, ghosts or immortality are not their concern as there is no evidence of them, nor can they be explained through science.

3.3.1 Rationale for using Critical Humanism

Massimi and Charise (2009) point out that laboratory studies are not very suitable to inspect the studies of dying, death and mortality which is the core of thanatechnology. They go on to argue that it is hard to define a clear area of practice for ethnomethodology

as an approach due to the fact that death and mortality might be sensitive to certain cultures. This makes it a difficult topic to use for interviews and to collect empirical data. They therefore suggested that a critical humanistic approach can be used to examine these very human emotions in a gentle manner and it can help to understand conceptual and practical issues influencing human and computer interaction (HCI), experiences and death.

3.4 Chinese Critical Humanism

China has the world's largest population so far (2016f). It is the origin of one of the most ancient civilizations in human history. Since it is a geographically big country and it has a mix of 56 ethnics (Wikipedia, 2016b) with various of belief systems, culture and customs can vary dramatically from different parts. This dissertation looks at the contemporary thinking from a critical humanism perspective first and traces its source along the history.

3.4.1 Communism & Contemporary Chinese Humanism

Modern China is associated with Communism. It has been nearly a hundred years since the Chinese Communist Party brought Marx's Dialectical Materialism to China. It was not an easy job to disseminate a new philosophy to one of the world's largest populations.

The Cultural Revolution took place from 1966 to 1976. Although in fact it is a political activity, but since it started from criticisms of the existing Chinese culture, it is named the Cultural Revolution. Traditional Chinese culture like Confucianism and Taoism were considered the Old Thinking and was aimed to be destroyed together with the Old Culture, Old Habit and Old Customs (known as the Four Olds) (2016p). Tang (2014) thinks the Cultural Revolution broke the cultural legacy chain in China and the Chinese nation became faithless and even cultureless. The impact of this is still influencing Chinese people.

Tang (2014) states that a healthy and reasonable society needs at least two social mechanisms. One is sound political and legal system. Another is a set of social moral standards. The moral standards are normally very much related to the religious beliefs and ethical systems. Tang (2014) also suggests that as long as these religious or ethical beliefs are beneficial to the society, they should be relatively independent of the political

system and there are many examples throughout Chinese history where political interferences in religions failed in the end.

In the 1980s and 1990s, China began to correct the mistakes made during the Cultural Revolution and many elites began to review this stance. Tang (2014) suggests that two aspects need to be reconsidered.

- I. The virtue of the Chinese culture should be restored and promoted to society once again. Traditions are roots of the existence of a nation and the virtues built throughout the history should be carried on, instead of being abandoned so easily. Only by inheriting the virtues can society keep developing them to adapt to the contemporary changing society.
- II. People should have faith and beliefs as well as the freedom to choose them. Since no one can force everybody in the society to have the same belief system, the best strategy is to respect different beliefs while guiding people towards kindness. (Tang, 2014)

3.4.2 Thanatology under Communism

Gradually, Chinese society is rediscovering old habits and customs. At the same time, Chinese people evolved Marxism into a Chinese version. Many of the main aspects are still kept. One of them is atheism. Marxism does not recognize the existence of God, Creator or Divine Ruler (Aikman, 1979). On the contrary, and according to Marxism, it is human beings who created God and all the religions (Riazanov, 1937). Under this influence of Marxism, most Chinese people do not believe in god, an afterlife or immortality although nearly all of them would enjoy many aspects from traditional Chinese mythologies or religions and these appear in literatures and entertainment. Many would celebrate festivals in different religions like Christmas Day or Zhongyuan Festival (festival of the ghosts) (July 15th in Lunar Calendar) which have different explanations in both Taoism and Buddhism. Although contemporary Chinese people might not accept the existence of god, ghost, the afterlife or immortality, they still keep a big part from the traditional Chinese culture regarding funerals, sacrifices and offerings to the dead.

Today, it is stipulated by the government that bodies have to be cremated before buried. People still follow some of the traditions and keep the deceased in a coffin at home until it is cremated. Instead of burying a coffin, a much smaller cremation urn is used and buried

into pre-purchased tombs. Unlike in ancient China where the location and size of tomb and the standards of it are determined by the social rank and status of the deceased, in modern China, it is normally determined by wealth. People also put personal belongings into the urn for the deceased to use in the afterlife.

It is still unchanged that the Chinese respect their culture and ancestors a lot. In ordinary Chinese homes, the pictures of the directly related ancestors are often hung on the wall as a memorial. For Buddhists, an altar might be placed at home for people to pray and sacrifice to the Buddha and the ancestors (Figure 3.1).

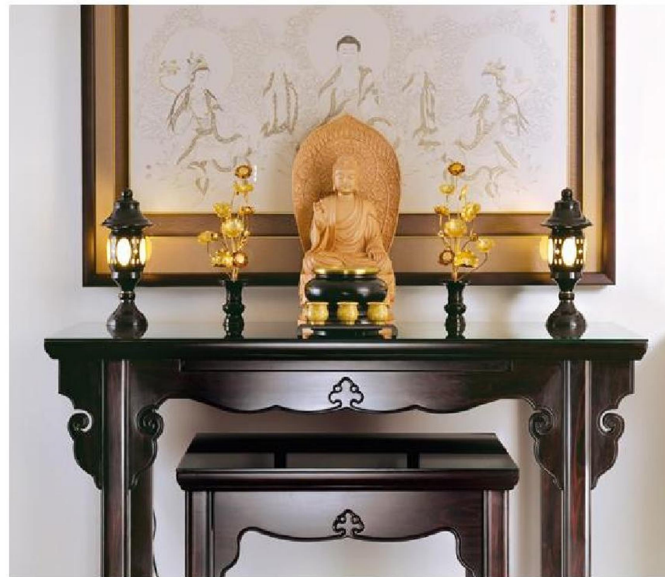


Figure 3.1 - A Buddhistic Altar Placed at Home.

Web source (2016e)

Offspring will visit the tombs of their ancestors every year at Qingming (2016ad), 5th solar term of the Chinese lunar calendar, and sacrifice to their ancestors offerings of food, drink and paper money etc. It is believed these will be passed on to the ancestors in the afterlife and this action is a type of communication with the deceased. What Chinese people say the most in the sacrifices is 'Please bless me and the whole family'.

As observed by Tang (2014) above, political interference in religion and customs did not succeed. These customs and traditions can all find their roots in the classical Chinese cultures. The following sections will review the main traditional cultures such as Confucianism, Taoism and Buddhism.

3.4.3 *Thanatology in Chinese Mythologies*

In the Chinese culture, there are several perspectives on dying, death and immortality: Confucianism, Taoism, Buddhism and Mohism etc. Due to the limitations on the size of dissertation, Confucianism, Taoism and Buddhism will be looked at and analyzed below as they have created greatest impact and are still influencing Chinese people around the globe today.

In each of these philosophies, we can see the seeds of the Chinese ancient mythology which believes in many Gods who are immortals. These Gods include the creator of the cosmos, Pangu, and the creators of the Chinese race (Huaxia race), Nüwa (Wikipedia, 2016c) and Fuxi (Wikipedia, 2006), half-human, half-snake (Yuan, 1985, c. 600 BC) as well as the Three Sovereigns and Five Emperors. Numerous stories about them were recorded in ancient books and records. Of particular relevance to this dissertation is <The Book of Rites> (Liji) (Legge, 2003).

In these mythology stories, the gods were all acting positively or even perfect. (e.g. Sacrifice themselves to create the Huaxia race, try hundreds of herbs to distinguish the poison ones out from the rest for people etc.). On the contrary, some can argue that the Gods in Greek mythologies are quite human inside, full of wayward actions, jealousy and hatred which make them more secular. It is very obvious that the Gods in Chinese mythology paid a lot of attention on cultivating themselves to comply with the moral and ethical standards or at least the culture that created them does. On this note, one can suggest that since the ancient mythologies, the Chinese culture has been one that focalizes in setting up positive moral and ethical structures on the society. This idea can be found in almost all Chinese philosophies and humanist thinking throughout Chinese history.

In Chinese culture, life and death were all considered as natural phenomena. It is recorded in Huainanzi, 139 BC, that one of the sage emperors, Yu the Great (Da yu), in ancient China made an inspection tour to the south and his boat was pushed up into the air by a dragon. He laughed and said life is temporary which is like living in a hotel while death is like going home (Liu, 139 BC, Jing Shen Xun). In one of the most famous ancient Chinese classics, Yi Jing or I Ching (Legge et al., 1972), life is described as 'Yang' and death is 'Ying'. Nan (2000) interpreted 'Yang' as force and 'Ying' as rest or subduction which suggests death is only resting and getting ready or recharged for another life.

Details of the rules, size and shape of the tomb; different grades of ceremonies and level of the burial objects etc., can be found in <The Rites of Zhou> (Zhou Li) (Zhou, 841 BC), <Rituals and Proprieties> (Yili) (Confucius, c. 500 BC) and <The Book of Rites> (Liji) (Legge, 2003).

People in ancient Chinese society worshipped Gods and Ghosts. While this practice is declining under Communism, it can still be found. In August 2016, a Chinese man was arrested for murder when he killed women to sell their corpses as 'ghost brides'. For over 3,000 years, in parts of rural China, it is believed to be extremely unlucky for a man to die a bachelor. In a ritual called 'ming hun', a 'bride' must be found and buried with the dead man. She will look after him in the afterlife and good fortune is restored to the man's family (Coonan, 2016).

In ancient China, a coffin, and grave-clothes (cannot be red) are normally prepared before the death occurs. Traditional coffin in China is rectangular. When death occurs, family members need to remove all mirrors in the house and cover all statues of deities with red paper; then clean the corpse with towel and put on the grave-clothes before putting the body into the coffin.

