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CHAPTER 2

Literature Review

With advancing technology, contacting elderly family members and friends become much easier than before. Many trending products and services on the market provide an effective user interface for elders to keep in touch with other people. However, many still feel uncomfortable when using electronic devices according to empirical observation during volunteering work. The author's experience of being a tutor in elderly smartphone classrooms reflected that many elders are still willing to enrol in these classes to familiarize themselves with basic mobile phone operations. Academic studies around the world also supported my observation. For instance, Clarke et al. (2010) argued that the level of computer literacy of elderly population is considerably lower than the current generation and thus elders might find it hard to understand and use electronic devices. They refer to this phenomenon as "digital divide".

In this chapter, I will look at what modern technologies enabled ordinary people to keep in touch, introduce their rationale, analyze and stress some pain points which inspired the "Keep in Touch" project to be reinitialised in 2022. I will also come up with some useful findings that have the potential to last long and endure time in the field of human aging, user interface interaction, well-being and state-of-the-art communication method by connecting relevant elements applied in the "Keep in Touch" project for future product development.

Notice that the summary of previous "Keep-in-Touch" projects since 2000, including theories and products developed by the academics, are documented in Section 2.4 where I identified appropriate literature from the research community and integrated past relevant academic projects into knowledge tables. The first part of Chapter 2 will mainly illustrate relevant concepts from various subjects such as Gerontology, Technology, Psychology, etc.

2.1 Gerontology

This reads a little oddly. It would be better to say that the core goal of this work is to understand usability issues of WeChat for elderly people. And you can start with a sentence that explains how it is important to draw on knowledge from gerontology ...

In this work, we investigated the current usability issues with WeChat and Gerontology is the study of aging. Understanding the basic features of the elder community is an essential task for keeping elders in touch using modern technologies.

Gerontology is often defined as the study of aging (Sasser, 2018). One of the most difficult parts of reviewing the field of gerontology is that many articles on this topic are presented via a blog format, instead of printed academic journals. The lack of comprehensive and authoritative textbooks or guidelines makes the gist and essence of gerontology much more difficult to grasp. The author's understanding of gerontology came from the Handbook of Gerontology, although it is still partial in introducing newcomers to the field.

Although lacking comprehensive guides, many ideas from academic journals of gerontology are very useful to this project. The most significant and relevant to the thesis is perhaps the concept of “aging-in-place”.

2.1.1 Aging-in-place

Aging-in-place is often mentioned in gerontology studies. Many see it as an optimal way to solve issues in aging since most prefer not to send elderly family members to residential care homes, where elders have to say goodbye to old friends and walk out of their comfort zone.

Technological aids, such as smartphone apps, are important means to help elders stay “in situ” and remain in elder’s long-lived environment.

Many prototypes, both in the academic field and in the commercial world, implanted the idea of aging-in-place into the products or services. To achieve this goal, some suggested that aging-in-place should be accompanied by the monitoring of elder activities; other academics, including Riche and Mackay (2009), argued that although the common tactic of keeping an eye on how the elderly are acting is widely adopted, this method is more concerned with providing information to caretakers than it is with helping the elderly themselves. Instead, he suggested products and services that improve elders’ interpersonal communication should be the substitute.

WeChat, from this point of view, has the potential to dramatically promote “aging-in-place” processes by improving interpersonal communication. Before the invention of WeChat, family members **This should be past tense.** lack effective ways to see how elders are doing and cannot help elders handle daily issues such as paying electricity fees since the landline is the only way family members could contact elderly people. If elders are walking outside their homes or taking showers, family members may not receive a timely response from elders, which might be worrisome and could bring many troubles in some cases. On the contrary, with smartphones and WeChat, elders could carry them anywhere they go and could respond to family members rapidly via WeChat. Furthermore, before the WeChat era, the landline was the only available way to communicate, which is symmetry and voice only. Instead, WeChat could provide real-time video connection, which enriches the landline’s voice channel by adding a video channel for elders to feel comprehended that they are just living with their family members.

The covid-19 pandemic further accelerated the process of “aging-in-place”, as many elders passed away in a care home during the early stage of the pandemic, as care homes often have intensive inter-elder communication and events in care home canteens or playgrounds, which could accelerate the spread of the virus. Lockdowns and self-isolation measures introduced by governments around the globe promoted the thought that elders should stay where they lived and could enjoy higher living quality in their houses or apartments than care homes during pandemics. This reality makes the usability evaluation of WeChat even more necessary.

