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Empatchi: A Phatic Technology to Support Emotion Regulation



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October 2018

Abstract

Experiencing emotions is a fundamental aspect of human life. It triggers an emotion regulation process which helps us to manage our emotion and move back into our emotional equilibrium. The process starts as an internal process in our own self (intrapersonal emotion regulation) which can lead us to share our emotion with others (interpersonal emotion regulation). We seek interpersonal interaction so that others can provide support, which in turn enables us to regulate our emotions. In contrast, research suggests that our behaviour in using technology that promised to improve our relationships is undermining empathy, and making us more socially isolated, which may be caused by the poor support that technology provides for emotion regulation. However, the solution is not to avoid technology. One suitable approach is to provide support for phatic interaction, which focuses on signalling awareness and readiness to communicate, and has the benefit of establishing the possibility of communication and improving social bonds. Lightweight signal exchanges using phatic interaction are important to create the opportunity for social sharing, which is essential for interpersonal emotion regulation. However, many studies exploring phatic technologies have not shown how supporting phatic interaction can provide benefit beyond connectedness: How can this facilitate the need of to regulate emotions and to move back into the emotional equilibrium? This is what this thesis trying to investigate. This research aims to establish, evaluate, and validate design implications using the phatic interaction approach as a guideline to develop interactive technology to support emotion regulation. To achieve this, three studies were conducted. These studies contributed in establishing design implications, proposing a mobile app and validating it to ultimately answer our research questions and understand what are the aspects that matter when supporting emotion regulation with technology, and how providing support for phatic interaction can help to achieve that.

Declaration

The work described in this thesis is based on research carried out at the Centre for Human Computer Interaction Design, City, University of London, London, United Kingdom. No part of this thesis has been submitted elsewhere for any other degree or qualification. All work is my own, unless stated otherwise.

Gilang Andi Pradana

23 October 2018

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Alhamdulillahi Rabbil 'Alamin.

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1. Introduction

Experiencing emotions is a fundamental aspect of human life (Barrett, 2006). Our emotions are often shaped by the significant events that we experience. We feel happy when we have received presents from our loved ones, we feel sad when we have lost the things we love, and we feel frustrated with the traffic jam in our daily commute. These are the ups and downs in our daily activities, and most of them evoke either positive or negative emotions inside our self, which Gable and Reis define as an emotional experience (Gable & Reis, 2010). Emotional experiences trigger an emotion regulation process which helps us to move back into our emotional equilibrium, a regulated state where we can manage our current affective state, which enables us to have more control of our responses (Rimé, 2007). Here, we define equilibrium not as a classic homeostatic point-of-view, where it is seen as a neutral-valence stable state. Equilibrium in emotion regulation is a state where we accept, understand, and have the power to take control, and not being controlled, over how we respond to a certain emotional experience. The process starts as an internal process in our own self called intrapersonal emotion regulation (Ayduk & Kross, 2010), which can lead us to share our emotion with others (interpersonal emotion regulation) (Rimé, 2007, 2009). The process of emotion regulation is shown in Figure 1, which will be explained further in Chapter 2.