3.4.4 *Thanatology in Confucianism (ru).*

Confucius (551 – 479 BCE) was a Chinese philosopher whose thinkings are contained in the Analects of Confucius (The Edited Conversations). Confucianism has been the dominant philosophy in China since the 7th emperor of Han Dynasty around 134 BC (2016l). Confucianism is often considered as humanistic because "the Confucian understanding and conception of the Ultimate, of the imminent power, of the transcendent, of the world, life and death are all related to, and based on, its exploration of human nature and human destiny" (Yao, 2000, p. 46). Human life is what people can actually feel and experience. It is the only way humans can fulfill its destiny of this life and to connect with what is beyond this life whichever religion this human being believes.

Confucians appreciate how meaningful and invaluable human life is. Confucius replied to the questions of how to serve spiritual beings and how to understand death: 'If you are not yet able to serve humans, how can you possibly serve spiritual beings? If you do not yet understand life, how can you possibly understand death?' (Yao, 2000, p. 46, Legge, 2009, Analects 12.5). Confucius made it very clear thousands of years ago that people should

always focus and care more about their current life, because the lives of the living are more important and Confucius thinks proper mourning is essential but that people's daily lives would not be hugely interrupted.

Some people argue that this illustrates that Confucius' ambivalence towards death is avoiding a direct pronouncement on death. However, Feng (1962) suggests that Confucius avoided discussing death directly for social reasons. He had to consider the social and real impact of his words. Feng quoted from an ancient book (Liu and Tso, 1970) a conversation between Confucius and his disciple Zigong. Confucius gave an answer to Zigong's question whether the dead people have consciousness with, "If I say the dead have consciousness, I fear that the ones with filial piety might spend a huge amount of time to bury and mourn the dead which would disrupt their lives. If I say the dead do not have consciousness, I fear that the ones do not have filial piety might leave their dead ancestors alone without burying or mourning them. There is no need to be anxious of knowing whether dead people have consciousness or not, you will know it when you are dead."(Liu and Tso, 1970). Confucius regarded death with great composure. If it is inevitable and mysterious, perhaps the best way is to not to be overly concern with it and let it reveal itself when the time comes.

Very similar to his attitude towards the afterlife, Confucius did not talk about god or ghosts much either. There are around 21000 characters in the Analects. The word 'God' together with 'Ghost' appeared less than 10 times. It is very clear that Confucius did not discuss god, ghosts, the afterlife or resurrection much. However, people during Confucius' time did believe in gods and ghosts as described in the mythologies. Due to the lack of knowledge in science, people could not explain various kinds of natural phenomena. As a result, it is understandable that, as a humanist, Confucius did not talk a lot about gods, ghosts, the afterlife and resurrection.

The basic Confucian's view over life and death is as what David Beckham's tattoo on his waist shows (Figure 3.2), "Life and death are destined by fate, rank and riches decreed by heaven." Interpreted by Reuters (Lau, 1979).



Figure 3.2 - David Beckham's tattoo - 'Life and death are destined by fate, rank and riches decreed by heaven.'

Web source (Francis, 2013)

Confucians did consider death a sad thing. It is explained in the Analects (Lau, 1979) that death can cause extreme sorrow to a human being and the Analects also record the death of one of Confucius' disciples that wrung the great master's heart to the very core. Confucius (Chi, 1885) believed that death and poverty are things people detest the most. Thus human beings need to use the rules of propriety ('Li') to control their feelings. For example, "That parents, when alive, be served according to propriety; that, when dead, they should be buried according to propriety; and that they should be sacrificed to according to propriety." (Legge, 2009, Analects 2.5).

Although dying and death is the inevitable (at the moment!) destination for every human being, people can endow different meanings to it. Almost all Confucians agree that in extreme cases where people's life is in the way of pursuing the moral value, life shall be sacrificed to maintain and continue the pursuit of the moral value while death can be used to actualize the value, righteousness ('Yi').

Zilu, one of Confucius disciples, was killed in a war while trying to pick up his crown and tie it up. Zilu said “I don’t mind dying, but I would be improperly dressed without my crown.” (Sima, 91 BC). Zilu chose ‘Li’ (propriety) and ‘Yi’ (righteousness) over his own life.

Wen Tianxiang (1236 - 1283), a grand councilor in the late Southern Song Dynasty, was captured by the invading armies from Mongolia. The Kublai Khan offered him two options: death or a high post in his dynasty on the lately conquered Chinese land of which Wen Tianxiang chose death. Until now, he is still considered a moral standard by the whole nation and the entire Chinese race (Chang, 2013).

However, Confucians are also very dialectical. Confucius objected on actions that would give up one’s life for meaningless actions like ‘fighting a tiger with bare hands or crossing a river without a boat’ (Chang, 2013, p. 71)

Confucians pay extra attention to funerals and sacrifices (Legge, 2009, Analects 20.1). In <The Book of Rites> are recorded detailed standards for death and burial rituals, covering everything from coffins dependent on status, fasting and length of mourning (Legge and King, 1879). Although Confucius never declared whether he believed in god, ghosts and souls or not, he made it very clear that people should mourn the dead “as if they were spiritual intelligences” and sacrifice the Gods and their own ancestors (Legge, 2003).

The reason to attach importance to funerals and sacrifices is that they will help to form up and keep good moral standard among people. Confucians believe if and only if all proprieties are followed, will the society be stable and prosperous (Legge, 2009, Analects 1.9).

The Confucians believe that Heaven is the transcendental power in the universe which dominates everything and it is believed that “the Confucian doctrines are the result of observing and following the laws of Heaven and Earth” (Yao, 2000, p. 141). This kind of observations have been the major cause to understand the circle of life and death and everything in between.

Although there’s a limit to everyone’s life; “by bringing individuals’ growth in line with cosmic evolution, Confucians locate their concept of immortality (buxiu).” (Yao, 2000, p. 158-159). This first appeared in the ancient book <Chun Qiu Zuo Zhuan>, It has been categorized into three immortals (buxiu), judging by the ‘virtue’ (de), the ‘merit’ (gong) and the ‘word’ (yan) (Yao, 2000, p. 158-159). A man can be considered as immortal if he can

establish at the same time good character that can be set as a moral sample ('de'), deeds or achievements that will not be forgotten and some imprint in history like the great thinking left by Confucius, Mencius and Laozi etc. and if these virtues last over time.

Perhaps the most relevant aspect of Confucianism for thanatology and this dissertation is that Confucians also believe that eternity can be achieved by the continuity of family. Every member of the family has a duty and "The young would obtain a sense of moral responsibility, the elderly gain respect, the dead live in the hearts of their descendants and the newborn be given a mission. In these ways an individual would last as long as his family lasted, and would acquire a sense of eternity in the midst of temporal life." (Yao, 2000, p. 204).

3.4.5 *Thanatology in Taoism*

The universe from a Taoists perspective is governed by an overarching order 'Dao'. 'Dao' forms everything in the universe. "The Dao produced One; One produced Two; Two produced Three; Three produced All things." (Legge, 2013, Dao De Jing, 25). The heaven, the earth and man are all following the order 'Dao'. The wisest action is to follow the order 'Dao' and there should be no attempts to change the order (Non-action or "wu wei"). Taoists affirm the idea of the harmony between man and nature. The source of this idea is from the Chinese mythologies mentioned earlier in this Chapter.

Laozi considers life and death are equal. "Men come forth and live; they enter (again) and die." (Legge, 2013, Dao De Jing, 50). Chuangzi explained more about the unity of life and death in <Chuangzi> (Legge, 1891, Chuangzi Zhibeiyou : 1).

Unlike Confucianism, Taoism does not agree with the idea of sacrificing lives for any reasons. Dying for 'righteousness' (yi) or the three immortalities (buxiu) is no different than a thief dying for stealing (Legge, 1891, Chuangzi).

Also, Taoism disagrees with Confucianism about funerals, rites and sacrifices. In their opinion, humans come to the universe naturally, so they shall return to it the same way. It is a waste of time and energy for activities like funerals and sacrifices. Chuangzi described the death of his wife as her return to 'qi' (breath) (Legge, 1891, Chuangzi Zhile.2). It's "like the processing of the four seasons from spring to autumn, from winter to summer." (Legge, 1891, Chuangzi Zhile.2).

Taoists think there is just one life and it is the body of a human being that is restricting it from being immortal (Legge, 2013, Dao De Jing, 13). They believe it is possible to not perish after death. Laozi explained this leads to longevity (Legge, 2013, Dao De Jing, 33). Chuangzi believes if people can forget the existence of their body and desires and unite their minds with 'Dao', they will penetrate beyond life and death. 'Dao' is eternal in Taoists view. Therefore uniting with it will certainly make a person immortal (Legge, 1891, Chuangzi tiandi : 9). This status is considered as super-human or saintly 'Xian' (2016ap).

Based on this belief in immortality, later Taoists formed several religions which focus on the ways of becoming immortal 'Xian'. A very famous Taoist, Ge Hong (Ge, c. 330), introduced in his book, Traditions of Divine Transcendents, four schools of immortality, 'Qi' (breath), 'Fan' (diet), 'Fang Zhong Zhi Shu' (arts of the bedchamber or art of sexual yoga) and 'Dan' (alchemy) as well as the ways to practice and cultivate to become 'Xian' in each of the four directions.