2.2 Technology

It's 2022. To keep someone in touch, we no longer need to write paper letters, use typewriters or dial through candlestick telephones. Below I listed not only traditional phone dial interface, but also trending commercial communication tools that are widely used around the world according to both empirical observation and literature documentation. Specifically, Facebook and its affiliated Messenger is widely used in most of the countries and regions; niche products like Snapchat is popular in the US and the UK; WeChat and QQ are often used by Chinese people (Statista.com, 2022); LINE is popular in East and Southeast Asian countries such as Japan, South Korea and Thailand (Inagaki, 2019).

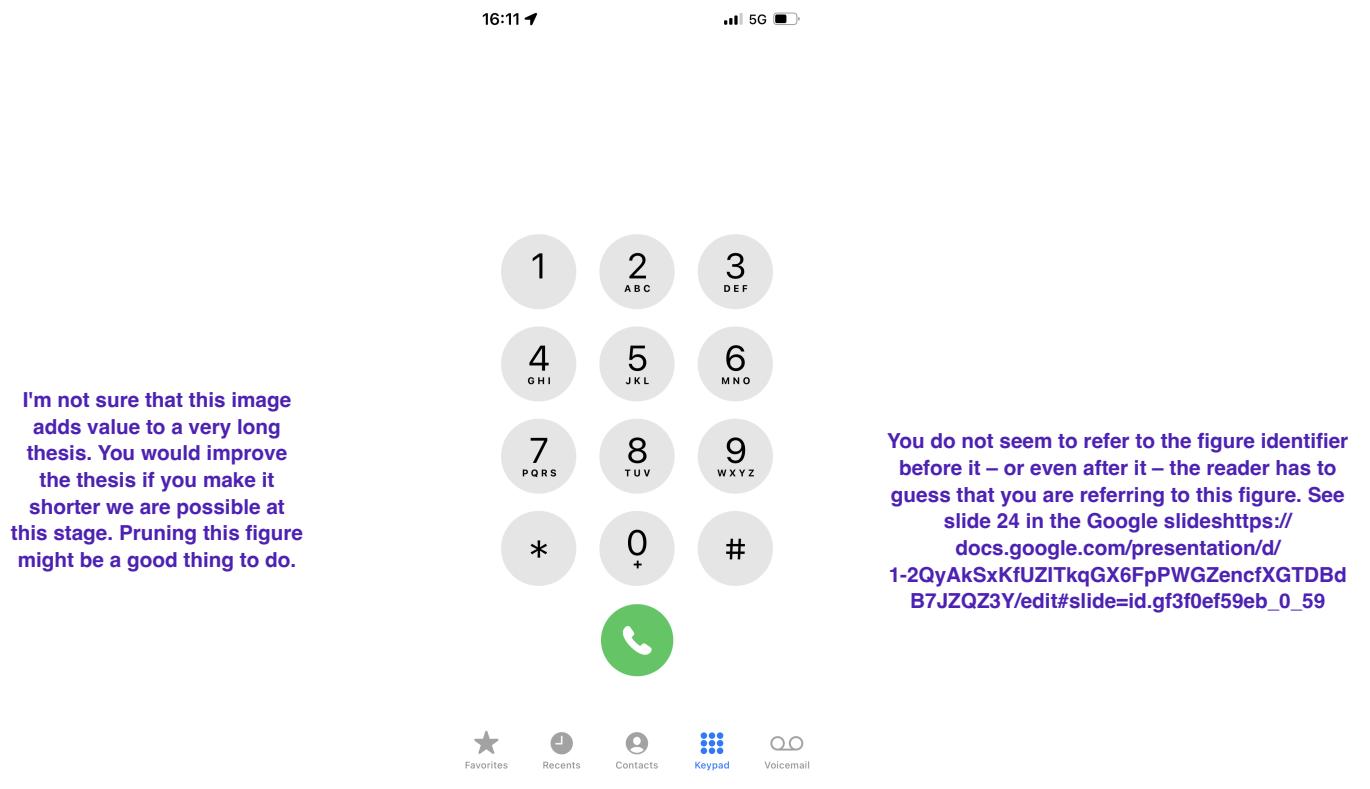


FIGURE 2.1. Dial Interface of iPhone

2.2.1 Phone-call

Smartphone's built-in dialing interface is the most traditional way to keep contact with other people. We can find someone by dialing a specific phone number, for instance in China, smartphone number are a numerical combination of 11 digits, such as (+86) 136-0270-1057¹. The image showed the dialing interface of iPhone, and other brands of smartphones, such as Samsung, Vivo and Sony all have similar layout.