One of the directions 'Qi' (breath) was developed from the ancient Chinese metaphysics, A real application of 'Qi' is Feng Shui, which aims to harmonize everything with the environment (2016o). Chinese people believe the orientation and architecture of the constructions must not go against the order of the universe 'Dao', otherwise, it might cause danger or a loss of fortune to people. In this regards, Chinese people are very serious about the tombs for themselves and their ancestors. It is deep in the minds of Chinese that only by keeping the harmony of everything in the environment is considered as obeying the rules of the heaven 'Dao'. Guo pu (276 - 324) described the detail of the rules of Feng Shui for tombs in his famous commentary book <The Zangshu or Book of Burial> (Pu, 2003).

3.4.6 Thanatology in Buddhism

Buddhism originated in India in the 6th century BCE and spread across Asia not long after. When Buddhism was adopted by people from different areas, different aspects of it were emphasized in different places to adapt and meet the requirements of the people there. (Hirakawa and Groner, 1993)

Even in China, there are several branches like Chinese Buddhism and Tibetan Buddhism. There are also three major branches (three vehicles) of Buddhism, Mahayana (Great

Vehicle), Theravada / Hinayana (Small Vehicle) and Vajrayana (Tantric Buddhism) (Van Gordon et al., 2015). This dissertation will only focus on Chinese Buddhism as a whole.

The Buddha devoted his life pursuing a solution to the issue of life and death. To understand life and death and what can be seen from death is the beauty of infinity. (Li, 2009)

Zürcher (2007) pointed out that the adoption of Buddhism in China was not so straightforward initially. The Buddhism that integrated into the Chinese culture at the very early stage, around fourth and fifth century AD, might seem quite strange or even hardly Buddhist to an Indian Buddhist. Zürcher (2007) provided some causes to this phenomena.

When translated, the Chinese terms used often had a “definite philosophical value” and some “non-buddhist” meanings already. This sometimes led to a completely opposite interpretation. Another very important reason is the different conceptions between the two cultures. Many fundamental notions in Buddhism were from the Indian worldview at that time but didn’t appear in the Buddhist doctrines. This includes “karman, rebirth, universal suffering and impermanence as well as the ideal of the religious life as a way to escape from it, the cyclic development of the universe in terms of cosmic periods (kalpa) and the existence of innumerable worlds (lokadhatu), the efficacy of meritorious works etc.” (Zürcher, 2007, p. 11). This makes it hard for people with Chinese culture to understand Buddhism without the familiarity with the facts of Indian Buddhist culture.

Buddhism first brought the concepts of “Emptiness and Sainly wisdom”, “the retribution of sins” and “the immortality of the soul” to China in the fourth and fifth century and soon captured the Chinese public’s interest (Zürcher, 2007). As mentioned earlier in this chapter, Confucianism and Taoism all focus on life more than death. None of them provided detailed explanations about the world after death. Taoism does not even believe in the existence of afterlife. The appearance of Buddhism, with the idea of rebirth and karma filled this breach which was very important to the public (Zürcher, 2007). The cosmic justice brought by karma matches the concepts of the “Heaven’s way” (Tian Dao) for Confucianism and the “order” (Dao) of the universe in Taoism which suggests any actions against the rules of the heaven will be punished. This gave its believers calmness and hopes when any injustices happened to them.

Zürcher (2007) found in his research that Huiyuan, (334 - 416) who studied Taoism and Confucianism at a young age, and who was later convinced by sermons of the Buddhist Dao An, played a very important role in reconciling Buddhism with the traditional Chinese religions and beliefs.

With the help from Huiyuan and the others, Chinese Buddhism finally adopted the theory of Saṃsāra which believes all existing beings in the three worlds are transforming among the six realms of Saṃsāra into different bodies and beings based on the Karma (deeds) they built up. Only nirvana can break the cycle and enter the Sukhāvātī (equivalent to the idea of Paradise).

3.5 Proposed Framework

Confucians treasure life over death. They believe death is just following a natural rule and the only immortality they would agree with is through the three 'buxiu'. When a person achieves great virtue, merit and leaves a great legacy of work, this person can be considered immortal. Confucians treat the dead with great respect and emphasize that the rule of propriety to mourn and sacrifice can keep the harmony of the society and help individuals to find their inner peace by following heaven's rules. It is considered filial piety to serve the dead as they were served alive.

Early Taoists believe death and life are equal; they are just like the two forms of the same item. People do not get to control life or death because a heavenly order 'Dao' sets everything in the cosmos. Death is the most natural thing where people don't need to mourn or sacrifice for the dead. Indeed since human beings are suffering from all kinds of pains while they are alive, death should be considered a great relief and release. Taoism disagrees with Confucianism on funerals and sacrifices and argues these forms of event are waste of times. 'Dao' is the overarching rule of the universe which denies the existence of any Gods, souls, or ghosts. Once a human understands the heavenly order 'Dao', he/she will be united with it and becomes transcendent or immortal. Becoming 'Xian' (super-human or saint) has been the major quest for most Taoists as well as the emperors ever since. Chinese people developed several religions based on Taoism which focuses on how to become 'Xian'. Many Chinese people are still using the Taoist 'Feng shui' to guide them on the selection and building of tombs in the hopes of adopting good fortune for the family.

Differing from the others, Buddhism believes in the idea of the cycle of lives where souls transform into different embodiments as different forms (human, animal, insect etc.). The only possibility to break the cycle and enter the eternal heaven (to be immortal) is by uniting with the universe. Buddhists believe this leads to Nirvana.

- Confucians believe that destinies are determined by Heaven's way (Tian Dao). They would rather choose 'Li' (propriety) and 'Yi' (righteousness) over their own lives.
- In Taoism, immortality can be achieved by understanding the 'Dao' and uniting with it. Following the rules of the universe is a positive action.
- Buddhists need to cultivate and accumulate merits by doing good deeds to gain better rebirth in the cycle of lives or to reach the ultimate goal – nirvana.
- In modern Chinese Communism, people are encouraged to contribute and fight for the ideal society where everyone is equally treated and respected.

A conclusion can be drawn that the majority of Chinese individuals would want themselves to be recognized by society or direct descendants as a person who is with 'Li' (propriety) and 'Yi' (righteousness); who has followed the rule of the cosmos (Dao); who has accumulated many good deeds; who has contributed a lot for a better society. All in all, the majority of Chinese have combined many elements of all of the above belief systems into a Chinese humanistic approach to death. Therefore, the memories they would like to leave after their death would be that they were good, kind or followed the rules of the universe or simply did not go against common moral standards of Chinese society.

From the literature review, it is possible to draw up a framework which shows the major beliefs, rituals and practices observed by the main cultural identities of China. This will be used to evaluate current thanatechnologies for their readiness and acceptance into Chinese culture in the next chapter. It can be used as a filter by thanatechnologies to 'tailor make' an appropriate avatar for the deceased. Since many Chinese accept elements from Confucianism, Taoism and Buddhism at the same time, it may also be used by the living to pre-set their preferences after death similar to the functionalities used by Facebook and Google mentioned earlier.

From the above, table 3.1 is created to introduce the framework.

Table 3.1 - Table of the Framework Summarized.

	Humanism	Communism	Confucianism	Taoism	Buddhism	Contemporary Chinese Humanism
Afterlife	No	No	No	No	Yes	No
Resurrection/Reincarnation	No	No	No	No	Yes	No
Burial	Yes	Yes	Yes	No	Yes	Yes
Cremation	No	Yes	No	Any Forms	Yes	Yes
Burial Objects	Not Important	No	Yes	No	No	Yes
Dead Worship	No	No	Yes	No	No	Yes
Ghosts	No	No	Not Important	No	Yes	No
Living Altars	Not Important	No	Yes	Not Important	Yes	Yes
Immortality	No	Spirit	The Three Buxiu	Xian	Nirvana	No
Soul	No	No	Ambivalent	Yes	Yes	No
Ethical Filter	Yes	Yes	Yes	Yes	Yes	Yes

3.6 Limitations and Lessons Learnt

The subject of philosophies in the Chinese culture environment is such an enormous field to do research in. This dissertation limits it to the perspectives towards dying, death and bereavement. Chinese people have a very long history and many interesting philosophical views on these subjects. Many belief systems were built up throughout the history and a lot of them are interrelated. In order to understand how Chinese people nowadays think about dying, death and grieving, it is very important to trace back to the major philosophies. Although the major belief systems were looked at in this dissertation, it is not possible to cover all perspectives and thinking in the Chinese culture environment. Therefore, this research can only provide a general guide towards the majority of Chinese people.

After summarizing all the perspectives from different philosophies, the points seem so scattered and cannot be related easily. The introduction of the table helps to organize all the thoughts better and clearer which makes it easier for the analysis.

Chapter 4 Analysis

4.1 Introduction

This chapter introduces current thanatechnologies of which some are existing and some are under development. They will be analyzed through a Chinese humanist point of view with the frame work suggested in Chapter 3.

Thanatechnologies are relating to death and immortality. Therefore, the acceptance level will be highly dependent on how the culture of the target market looks at death and immortality.

The author believes through this process, we can provide critical judgement on the projects through a Chinese humanist point of view which should offer the companies/organizations behind these projects an opportunity to review them with a closer look to the Chinese culture and philosophies should they wish to spread their products into the Chinese market.

This chapter begins with some chosen contemporary projects that can represent the major trends of thanatechnology. The projects will be presented from the most basic to the most complicated according to the mechanisms used and technologies involved. This is followed by a detailed analysis of the projects and subsequent findings using the framework introduced in Chapter 3.

4.2 Contemporary Thanatechnologies

Judging from their goals, the current trend of digital thanatechnologies can be categorized into four different types.

- 3D representation (avatar) with interaction in real-time.
- 3D representation with the aid of artificial intelligence (AI).
- Recreation of human mind.
- Recreation of human.

4.2.1 *Project Elysium*

Project Elysium was a project submitted to the Oculus Mobile VR Jam 2015 competition event hosted by the virtual reality (VR) company Oculus VR, LLC. The two founders both wanted to use this project to re-unite with their deceased fathers once more. The project was planned to create a virtual environment as well as an avatar of the deceased using VR goggles like the Oculus Rift and the goal was 'to create something predicted and heavily scripted'. (2015)

The project is more like a game or a virtual reality (VR) experience program. Very little use of artificial intelligence or machine learning has been made that can help to shape a similar personality to the person it simulates. This may be one of the reasons this project did not proceed to the final of the competition, nor has it yet to yield any exciting results. At the time of writing, the development of this project seems to have stopped and no further information can be found online.

The rationale for this project was to memorialize a parent, a rationale very sympathetic with the Chinese concept of filial duty and propriety.

4.2.2 *Project LifeLike*

A collaborative group of researchers presented a realistic avatar at the National Science Foundation's (NSF) annual meeting in 2009. A team from Electronic Visualization Lab at the University of Illinois at Chicago focused on building a realistic avatar with the unique gestures and body movements of the person it is mimicking. They claim that their research shows that people often pay more attention to the 'idiosyncratic movements' rather than how lifelike the avatar is (Geddes, 2010). Another group from the Intelligent Systems Lab at the University of Central Florida worked on providing the avatar with AI which can enable it to understand natural language(2016ac). The avatar demonstrated at the meeting was able to communicate with attendees and provide information about a program on the meeting.

More research was done based on this project to make the virtual embodiment look and behave more naturally and closer to human beings(HUSK, 2012). The end goal of this project is to enable avatars with more natural alternative computer interfaces that can provide services to patients (i.e people with autism) which will be more approachable than

current human based health services; virtual tutors for students or guides in museums or businesses that involve communication (i.e information kiosk)(HUSK, 2012); or digital archives for notable scientific, social and political leaders (2010).

4.2.3 *Eterni.me*

In 2014, a team from an Entrepreneurship Development Program in MIT created a start-up company, Eterni.me, in the hopes of helping people to leave a digitized legacy to their descendants after they die. As it is still in its private beta period, very limited data and information has been released.

The company aims to gather as much social media data, emails, geo-location information, uploaded pictures and video recordings (including ones from devices like Google glass) as each individual user would allow and use technologies like big data analysis, artificial intelligence, and machine learning algorithms to create a digital representation (avatar) of the signed up volunteer. The avatar will try to emulate the user not only on the look but also on thoughts and personality and it will be grow and develop to more resemble its owner as time progresses, more data has been collected and more interactions have been made between it and the user. The nominated 'beneficiaries', normally the user's friends and families, could communicate with the avatar and use it like a search engine to access more information of the deceased person.

One advantage of this digital legacy project is its interactive quality. The descendent of a deceased can learn his/her legacy as though they are having a regular conversation in the sitting room on a summer afternoon.

4.2.4 *Terasem Movement Foundation Projects*

The TMF Inc. (Terasem Movement Foundation), founded and owned by Martine Rothblatt, is a US-based non-profit organization that funds projects aiming to investigate the two hypotheses raised by Terasem Movement.

1. It is possible to collect sufficient amount of data from human to create their digitized mindsets (mindfiles) and to make them conscious.
2. It is possible to transport the mindfile into a Nano-technological body and make it conscious.(2016aj)

Promoting the global ethical use of nanotechnology to extend human lives is the company's mission. With the awareness that these technologies might raise fears and concerns, as well as the aspiration to avoid the technologies from creating social class divisions, the founders of the company decided to allow participants from every part of the society which can also help to raise the level of awareness across to reduce fears and concerns.

1. Lifenaut Mindfile Project

Participants need to upload documents, pictures, and videos which will all be archived digitally (Figure 4.1). A computer-based avatar will be generated based on this mindfile collected. Participants can interact with the avatar to increase the likeliness between the two.

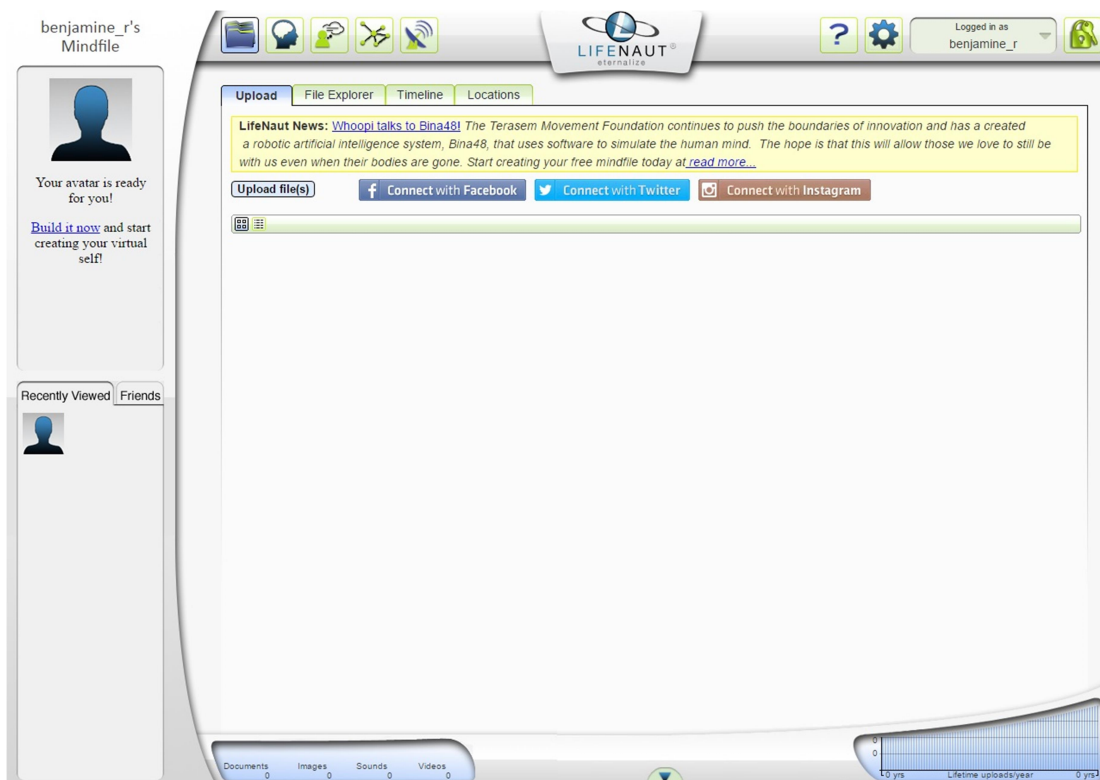


Figure 4.1 – Interface to create the Lifenaut avatar using social media data. (2016x)

2. Lifonaut Bio File Project

Participants will be provided with a mouthwash which needs to be sent back with the live cells from their mouths. The company then store the sample cells at -190° C in the hopes of someday some future technology can grow a new body based on the cells to which the mindfile archived can then be downloaded.

4.3 Findings and Analysis

4.3.1 *Project Elysium*

Technologies that aim to create virtual avatars with real time interaction (i.e in a realistic virtual environment) like Project Elysium cannot provide much functionality other than a better experience than reviewing photos or watching videos of the deceased. With today's level of software and hardware, as can be seen in virtual reality (VR) games, these projects do not have many technical difficulties to overcome and are generally achievable.

It is clearly shown in Table 3.1, Chinese people respect ancestors and it is in the culture that people should memorialize and sacrifice to their ancestors. This type of technology will be happily accepted by Chinese users especially for the ones that have already created the online graves. It may even be considered a duty to have an active, even interactive avatar whenever people go and visit them in the online cemeteries. Furthermore, people can easily setup an altar at home by using a tablet device to constantly visit the online grave and the avatar.

However, Project Elysium did not anticipate the reactions of users when they are reunited with the deceased loved ones again. A very concerning fact would be the user might be overcome with sorrow and endless mourning which is against Confucius' will that the mourning should be proper and should not affect the life of the livings too much. Similar thinking can be found in Taoism, Buddhism, and contemporary Chinese humanism. Certain monitoring and control mechanism can be included to warn the users when they are spending too much time in this virtual environment.

The initial goal of the project was to win the contest and use the prize to develop it into a commercial program. Since it failed and did not win the prize, the game studio which started this project seemed to have abandoned it and very little can be seen about it from Google searches. It could be a viable commercial product for the Chinese market if it can

include a mechanism to provide warnings to avoid situations where users get addicted to it.

4.3.2 *Project LifeLike*

Project Lifelike not only aims to create a realistic avatar, but also imbue it with artificial intelligence which allows it to communicate with humans. As can be seen from the online sources, the demonstrated avatar was only able to have a conversation with human beings regarding a specific topic – information about the programs in the conference. This indicates the AI level is still primitive and functionality is very limited. It is very obvious that it will not be able to pass the Turing test. But its goal was only to provide the technology as a service. Perhaps one day, when people walk into a science museum, a virtual Albert Einstein will give them a tour of the Theory of Relativity.

As can be seen in the Table 3.1 introduced in Chapter 3, Confucians only consider those who have created the three 'Buxiu' as immortal, because what they left to posterity are positive thinking, virtue, and merits that can inspire human towards a better self. This project can certainly help to memorialize all the great minds in history to leave a more direct impact for the world after their physical death.

Taoists believe when you followed the rule of the cosmic, you become 'Xian', also an immortal. One can argue the scientific theories of the universe are definitely rules of the cosmos.

One can also argue that the goal of 'Nirvana', which Buddhists are pursuing, is to enter the eternal world and become a sage whose responsibility is to make the world a better place. So, without any doubt, projects like project lifelike should be accepted by the Chinese culture standards.