The drawback of traditional phone call is obvious. Elders have to remember 11 digits number in order to contact a friend or family member. Elder people might feel headache remembering such a long string of digits, as ordinary people can only remember 7 ± 2 as Miller's "Magic 7" theory (Miller, 1956) pointed out. Furthermore, elders taking notes on personal phone-book or phone-memo is also inconvenient. Using commercial applications which shows family or friend's photo or name is the current trend as it benefits everyone.

¹This is the author's smartphone number. Readers are welcome to contact me via phone number, but consider the fact that it will be an international call, which is very expensive...

In China, the solution is usually WeChat.

2.2.2 WeChat



FIGURE 2.2. Main Interface of WeChat

WeChat, or Weixin, was initially created as an instant messaging app launched in 2011 by Allen Zhang and later evolved into a multipurpose app through its integration with a social media platform, mobile payment, e-commerce shopping and mini-program for local services. However, it's still the key functionality, messaging, makes WeChat a ubiquitous daily use app (Nature, 2020).

On the corporate side, WeChat was developed by Chinese telecommunication giant Tencent, and is widely used by the Chinese community if we look at WeChat's market share: As of the end of 2021, the number of WeChat's active monthly users in China had reached 1.268 billion, which is around 88% of the country's entire population (Statista.com, 2022). Since the majority of the user group is of Chinese ethnic and Chinese citizens, WeChat will be the key product the thesis looks into.

This is a very long sentence – please break it up to make it easier for the reader.

WeChat plays an important role in providing social support among Chinese. Studies in China suggest that WeChat use intensity is positively associated with online and offline social support, the information acquisition motive and interpersonal communication motive both have a relatively strong direct effect on the acquisition of online and offline social support, which means that an interpersonal communication motive may increase enthusiasm for using WeChat and significantly interact with WeChat use to increase online and offline social support (Wang et al., 2019).

WeChat is also becoming more and more elder-friendly. China Central Government in Beijing called on tech companies earlier this year to make apps more accessible to the elderly as it seeks to close the “digital divide” (Deng, 2021). As a respond to governmental strategy, WeChat added “Easy Mode” for elders since V8.0.14 in September 2021. In fact, in WeChat’s Mandarin version, Easy Mode does not correspond to its original Chinese meaning, which is closer to “Care Mode”.

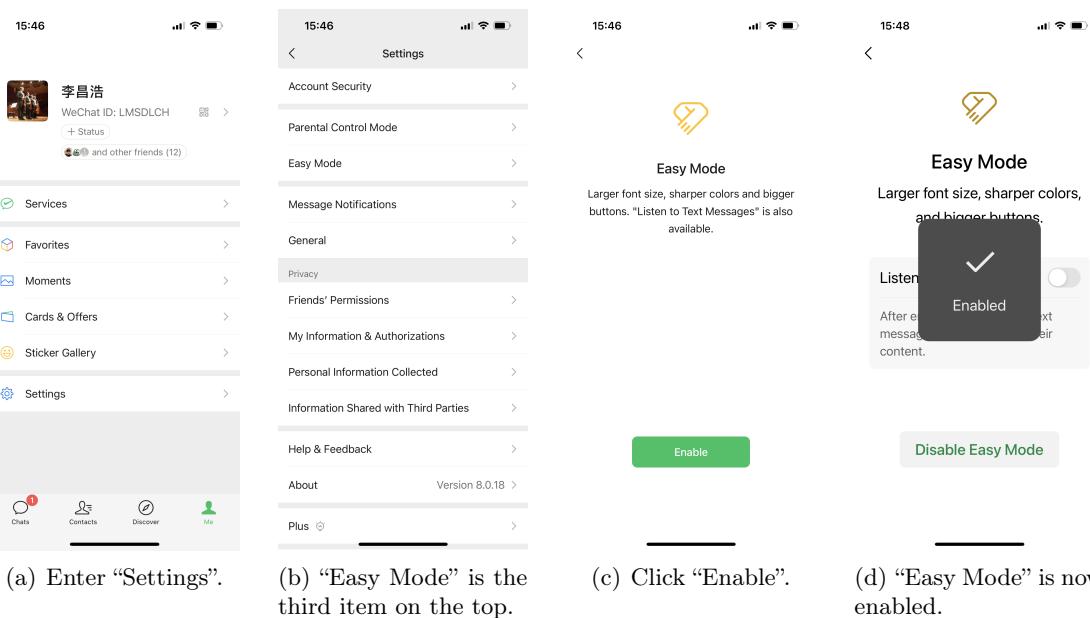


FIGURE 2.3. Enabling WeChat’s “Easy Mode”

However, WeChat’s Easy Mode is not a cure-all solution for elders. It has limited functionalities. According to the figure, Easy Mode can only turn WeChat’s font size larger, image colour sharper and buttons bigger. The tabular layout of the main page stays the same, not to mention complex operations to look for people they want to contact, etc. WeChat’s Easy Mode could be further optimized.

I won’t keep repeating it in the rest of this chapter – please look at slide 24. You need to introduce each figure before it appears in the text. Look also at the other comments in that slide.

Luckily, WeChat is improving its Easy Mode. In April 2022, WeChat's V8.0.20 updated Easy Mode by adding “Listen to Text Message” functionality. After enabling this option, users can tap text messages in chats to hear the content of the message.

This paper is going to focus on WeChat and how its' been used by elders to keep in touch with the very small circle of their closest family and friends.

2.2.3 Facebook

It would be good to add a sentence explaining why you included this section. You should also mention why are you only looked at the iPhone.

In Australia, Meta's Facebook is often the choice instead of WeChat. Does Facebook incorporated the option to adjust font size or enable “Care Mode” similar to WeChat? After searching the settings on iPhone's Facebook app, the author discovered no font adjustments functionality, thus making fonts bigger and easier to read are technically not allowed by Facebook.