Unfortunately, after extensive research, it is not clear whether this project has been suspended or not. But the concepts and technologies might have already been adopted into other projects or research which might occur in the near future. Nevertheless, the commercial use of this project is very straight forward. It can be used as a type of service; expositions in museums and historical venues or shopping guide in the malls and supermarkets or even replace some of the tutors in schools.

4.3.3 *Eterni.me*

The Eterni.me program aims to create a commercial system that can make it possible for normal people to leave their digital legacy behind. The idea of leaving the legacy to the offspring matches the family ideology in Chinese culture where family comes first and that all family members should sacrifice to make the family glorious as well as memorialize and pass on the wisdom inherited through the family line. However, the same issue occurred for Project Elysium also applies to this one. Eterni.me needs to find out a way to avoid their user from being too preoccupied with sorrow and mourning it might cause. Perhaps one idea is to not make the avatar too realistic and to warn the user this is not the real person.

The avatars which will be created by Eterni.me are claimed to have built in AI as well which can allow the descendent of the users to have a proper conversation just like they were alive. This also fulfills the mentality in Chinese culture that one should communicate with the ancestor on the occasions of the sacrifices to show their respect and to reminisce. At the same time, it can comfort the living greatly. Depending on the level of AI technology used, people might even be able to get information, guidance and advices from their deceased loved ones.

However, this project is still in beta version. I have personally signed up for it in 2015, but still have not received any information regarding the timeframe or plans. Everything still remains a mist. Should it ever be successfully developed and released, a very important suggestion would be, to create a valid filter for the data collected.

As described in Chapter 4, in Chinese culture, a filter is needed to pick the good out from the bad, to also differentiate the words of the users from those quoted from others. The standards to distinguish the good from the bad also need to be discussed and looked at. A database of all the remarkable and well known sayings would be necessary. A mechanism to filter the contents is also critical.

Since the avatar created in this project is claimed to have AI, although the level of AI remains unknown, it is recommended that they should make sure that the avatars are reactive. In other words, the avatars should only respond to actions or communications made towards them when requested. They should not approach the living persons

intentionally (e.g. Respond to Facebook messages or re-tweet and @ living users). This is not advised in Confucianism as it will interfere with the lives of the living.

4.3.4 *Terasem Movement Foundation Projects*

The Lifonaut project is an undergoing project. Geddes (2010) created an avatar for herself. Having rated some 480 statements and uploaded diaries, photos and videos, she was able to have a conversation with her own Lifonaut avatar for hours to teach the avatar more about her. When she finally asked her husband to chat with her avatar to assess the realism, her husband told her most of its responses were nonsense and the avatar finally told him it was depressed (Geddes, 2010). Geddes (2010) was told by an AI researcher that the Lifonaut avatar might need a lifetime's conversation to be like her.

It is clear that the user experience is highly dependent on the level of AI technology used. While the company is still devoting in better AI algorithms, the acceptance level should be similar to the Eterni.me project and the same issues and concerns should apply to Lifonaut avatars as well.

The second part of the Lifonaut project is more complex. Although there is no clear answer as to whether this approach is achievable in the future, the idea of immortality has been long in the Chinese culture. Many emperors requested Daoshi (Priest in Taoism) to produce various of medicines and elixirs through alchemy (2016ab, 2016g) in the hope that the elixirs might help them to live forever. The ordinary Chinese also seek longevity. It is in the culture that when greeting the elderly, Chinese people always wish for good health and longer life (e.g. Wish you a life of a hundred years "chang ming bai sui"(2016y) or live as long as the Zhongnan Mountains "shou bi Nan Shan"(2016z)). Table 3.1 shows that major philosophies in the Chinese culture believe in different forms of immortality. Even communism believes that positive mindsets that reflect the moral and ethical values of the society can be memorialized by people which can be considered as immortality. Technologies that aim to give longevity to people or make humans 'immortal' should find themselves easily accepted by the majority Chinese.

4.3.5 Conclusion on Analysis

It is very gratifying after analysis that despite different issues, all of the projects were found acceptable by the majority in the Chinese culture environment. The issues to note are all technically resolvable.

However, none of the projects included a mechanism that will run through all data collected from users and put them through a filter described in the framework in Chapter 3. This can be essential for the project to enter the Chinese market. Based on what is suggested in the framework in Chapter 3, the majority of Chinese users would like the legacy they leave behind to be judged as positive and respectable that contains virtues and good morals.

4.4 Viable Model

4.4.1 Look

Although in contemporary China, atheism is the dominant thinking and majority of people do not believe in the afterlife or ghosts anymore, but in parts of the Chinese culture, it is believed there is an afterlife. People are considered to have souls and accept the existence of ghost. And a lot of the traditional culture and customs are still kept to this day. So it is suggested that the avatars of the viable model do not need to look as realistic as possible, in fact, it might be better if they can be easily recognized as not real. This would reduce the probability that users get absorbed in endless grieving which is against the Confucian thinking of mourning should not interfere the life of the living.

Should the technology get developed to the stage where it can be highly realistic, it is advised to have some mechanism to make sure the users would not mistake this technology for the real person to make sure they will not be addicted to it, or prolong the period of mourning so much that it impacts on their day to day lives.

4.4.2 Content

Research in this dissertation shows that most of people, especially in the Chinese culture environment would want to leave a good impressions, positive viewpoints, and inspiring ideas to their offspring instead of negative, depressing, or cruel thoughts. Research in this dissertation show that the Chinese culture would prefer the memories or behaviors

preserved to be the ones that are not against major moral and ethical standards of the society. Therefore a filtering mechanism to help scanning through all the data collected and pick out the ones against the social moral and ethical standards would be a great add-on to projects that aim to create a digital avatar with similar thinking to the user using their social media data.

On the other hand, it should be appreciated that the viable model is for a commercial service. Therefore, it should be the users' free will to decide what can be kept from the data they provided. So this filtering mechanism should be optional in the case where the user would like to leave positive legacy behind.

However, the mechanism would be benefiting hugely if these avatars are ever to be used publicly instead of just in the family. This will make sure the 'thoughts' that might come out from them would fit the moral and ethical standards of the society and would make it more acceptable to the majority.

Another possibility is that this kind of service can perform as a self-examine tool which can be used by the users to better understand themselves while they are still alive. Evaluations can be done based on the data collected from users and the information from the pre-stored classical mindsets of different major doctrines (e.g. Confucianism, Taoism, Buddhism, etc.) to provide more details of the users' minds. (e.g. Is the user more towards Confucianism or Taoism. Is there any thinking from the user that is seriously against the major ethical standards of the Chinese society?)

One of the main reasons Chinese people needs to memorialize and to communicate with the deceased is for the filial duty, so certain functions are required to allow people to sacrifice online (e.g. Allow an altar for different offerings and incense).

In ancient China, people were categorized into different ranks and the 'Three Bonds' and 'Five Constants/Relationships' were used to maintain the proper propriety 'li' in the society (Tu, 1998). As mentioned earlier, a lot of the details regarding the standards of tomb, mourning were recorded in books in ancient China.

Although the ranks were eliminated by communism, but it is deep in Chinese people's minds that people are born different. An example would be, there are different types of tombs to purchase on the market in nowadays with different prices. Bigger and better located (based on Feng Shui) tombs cost more, but can get better services as well. Also,

richer people generally spend more money on yearly sacrifices to their ancestors. When they die, they might get more expansive objects to be buried with them in the casket.

Therefore, it is better for the viable model, if intending to become commercialized, to provide different pricing levels with different services towards different class of people in the society. Variety helps to make the product suitable for different customers in different markets.

4.5 Summary

There is much in the major philosophies of China that would be amenable to the idea of a specific thanatechnology tailored to the needs of the Chinese people: filial duty, propriety, remembrance and respect.

If it is for the purpose of memorializing the dead, a simple product that could allow people to easily interact or even view the avatars of the deceased would be sufficient. This makes it more convenient for people to memorialize and sacrifice to their ancestors, therefore should be widely adopted very quickly.

More advanced products should also be welcomed to help passing on people's legacy. The viable model can be used as guidance on pursuing technologies required for it.

That been said, it should be emphasized that it is not vital that all the criteria for the viable model need to be fulfilled for a product to be accepted by the Chinese public. An initial product can be launched with the core features like a more mature AI and the data validation/filtering mechanism.

Chapter 5 Conclusions and Future Work

5.1 Introduction

This chapter reviews the research process and the findings. It discusses the limitations of the research and outlines the future research opportunities.

5.2 Research Findings

This dissertation has looked at thanatechnology, current thanatechnologies, and a framework based on Chinese culture. Current thanatechnologies were evaluated based on the proposed framework and a viable model was suggested.

Thanatechnology is the technologies relevant to death, dying and grieving. Many aspects regarding death, dying and grieving in some of the major belief systems in Chinese culture has been examined and discussed. A table containing aspects from these belief systems towards death, dying and grieving has also been created so that all relevant points can be clearly reviewed with ease.

The research in this dissertation shows that the Chinese culture is quite accepting of thanatechnologies using social media data as long as they follow certain rules. Thanatechnology is about respecting and memorializing the dead both of which have a long and continuing tradition. Therefore, it is reasonable to draw a conclusion that Chinese people should have no problem accepting technologies to allow them to pay their respect and to memorialize their loved passed ones better with more advanced technologies. At the same time, it is worth noticing that in Chinese culture, there is a need to analyze the collected data and separate the thoughts that are against the moral and ethical standards in the Chinese society from the ones that are accepted.

A viable model was proposed in Chapter 4 for companies that might be interested in expanding their business into China.