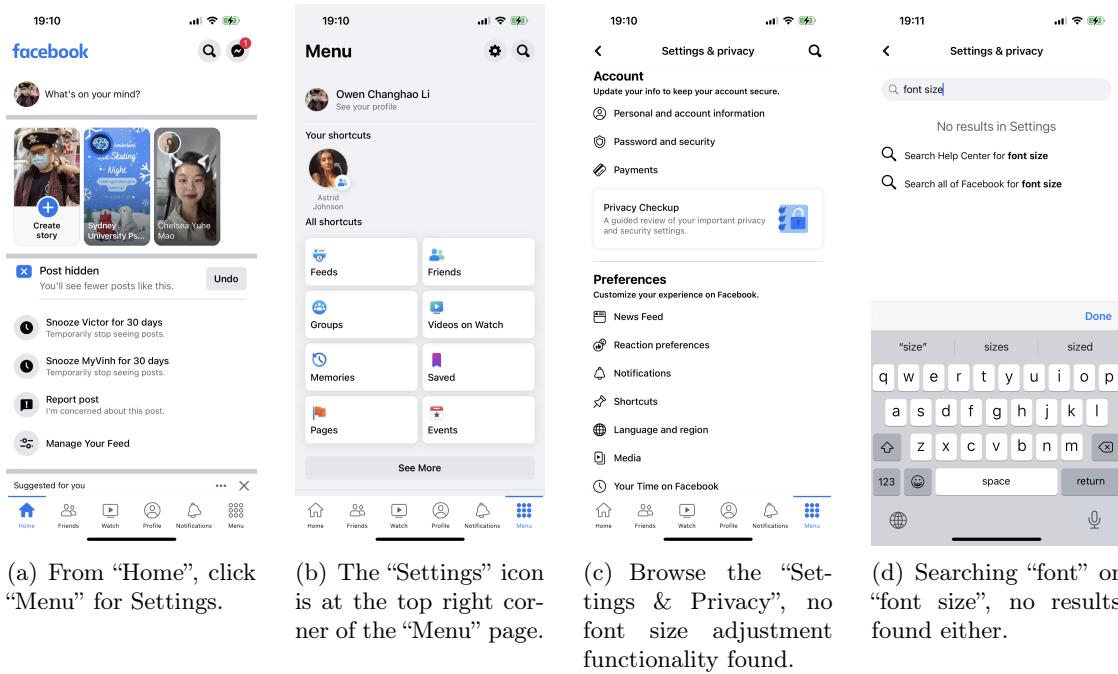


FIGURE 2.4. No “Care Mode”-like Functionality Found on Facebook

2.2.4 QQ

Like WeChat, QQ is an instant messaging application and web portal created by the Chinese internet company Tencent. Online messaging, informal phone and video conversations, document

sharing, and social networking are the main uses of QQ. QQ has become one of the most well-liked platforms among teenagers in China thanks to its smooth interfaces with other Tencent products, such as QQ Music and Tencent Video.

As the study body are Chinese elders, QQ is less relevant to our study compared to WeChat. However, it will appear as options in the questionnaire.

Aha! This is the first place that I have seen you explain that this whole section is important for your design of the questionnaire. You really need to introduce that at the beginning of the section.

2.2.5 LINE

LINE, as indicated in the previous section, is a popular choice for East and Southeast Asians such as Japanese, South Korean and Thai. As LINE is famous for its branding targets the young generation in the 20s or 30s, whether all elders use LINE or not are not yet known or confirmed by the author. However, LINE do have font size adjustment functionality as shown in figure below.

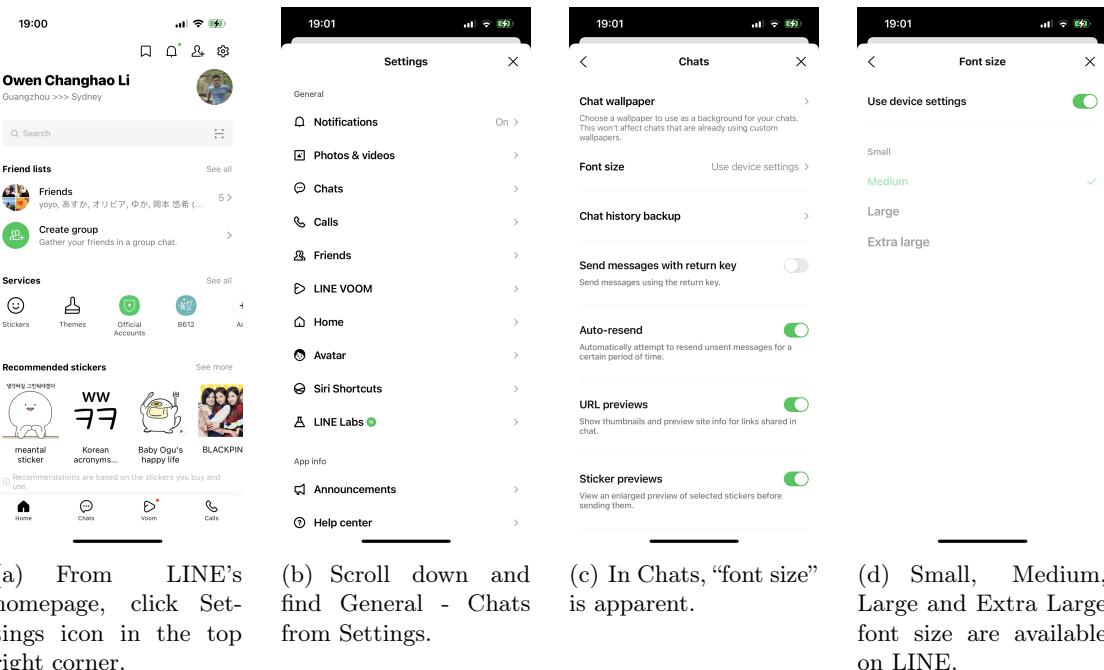


FIGURE 2.5. LINE’s Fontsize Adjustment Functionality

To sum up, both WeChat and LINE allows elders to turn font size larger as they wish, but Facebook app seems to yet allow this functionality.