After extensive research on Google as well as the Chinese search engine Baidu (Baidu, 2016a) and Baidu Xueshu (similar to Google Scholar) (Baidu, 2016b), no evidence of projects using similar thanatechnologies based on avatars customized from social media data exist in the Chinese market. Although there is a possibility that there are similar

projects under development or planning and have not been published yet, it is still worth noticing that this part of market remains blank in the world's second largest economy with the world's largest population.

A question of "Why are there still no similar projects?" seems necessary and quite relevant to the purpose of the research which is to find out if any of the thanatechnologies are suitable for the Chinese market.

The reason these technologies still have not appeared in the Chinese market might be for some of the following reasons.

- A reasonable conclusion is that these technologies are still very new and Chinese society has undergone momentous change and is preoccupied with other issues: rising standards of living, doing business in a global economy and adapting a version of capitalism to Chinese communism.
- Chinese culture is fatalistic and respects heaven 'Tian' and believes everything is determined by it. Everyone has their destiny 'Ming'. It is encouraged to accept the fate assigned to individuals and obey the rules of the heaven 'Tian dao'. Therefore countless stories and examples have been passed down through the history which shows Chinese people enduring any sufferings and pains heaven assigned to them. Therefore using these technologies may not be part of heaven's plan. Before a mature technology exists, some Chinese people might lack motivation to pursuing actively this way to immortality.
- Due to the evidence of anti-social and immoral behavior (behavior that is very unacceptable to the Chinese culture) on the internet, people need to build up confidence in sharing their details with anonymous companies.
- Compared to the English language, Chinese as a language might be too difficult for current language recognition technologies. Current context awareness technology still cannot interpret the Chinese language very well. The speech recognition software at the moment is still struggling with different dialects in China, let alone different tones of the same sound and the characteristic of polysemy.

From the research, the Chinese will accept a thanatechnology very willingly if it was presented in a right way.

1. The avatars should not look so realistic so as to avoid users getting addicted to it.
2. An optional filtering mechanism should be considered to make sure the legacy passed down is positive and not against major moral and ethical standards in the Chinese society.

5.3 Limitations of the Research

After extensive research on the subject of thanatechnology using social media data, very few sources have been found. As the nature of the research topic is relatively new, a lot of the research areas still remain unexplored.

The projects discussed in this dissertation are all startup companies and are just the beginning. There has been very limited initial research done on how people are reacting to them.

5.4 Areas of Future Research

After the research done in this dissertation, the following six directions are worth noticing for future research.

1. Monitoring the maturity and development of the technologies involved. (e.g. advances in big data processing, Artificial Intelligence & Language/Context Recognition)
2. Further studies on the legal requirements in the Chinese society for the use of data from social media services and creating avatars which can pass along a digital legacy.
3. Surveys are needed to prove the conclusions based on the framework suggested in this dissertation.
4. More research is required as to the ethical implications of such work, particularly reincarnating the dead as the Lifonaut project plans to do. Would the knowledge that one could be 'reincarnated' affect behavior?
5. As the nature of the Chinese language, it might be the biggest technical barrier of the Thanatechnologies. Further research can be conducted on how prepared are the technologies towards the recognition of the Chinese language.
6. The filter mechanism proposed in Chapter 3 should be designed and planned based on more research on different aspects of the Chinese culture. How to use the

classics of the philosophies to categorize data (people's thoughts) collected? How to screen all the data and filtrate what are user's real thoughts and what are just noise or thoughts from the classics?

5.5 Final Conclusions

Technology is growing at a super high speed, maybe we would not have to wait for too long to see some or all of goals in these projects succeed. Maybe one day, human beings will be able to live another life after they die. Chinese culture accepts technologies that could help them to memorialize the deceased and to pass the legacy and heritage down through generations or even make them immortal if these technologies follow the way Chinese culture requires.

However, the consequences of using these technologies should also be looked at. Will people choose to end their lives early just because life can be continued in a different way (trans-humanism)? The action to finish the lives in purpose could cause huge ethical issues. For the Chinese culture, Confucianism and Taoism clearly pointed out that we should not harm ourselves and should make the best of our lives. Should a chance of another life be given to the humans, chaos might be created which may even threaten the mankind.

Artificial intelligence might be another valid concern. Whether it is possible to produce artificial intelligence that is as smart as human beings is still an open debate. But it is certainly going towards that trend.

Without any doubt, the possibility that someday machines will be able to think like human beings will raise ethical issues. Bostrom and Yudkowsky (2014) introduced two directions.

1. Questions relate to ensure such machines do not harm humans and other morally relevant beings.
2. Questions relate to the moral status of the machines themselves. (Bostrom and Yudkowsky, 2014)

The other ultimate goal, immortality, either through the trans-human way or the recreation of human beings, presents complicated ethical dilemmas for some cultures. It confronts ethical challenges for the cultures that believe people have to die (e.g. Hindu).

As it is still early stage of the research and development on this field. Very few resources can be found and the research done in this area is limited. As technology grows, more attention should be drawn to thanatechnologies as death has been inevitable since the beginning of time. Now we finally see the light of fighting it. Will we succeed? Will we ever live in another form?

References

2005. *Memorial videos played right on the tombstone* [Online]. Available:
http://www.nbcnews.com/id/9257776/ns/technology_and_science-tech_and_gadgets/t/memorial-videos-played-right-tombstone/ [Accessed 26 Jul 2016].
2010. *evl | electronic visualization laboratory* [Online]. Available:
<https://www.evl.uic.edu/entry.php?id=1929> [Accessed 15 Jul 2016].
2015. This 'Afterlife Experience' Is Everything that's Wrong with VR Hype.
- 2016a. 28% of Time Spent Online is Social Networking.
- 2016b. *About Inactive Account Manager - Accounts Help* [Online]. Available:
<https://support.google.com/accounts/answer/3036546?hl=en> [Accessed 22 Aug 2016].
- 2016c. *Analytics* [Online]. Available: <http://analytics.twitter.com/> [Accessed 24 Aug 2016].
- 2016d. *Ancient Egyptian funerary practices - Wikipedia, the free encyclopedia* [Online]. Available:
https://en.wikipedia.org/wiki/Ancient_Egyptian_funerary_practices [Accessed 16 Jul 2016].
- 2016e. *Chen's Buddhism Objects* [Online]. Available: <http://www.chengji.com.tw/product.php> [Accessed 25 Aug 2016].
- 2016f. *China Population (LIVE)* [Online]. Available: <http://www.worldometers.info/world-population/china-population/> [Accessed 28 Aug 2016].
- 2016g. *Chinese alchemy - Wikipedia, the free encyclopedia* [Online]. Available:
https://en.wikipedia.org/wiki/Chinese_alchemy [Accessed 18 Aug 2016].
- 2016h. Close Facebook Account Everplans.
- 2016i. *Company Info | Facebook Newsroom* [Online]. Available:
<https://newsroom.fb.com/company-info/> [Accessed 24 Aug 2016].
- 2016j. *Day of the Dead - Wikipedia, the free encyclopedia* [Online]. Available:
https://en.wikipedia.org/wiki/Day_of_the_Dead#Similar_traditions [Accessed 24 Aug 2016].
- 2016k. *DEATH AND SOCIAL MEDIA IMPLICATIONS FOR THE YOUNG AND WILL-LESS - ProQuest* [Online]. Available:
<http://search.proquest.com/openview/2c779eec901c02592ac0c043f8e34962/1?pq-origsite=gscholar> [Accessed 25 Jul 2016].

- 2016l. *Dominant of Ru* [Online]. Available:
<https://zh.wikipedia.org/wiki/%E7%8B%AC%E5%B0%8A%E5%84%92%E6%9C%AF>
[Accessed 26 Aug 2016].
- 2016m. *Egyptian Book Of The Dead Quotes*. *QuotesGram* [Online]. Available:
<http://quotesgram.com/egyptian-book-of-the-dead-quotes/> [Accessed 26 Aug 2016].
- 2016n. *Face2Face: Real-time Face Capture and Reenactment of RGB Videos (CVPR 2016 Oral)*
[Online]. Available: <https://www.youtube.com/watch?v=ohmajTcpNk> [Accessed 24 Aug
2016].
- 2016o. *Feng shui - Wikipedia, the free encyclopedia* [Online]. Available:
https://en.wikipedia.org/wiki/Feng_shui [Accessed 23 Aug 2016].
- 2016p. *Four Olds - Wikipedia, the free encyclopedia* [Online]. Available:
https://en.wikipedia.org/wiki/Four_Olds [Accessed 22 Aug 2016].
- 2016q. *Global Sacrifice and Pray* [Online]. Available: <http://www.qjqw.com/> [Accessed 23 Aug
2016].
- 2016r. *Heaven Memorial* [Online]. Available: <http://www.waheaven.com/> [Accessed 23 Aug 2016].
- 2016s. *Heaven Online* [Online]. Available: <http://www.ettol.com/Gb/Main/Memorial.aspx>
[Accessed 23 Aug 2016].
- 2016t. *How much data is created daily?* [Online]. @wordpressdotcom. Available:
<https://storageservers.wordpress.com/2016/02/06/how-much-data-is-created-daily/>
[Accessed 24 Aug 2016].
- 2016u. *if i die.org* [Online]. Available: <http://ifidie.org/> [Accessed 24 Jul 2016].
- 2016v. *Internet Users by Country (2016) - Internet Live Stats* [Online]. Internet Live Stats
(www.InternetLiveStats.com) Elaboration of data by International Telecommunication
Union (ITU), United Nations Population Division, Internet & Mobile Association of India
(IAMAI), World Bank. July 1 2016 Estimate. Available:
<http://www.internetlivestats.com/internet-users-by-country/> [Accessed 4 Sep 2016].
- 2016w. *Jade burial suit - Wikipedia, the free encyclopedia* [Online]. Available:
https://en.wikipedia.org/wiki/Jade_burial_suit [Accessed 16 Jul 2016].
- 2016x. *LifeNaut* [Online]. Available: <https://www.lifenaut.com/login#explorer> [Accessed 30 Aug
2016].
- 2016y. *MDBG English to Chinese dictionary chang ming bai sui* [Online]. Available:
<http://www.mdbg.net/chindict/chindict.php?page=worddict&wdrst=1&wdqtm=0&wdqch>

- [am=1&wdqt=%E9%95%BF%E5%91%BD%E7%99%BE%E5%B2%81%0D%0A](#) [Accessed 20 Aug 2016].
- 2016z. *MDBG English to Chinese dictionary shou bi Nan Shan* [Online]. Available: <https://www.mdbg.net/chindict/chindict.php?wdqcham=1&wdqchs=%E7%A5%9D%E4%B D%A0%E7%A6%8F%E5%A6%82%E4%B8%9C%E6%B5%B7%EF%BC%8C%E5%AF%BF%E6% AF%94%E5%8D%97%E5%B1%B1&wdrst=0> [Accessed 20 Aug 2016].
- 2016aa. *Memorial Site* [Online]. Available: <http://jidian.zupulu.com/> [Accessed 23 Aug 2016].
- 2016ab. *Neidan - Wikipedia, the free encyclopedia* [Online]. Available: <https://en.wikipedia.org/wiki/Neidan> [Accessed 20 Aug 2016].
- 2016ac. *Project LifeLike* [Online]. Available: <http://www.virtualworldlets.net/Resources/Hosted/Resource.php?Name=ProjectLifeLike> [Accessed 20 Aug 2016].
- 2016ad. *Qingming - Wikipedia, the free encyclopedia* [Online]. JPL Horizons On-Line Ephemeris System. Available: <https://en.wikipedia.org/wiki/Qingming> [Accessed 20 Aug 2016].
- 2016ae. *Real-time Expression Transfer for Facial Reenactment* [Online]. Available: <https://www.youtube.com/watch?v=eXVspNUeiWw> [Accessed 24 Aug 2016].
- 2016af. *Séance - Wikipedia, the free encyclopedia* [Online]. Available: <https://en.wikipedia.org/wiki/S%C3%A9ance> [Accessed 20 Jul 2016].
- 2016ag. *Shiji (Records of the Grand Historian) - wikisource* [Online]. Available: <https://zh.wikisource.org/wiki/%E5%8F%B2%E8%A8%98/%E5%8D%B7006> [Accessed 15 Aug 2016].
- 2016ah. *Sociotope - a social media experiment* [Online]. Available: <http://sociotope.me/> [Accessed 24 Aug 2016].
- 2016ai. *Submit a request regarding a deceased user's account - Accounts Help* [Online]. Available: <https://support.google.com/accounts/troubleshooter/6357590?hl=en> [Accessed 25 Aug 2016].
- 2016aj. *Terasem Movement Foundation: Welcome to the TMF, Inc.* [Online]. Available: <http://www.terasemmovementfoundation.com/> [Accessed 12 Jul 2016].
- 2016ak. *They Wish to Help You to Better Manage Your "Digital Legacy"* [Online]. Available: <http://news.163.com/16/0526/16/BO0N4R3300014TUH.html> [Accessed 23 Aug 2016].
- 2016al. *Topic: Social Networks* [Online]. Available: <http://www.statista.com/topics/1164/social-networks/> [Accessed 15 Jun 2016].

- 2016am. *What will happen to my account if I pass away? | Facebook Help Center* [Online]. Available: <https://www.facebook.com/help/103897939701143> [Accessed 18 Aug 2016].
- 2016an. *Witchcraft - Wikipedia, the free encyclopedia* [Online]. Available: <https://en.wikipedia.org/wiki/Witchcraft> [Accessed 20 Jul 2016].
- 2016ao. *World's largest economies - CNNMoney* [Online]. @CNNMoney. Available: http://money.cnn.com/news/economy/world_economies_gdp/index.html [Accessed 4 Sep 2016].
- 2016ap. *Xian (Taoism) - Wikipedia, the free encyclopedia* [Online]. Available: [https://en.wikipedia.org/wiki/Xian_\(Taoism\)](https://en.wikipedia.org/wiki/Xian_(Taoism)) [Accessed 23 Aug 2016].
- 2016aq. *Xian Terracotta Warriors, Terracotta Army, Qin Terracotta Army* [Online]. Available: <http://www.topchinatravel.com/china-attractions/qin-terracotta-army.htm> [Accessed 25 Aug 2016].
- 2016ar. *YouTube For The Deceased - SlipperyBrick.com* [Online]. Available: <http://www.slipperybrick.com/2007/01/vidstone-serenity-panel/> [Accessed 26 Jul 2016].
- c. 600 BC. *Shan Hai Jing (Classic of Mountains and Seas)*.
- AIKMAN, D. 1979. *The Role of Atheism in the Marxist Tradition*, University of Washington.
- ALING, C. F. 2003. Joseph in Egypt. *Bible and Spade (Second Run)*, BSPADE 16:3 (Summer 2003), 89.
- AMBROSINO, B. 2016. *Facebook is a growing and unstoppable digital graveyard* [Online]. @BBC_Future. Available: <http://www.bbc.com/future/story/20160313-the-unstoppable-rise-of-the-facebook-dead> [Accessed 6 Jul 2016].
- ARAL, S., DELLAROCAS, C. & GODES, D. 2013. Introduction to the special issue-social media and business transformation: A framework for research. *Information Systems Research*, 24, 3-13.
- ASUR, S. & HUBERMAN, B. A. Predicting the future with social media. Web Intelligence and Intelligent Agent Technology (WI-IAT), 2010 IEEE/WIC/ACM International Conference on, 2010. IEEE, 492-499.
- BAIDU. 2016a. *Baidu* [Online]. Available: <https://www.baidu.com/> [Accessed 31 Aug 2016].
- BAIDU. 2016b. *Baidu - Xueshu* [Online]. Available: <http://xueshu.baidu.com/> [Accessed].
- BAIKE. 2016. *Online Cemetery_baike.com* [Online]. Available: <http://www.baik.com/wiki/%E7%BD%91%E4%B8%8A%E5%A2%93%E5%9C%B0> [Accessed 23 Aug 2016].
- BAILENSON, J. N. & BLASCOVICH, J. 2011. This is your mind online. *IEEE Spectrum*, 6, 78-83.

- BASSETT, D. J. 2015. Who Wants to Live Forever? Living, Dying and Grieving in Our Digital Society. *Social Sciences*, 4, 1127-1139.
- BELL, G. & GRAY, J. 2000. Digital Immortality. Microsoft Research: San Francisco, CA.
- BELL, M. W. 2008. Toward a definition of "virtual worlds". *Journal For Virtual Worlds Research*, 1.
- BENNETT, H. 2005. *Humanism, What's That?: A Book for Curious Kids*, Prometheus Books.
- BOSTROM, N. & YUDKOWSKY, E. 2014. The ethics of artificial intelligence. *The Cambridge Handbook of Artificial Intelligence*, 316-334.
- BZAMAYO. 2016. *Digital property after death issues continue as Apple requires court order for widow to get late husband's Apple ID password* [Online]. @9to5mac. Available: <https://9to5mac.com/2016/01/19/digital-property-after-death-issues-continue-as-apple-requires-court-order-for-widow-to-get-late-husbands-apple-id-password/> [Accessed 23 Aug 2016].
- CHANG, C. Y. 2013. *Confucianism: A modern interpretation*, World Scientific.
- CHI, L. 1885. Book of Rites. *Trans. James Legge*, 2.
- CHUI, M., MANYIKA, J., BUGHIN, J., DOBBS, R., ROXBURGH, C., SARRAZIN, H. & WESTERGERN, M. 2012. The social economy: Unlocking value and productivity through social technologies. McKinsey & Company. Retrieved February, 1, 2013.
- COLEMAN, B. & SHIRKY, C. 2011. *Hello avatar: rise of the networked generation*, MIT Press.
- CONFUCIUS c. 500 BC. *Yi Li*.
- COONAN, C. 2016. *Man charged with murdering women to sell as 'ghost brides'* [Online]. @IrishTimesWorld. Available: <http://www.irishtimes.com/news/world/asia-pacific/man-charged-with-murdering-women-to-sell-as-ghost-brides-1.2768103> [Accessed 25 Aug 2016].
- ERIC. 2016. *See the New Phone App That Can Allow You Receive Visual Messages from Beyond the Grave* [Online]. Eric. Available: <http://naijaexclusive.net/see-the-new-phone-app-that-can-allow-you-receive-visual-messages-from-beyond-the-grave/> [Accessed 27 Aug 2016].
- FALLOON, G. 2010. Using avatars and virtual environments in learning: What do they have to offer? *British Journal of Educational Technology*, 41, 108-122.
- FENG, Y. 1962. Series of Books by the Historian of Philosophy (Zhong Guo Zhe Xue Shi Xin Bian). People's Publishing House.
- FIFIELD, A. 2014. *The new "Yahoo Ending" service lets users in Japan prepare for the inevitable*. [Online]. Available: https://www.washingtonpost.com/world/asia_pacific/a-new-yahoo-

[ending-service-lets-users-in-japan-prepare-for-the-inevitable/2014/07/20/d5751480-0866-4760-b41b-79aee25ad412_story.html](http://www.celebsnow.co.uk/celebrity-news/david-beckham-shows-off-hot-body-and-huge-new-ribcage-tattoo-during-china-trip-31554) [Accessed 21 Jul 2014].