2.3 Psychology

I think it would be better to change the heading to psychological research about positive psychology and on loneliness. Then I think you should introduce this section by stating that your work drew on psychology research as it has the potential to be important for the design of the question and critique of existing interfaces. I think that you could then mention that within that body of work, you describe the UCLA line on a scale.

Two elements from the subject of Psychology is relevant in this project: first, UCLA Loneliness Scale which measures loneliness level, and second, Positive Psychology theory which is helpful studying how to reduce elder's loneliness and increase well-being.

2.3.1 Positive Psychology

Positive Psychology was founded by Martin Seligman and Mihaly Csikszentmihalyi in 2000. In their revolutionary paper *Positive Psychology: An Introduction*, Positive Psychology is defined as “a science of positive subjective experience, positive character qualities, and positive institutions that seeks to enhance life quality and avert the pathologies that result from a life devoid of purpose and meaning” (Seligman and Csikszentmihalyi, 2000). In contrast with traditional Psychology, Positive Psychology study the positive features that make life worth living, which is especially helpful for the elders.

Positive Psychology provides theoretical support for “Keep in Touch” project. Why is this the case? Well, in one of his book *Flourish*, Martin Seligman (2011) proposed a new framework of Positive Psychology called “PERMA”: Positive emotion, Engagement, Relationship, Meaning and Accomplishment; which means that people need all five aspects listed above to improve well-being. Notice that *engagement* is one of the building block.

In the Covid-19 pandemic, elders might be forced into situations such as lockdowns or self-isolations where they have to live separately, without support from their families and friends. Empirical research also proved that the lockdown and social distancing during the Covid-19 pandemic has indeed caused many elderly people to suffer from depression (García-Fernández et al., 2020).

Therefore, increase engagement by keeping touch with the elders might be very beneficial to elders' well-being. This has been proven correct in the Chinese context as well. Although some argued that limiting social media use can decrease anxiety and depression ² (Hunt et al., 2018),

²I mentioned this article because I was hugely benefited from it argument personally. During my stay at Penn in 2018, I suffered from both anxiety and depression. However, someday in November, I grabbed a Penn Today newspaper on Locust Walk and saw the article about the benefits of limiting social media use. I realized that it was the peer pressure and the envy of influencers that caused it. I suspended social media use, even locked my phone at school every 3pm to the next morning after I attended University of Sydney. It was really helpful.

the population chosen did not necessarily include the elderly population. For instance, Prof Hunt from University of Pennsylvania (Penn) reached the above conclusion by selecting only Penn undergraduate students to participate in her study. By selecting only Chinese elderly people as the population of the study, Ma et al. (2021) reached a different conclusion, which is counter-intuitive from many's view. Specifically, X. Xu et al. (2020) used WeChat as the social media medium in the study, and reached the same conclusion that social media use might alleviate elders' loneliness level and is good for well-being.

Keeping elders in touch could directly bring positive emotion to the elders by strengthening their personal relationships among family members, engaging them in social activities. Additionally, the elders might be benefited by achieving many accomplishments and feeling sense of meaningfulness when engaging in those activities. By keeping in touch with family and friend, elders might well follow the advice of Positive Psychology, such as the “PERMA” framework, eventually will enrich their life and bring them happiness and well-being.

2.3.2 UCLA Loneliness Scale

How to measure loneliness? Scholars from University of California at Los Angeles suggested that “research on loneliness has been hindered by the lack of an easy and reliable assessment technique” and reported a 20-item general measure of loneliness (Russell, Peplau, and Ferguson, 1978). Roughly 2 years later, the revised scale, one of the most adopted version around the globe had been proposed (Russell, Peplau, and Cutrona, 1980). Since then, it has become a key clinical and research questionnaire that is widely accepted. Reports of the UCLA Loneliness Scale’s application have come from several countries/societies (Alsubheen et al., 2021).

If this refers to the Russell above, and the reference so that the reader can be confident that that is what you mean.

According to Dan Russell, the differences between the original and revised version of the UCLA Loneliness Scale is that the original scale consisted of 20 negatively worded self-reported questions designed to identify feelings of loneliness in college students, and the revised version tried to reduce possible systematic response bias by including a mix of 10 negatively worded items.

One of the issues with the Revised UCLA Loneliness Scale is that it's considered too long. Most participants are not willing to calm down and complete all of the questionnaire questions, especially in a field study where people are not compensated for their time. Attempts to reduce questionnaire length and increase the response rate in clinical practice and longitudinal studies

has been recorded in many papers around the world. The figure below which summarized by the author provides a comprehensive overview of different versions of the UCLA Loneliness Scale. Short versions of the UCLA Loneliness Scale are named by the number of the included questions.

UCLA Loneliness Scale: Versions	
<p>*Note: UCLA-10 and UCLA-6 has several different sub-versions (due to differently selected questions).</p>	<p>Complete Versions:</p> <ul style="list-style-type: none"> - Original UCLA-20 - Revised UCLA-20 - Version 3 UCLA-20 <p>Selected Versions:</p> <ul style="list-style-type: none"> - UCLA-16 - UCLA-11 - UCLA-10* - UCLA-8 - UCLA-7 - UCLA-6* - UCLA-5 - UCLA-4 - UCLA-3

FIGURE 2.6. Variations of the UCLA Loneliness Scale

Missing text

2021 studied the validity of all 3 versions of the 20-item and 9 short versions of the UCLA Loneliness Scale, and the high-quality result supported the internal structure of the UCLA-4, 6, 7 and 10. In other words, the UCLA-4, 6, 7 and 10 had the most robust internal structure and may therefore be the most useful for informing social psychologists engaged in assisting those with loneliness. Based on this conclusion, I considered selecting UCLA-4 or UCLA-6 in my preliminary study, which aims to provide an overview of the loneliness situation around the neighbourhood and for future comparison individually, if one of the questionnaire respondents became a formal participant in one of the future studies.

In Australia, Elphinstone (2018) assessed the validity of 8 short-forms of the UCLA Loneliness Scale using a population formed by undergraduate students from a university in Melbourne via online surveys. According to the result, Elphinstone recommended that a 10-item short-form should be used in future applications since it “was half as long as the 20-item measure but still showed similar internal consistency and convergent validity, and it had better model fit”.

Shorter versions of the UCLA Loneliness Scales’ applications in China were also assessed by several scholars. Gan et al. (2015) introduced the UCLA-8 into China, later Niu et al. (2018)

used the UCLA-6 to investigate the validity of proxy respondent reports on loneliness. This thesis will reflect on previous field experiences conducted in China.

You've done a really nice job of digging into this literature. I really enjoyed reading the section.

2.4 Past Academic Projects

In past “Keep-in-Touch” projects, asynchronous communication has been the major way for people to transmit information. Asynchronous communication could be dated back to the ancient times. The emergence of telephone during the 20th century changed the way we communicate and keep in touch from asynchronous towards more synchronous.

Why should we not only look at commercial solutions, but also previous efforts and solutions to address elder’s communication problems from the academic faculties? Although the academic projects are not polished and examined in the market with masses of customers, it gave intuitive ideas and useful conclusions and takeaway knowledge drawn from rigorous lab and field studies. For instance, the idea of “integrate everyday chat with elders into daily activities” from Brereton et al. (2015) was applied in commercial products such as WeChat, which is essentially a wallet. When people pay via WeChat Pay functionality, they might also spend time responding other people’s messages.

Project	Author	Year	Format
ASTRA	Markopoulos et al.	2004	Picture, Handwriting
KiT System	Langdale et al.	2006	Voice
Hermes@Home	Saslis-Lagoudakis et al.	2006	Picture, Handwriting
HomeNote	Sellen et al.	2006	Handwriting
Whereabouts Clock	Sellen et al.	2006	Picture
MarkerClock	Riche & Mackay	2009	Others
Building Bridge	Doyle et al.	2010	Picture, Video
Wayve	Lindley	2011	Handwriting, Voice
Family In Touch	Baecker et al.	2014	Picture, Texting
Messaging Kettle	Brereton et al.	2015	Voice, Texting
xPress	Brewer & Piper	2017	Voice
CoasterChat	Diks et al.	2021	Texting, Picture

TABLE 2.1. Past Academic Projects

As shown in the summary table above, on the whole, relevant studies reduced significantly in recent years compared to the previous decade, which in some degree indicated that the necessity of building communication tools for elders decreased due to the emergence of massive commercial applications such as WeChat, LINE, Facebook, etc. From the point of developing commercial

software, past academic projects are still useful and insightful since they could provide ideas and future work directions for commercial peer products.