FRANCIS, A. 2013. *David Beckham shows off hot body and huge new ribcage tattoo during China trip - CelebsNow* [Online]. @celebsnow. Available:

<http://www.celebsnow.co.uk/celebrity-news/david-beckham-shows-off-hot-body-and-huge-new-ribcage-tattoo-during-china-trip-31554> [Accessed 8 Jun 2016].

GAGGIOLI, A., MANTOVANI, F., CASTELNUOVO, G., WIEDERHOLD, B. & RIVA, G. 2003. Avatars in clinical psychology: a framework for the clinical use of virtual humans. *Cyberpsychology & behavior*, 6, 117-125.

GE, H. c. 330. *Shenxian Zhuan*.

GEDDES, L. 2010. Immortal brain: you can live forever. *New Scientist*, 206, 28-31.

GIRARDIN, F., CALABRESE, F., FIORE, F. D., RATTI, C. & BLAT, J. 2008. Digital footprinting: Uncovering tourists with user-generated content. *Pervasive Computing, IEEE*, 7, 36-43.

HEMP, P. 2006. Avatar-based marketing. *Harvard business review*, 84, 48-57.

HIRAKAWA, A. & GRONER, P. 1993. *A history of Indian Buddhism: from Śākyamuni to early Mahāyāna*, Motilal Banarsidass Publ.

HOLZWARATH, M., JANISZEWSKI, C. & NEUMANN, M. M. 2006. The influence of avatars on online consumer shopping behavior. *Journal of marketing*, 70, 19-36.

HUSK, E. R. 2012. *IMITATING INDIVIDUALIZED FACIAL EXPRESSIONS IN A HUMAN-LIKE AVATAR THROUGH A HYBRID PARTICLE SWARM OPTIMIZATION-TABU SEARCH ALGORITHM*. University of Central Florida Orlando, Florida.

KAUFF, P. & SCHREER, O. An immersive 3D video-conferencing system using shared virtual team user environments. Proceedings of the 4th international conference on Collaborative virtual environments, 2002. ACM, 105-112.

KLANG, M. 2004. Avatar: From Deity to Corporate Property A philosophical inquiry into digital property in online games. *Information Communication & Society*, 7, 389-402.

LAU, D. C. 1979. *The analects*, Penguin.

LEGGE, J. 1891. The Writings of Chuang Tzu. *Reprinted in The Texts of Taoism*, 1.

LEGGE, J. 2003. *Li chi: Book of rites*, Kessinger Publishing.

LEGGE, J. 2009. *The Confucian analects, the great learning & the doctrine of the mean*, Cosimo, Inc.

LEGGE, J. 2013. *Tao Te Ching (Legge)*, Start Publishing LLC.

LEGGE, J., CHAI, C. & CHAI, W. 1972. *Yi Jing: Book of Changes*, University Books.

- LEGGE, J. & KING, H. 1879. The classic of filial piety. *Sacred Books of the East*, 3, 449-487.
- LI, T. 2009. Escape the Bitter Cycles - Research on Life and Death in Buddhism (Zou Chu Tong Ku De Lun Hui - Lun Fo Jiao De Sheng Si Guan). *Heilongjiang Shi Zhi*, 14, 93-94.
- LIU, A. 139 BC. *The Huainanzi*.
- LIU, X. & TSO, S.-C. O. 1970. *Shuo yuan*, Taiwan Zhonghua shu ch.
- LOCHTEFELD, J. G. 2002. *The Illustrated Encyclopedia of Hinduism: AM*, The Rosen Publishing Group.
- MASSIMI, M. & CHARISE, A. Dying, death, and mortality: towards thanatosensitivity in HCI. CHI'09 Extended Abstracts on Human Factors in Computing Systems, 2009. ACM, 2459-2468.
- MCNICHOL, T. 2006. The new gravesite accessory: LCD screens that flash tributes - December 1, 2006. *Business 2.0 Magazine*. Time Warner.
- MOODY, L. & BICKEL, W. K. 2016. Substance Use and Addictions. *Computer-Assisted and Web-Based Innovations in Psychology, Special Education, and Health*, 157.
- MORTENSEN, T. E. 2006. Wow is the new mud social gaming from text to video. *Games and Culture*, 1, 397-413.
- NAN, H. 2000. *Interpretation of Zong Jing Lu*, Ethnic Knowledge Publishing House.
- NELSON, C. M. 2009. *The oracle and astrology in traditional China* [Online]. Available: <http://www.chaz.org/Arch/China/Oracle/Oracle.html> [Accessed 15 Jul 2016].
- NORTH, M. M. & NORTH, S. M. 2016. Virtual reality therapy. *Computer-Assisted and Web-Based Innovations in Psychology, Special Education, and Health*, 141.
- OBAR, J. A. & WILDMAN, S. S. 2015. Social Media Definition and the Governance Challenge-An Introduction to the Special Issue. Available at SSRN 2663153.
- OESTREICHER, K., KUZMA, J. & YEN, D. 2010. Avatar supported learning in a virtual university. *Worcester Journal of Learning and Teaching*, 1-8.
- OTAKE, T. 2016. 'Pokemon Go'-like app allows living to plan missives from beyond the grave | *The Japan Times* [Online]. The Japan Times. Available: <http://www.japantimes.co.jp/news/2016/08/16/business/corporate-business/pokemon-go-like-app-allows-living-to-plan-missives-from-beyond-the-grave/> [Accessed 27 Aug 2016].
- PAUL GILBERT, F., SOFKA, C., GILBERT, K. & CFLE, F. 2012. *Dying, death, and grief in an online universe: For counselors and educators*, Springer Publishing Company.

- PLUMMER, K. 2015. *What is Critical Humanism?* [Online]. @wordpressdotcom. Available: <https://kenplummer.com/cosmosexualities/what-is-critical-humanism/> [Accessed 15 Jul 2016].
- PU, G. 2003. Zangshu or book of burial. *translated by Stephen L. Field*.
- RIAZANOV, D. 1937. Karl Marx and Frederick Engels. An Introduction to their Lives and Work. New York: International Publishers.
- SIMA, Q. 91 BC. *Shiji (Records of the Grand Historian)*
- SOFKA, C. J. 1997. Social support" internetworks," caskets for sale, and more: Thanatology and the information superhighway. *Death Studies*, 21, 553-574.
- SOFKA, C. J., CUPIT, I. N. & GILBERT, K. R. 2012. Thanatechnology as a conduit for living, dying, and grieving in contemporary society. *Dying, Death, and Grief in an Online Universe: For Counselors and Educators*, 1.
- TANG, Y. 2014. *Looking Forward to the New Epoch: Ponder over Philosophy in the New Era (Zhu Wang Xin Zhou Xin Shi Dai: Zai Xin Shi Ji De Zhe Xue Si Kao)*, Central Compilation & Translation Press.
- THIES, J., ZOLLH FER, M., NIE NER, M., VALGAERTS, L., STAMMINGER, M. & THEOBALT, C. 2015. Real-time expression transfer for facial reenactment. *ACM Transactions on Graphics (TOG)*, 34, 183.
- THIES, J., ZOLLH FER, M., STAMMINGER, M., THEOBALT, C. & NIE NER, M. 2016a. *Face2Face: Real-time Face Capture and Reenactment of RGB Videos* [Online]. Available: <http://www.graphics.stanford.edu/~niessner/papers/2016/1facetoface/thies2016face.pdf> [Accessed 24 Aug 2016].
- THIES, J., ZOLLH FER, M., STAMMINGER, M., THEOBALT, C. & NIE NER, M. 2016b. Face2face: Real-time face capture and reenactment of rgb videos. *Proc. Computer Vision and Pattern Recognition (CVPR), IEEE*, 1.
- TU, W.-M. 1998. Probing the 'three bonds' and 'five relationships' in Confucian humanism. *Confucianism and the family*, 121-136.
- VAN GORDON, W., SHONIN, E., GRIFFITHS, M. D. & SINGH, N. N. 2015. There is only one mindfulness: Why science and Buddhism need to work together. *Mindfulness*, 6, 49-56.
- WALTER, N. 1997. Humanism: What's in the Word.
- WEBSTER, B. 2012. Understanding Thanatechnology. *Canadian Funeral News*, 40, 14.

WIKIPEDIA. 2006. *Fuxi - Wikipedia, the free encyclopedia* [Online]. Available:

<https://en.wikipedia.org/wiki/Fuxi> [Accessed 25 Aug 2016].

WIKIPEDIA. 2016a. *Ci (poetry) - Wikipedia, the free encyclopedia* [Online]. Available:

[https://en.wikipedia.org/wiki/Ci_\(poetry\)](https://en.wikipedia.org/wiki/Ci_(poetry)) [Accessed 26 Aug 2016].

WIKIPEDIA. 2016b. *Demographics of China* [Online]. Available:

https://en.wikipedia.org/wiki/Demographics_of_China [Accessed 28 Aug 2016].

WIKIPEDIA. 2016c. *Nüwa - Wikipedia, the free encyclopedia* [Online]. Available:

<https://en.wikipedia.org/wiki/Nüwa> [Accessed 25 Aug 2016].

YAO, X. 2000. *An introduction to Confucianism*, Cambridge University Press.

YUAN, K. 1985. *Interpretation of Shan Hai Jing (Classic of Mountains and Seas) Shan Hai Jing Jiao Yi*, Shanghai Classics Publishing House.

Z RCHER, E. 2007. *The Buddhist conquest of China: The spread and adaptation of Buddhism in early medieval China*, Brill.

ZHOU, G. 841 BC. *The Rites of Zhou (Zhou Li)*.

ZHU, X. 2016. *Egyptian Mummy Meets Chinese Jade Suit* [Online]. Available:

<http://www.chinanews.com/cul/2016/08-09/7966711.shtml> [Accessed 12 Aug 2016].