2.4.1 ASTRA



FIGURE 2.7. ASTRA Prototype by Markopoulos et al., 2004.

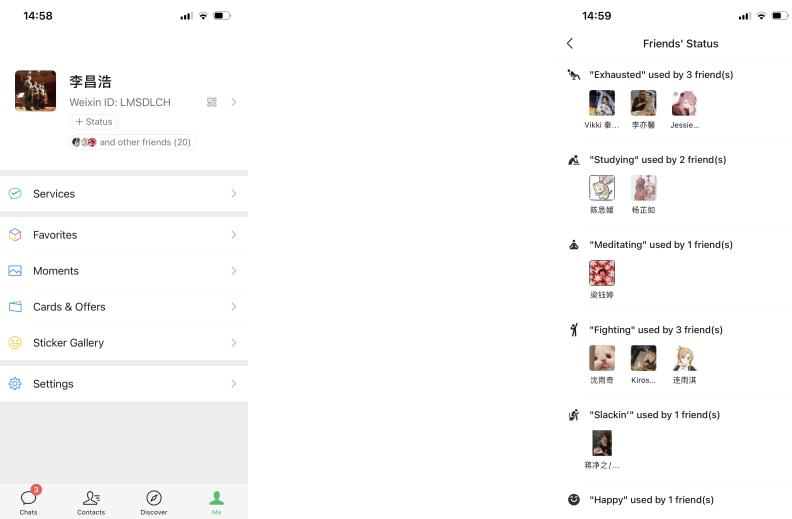
ASTRA was a system developed by Markopoulos et al. (2004) which enables close relatives who are separated to stay in touch with one another, providing a lightweight, asynchronous prototype for a modern device embedded with its software. Utilizing the phone and computer devices that was already available in 2004, ASTRA project surpassed both the digital family photo project and the design ideas put out by the Casablanca project, which are examples of early awareness systems for the household at the time, and spend effort to comprehend the concept of awareness itself.

On the other hand, ASTRA's concentration of study was focused on the awareness aspect of keeping in touch, which enables casual, social interaction to be experienced during leisure and downtime at home. According to author's definition, computer-mediated communication systems that enable people in keeping a peripheral awareness of one another's actions with little effort are known as "Awareness Systems".

Tencent applied the concept of "Awareness System" extensively throughout the design and implementation of WeChat. For instance, by using the "Status" functionality on the main user

page, WeChat users can post their current status, including aspects from Feelings (happy, exhausted, zoning out, fighting, thinking, energetic, melting, etc.), Activities (having fun, checking in, workout, having coffee, having milk tea, dining, taking selfie, etc.), Breaks (meditating, chilling, sleeping, playing cats, walking dogs, gaming, etc.) and others onto WeChat. By posting current status to family and friends on WeChat, others might be aware of your current actions or feelings with little effort, provided by the awareness system, which **consists a major aspect** of keeping people in touch.

Although both ASTRA and WeChat showed the idea of “Awareness System” in the system implementation, those two are not the same. The difference between ASTRA and WeChat’s awareness system is that ASTRA tries to keep awareness between stationary households and mobile individuals, whereas WeChat provides mobile-to-mobile method that can be used in households as well.



(a) Enter the status page by clicking “friends’ photo and other friends” button below “+ Status”.

(b) The list for friends’ status.

FIGURE 2.8. Viewing Others’ Status on WeChat

You should refer to the figure identifier i.e. Figure 2.8 - as you do later in the chapter!. You need to add labels on this pair of figures, A, B etc so that you can refer to them in the text in the reader knows what you are referring to.

The user must first click the “Me” button to access the Personal Information Card page before selecting the button that reads “icon, icon, icon and other friends (20)” in order to use WeChat’s awareness system, or status system. The number 20 in the parenthesis indicates that 20 additional users also updated their status on WeChat; this number could range from 1 to the total number of friends on your friend list. WeChat will display a “Friend’s Status” page with a list of friends’ icons or photos after you click this button. The real-time status system makes it a

I cannot see where this refers to in the figure.