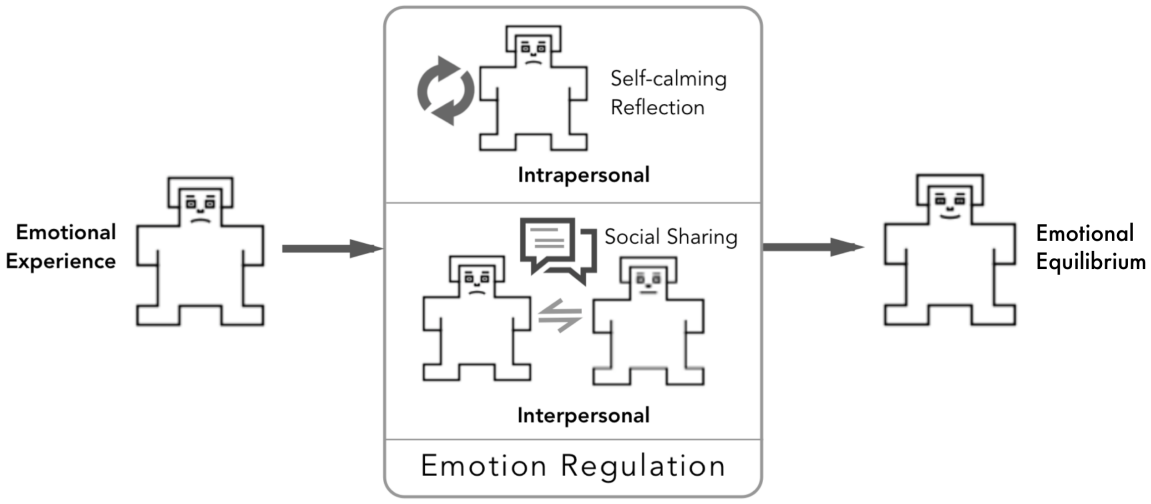


Figure 1 Emotion Regulation Process

In an intrapersonal emotion regulation process, the person experiencing an emotion begins a self-evaluative process, comparing their current affective state with his or her own typical

emotional state. Most of the empirical studies of emotion regulation have been limited to the intrapersonal process of emotion regulation. However, we need to also understand that in our life, we form a complex network of social relationship that are also closely related with how we experience and make sense of emotion. We seek social contact when experiencing emotion, and it continuously develops as an interdependent act between us and our social circle to help manage our emotions (Rimé, 2009). The basic need to share feelings in response to emotional events and to receive feedback from others is a behaviour known as social sharing. For example, telling our brother that we just got a good grade on an exam, or got promoted at work, establishes social sharing because this event will likely evoke an emotional response. In fact, the act of social sharing of emotion has developed since the very early stage of our life (Bowlby, 1990)When we are babies, we signal discomfort to our parents which gives them the opportunity to appease us by comforting us or by their mere presence (Rimé, 2009). The need for social contact when experiencing emotion does not vanish as we grow up, as it continuously develops as an interdependent act between us and our social circle to manage our emotion.

Expressing our feelings through social sharing within our trusted circle helps us clarify and resolve the emotions we experienced on those events, and it is our attempt to manage and regulate emotions experienced in our daily life (Zaki & Williams, 2013). Imagine when you are stressed or facing a hard time at work. You stayed up until late to prepare for a presentation on the next day, but it turned out that your boss hated your presentation because it did not meet his expectation and he scolded you in front of other colleagues. In this kind of situation, knowing that there are people who are always there to support you means a lot to you, and can help you achieve emotional equilibrium, feeling relieved and less stressed. Experiencing negative emotion can cause a weakened self with reduced self-confidence, anxiety, and even feelings of loneliness (Rimé, 2009). In this condition, one is highly motivated to reduce the distress that one experiences. We usually try to cope with hard situations by choosing not to go through it alone, but instead, we seek others' help in understanding and managing our emotions. For example, we discuss our emotional experiences in a car ride back home, over dinner, or via a phone call or text messages when we are away from our friends or family.

The advancement of technology has brought us communication tools that enable us to interact with others over distance. However, there are also downsides to the development of communication technologies. Instead of feeling closer to others, we feel lonelier, less happy with our lives, and more envious with each other (Turkle, 2011). A number of studies have found that our unhealthy behaviour in consuming technology, like looking at our smartphones instead of talking to our family or friends during dinner, is harming our capability to interact with each other, where the feeling of isolation is growing as empathy is declining in communication (Gergen, 2003; Jordan et al., 2011; Konrath, Chopik, Hsing, & O'Brien, 2014; Kross et al., 2013).

Current technologies also provide poor support for our emotion regulation needs caused by the lack of channels for transmitting emotion, which is as an important cue in communication that helps us to strengthen social bonds and intimacy (Willis & Jones, 2012). Examples of non-verbal emotion cues are body gestures in face-to-face communication, or voice intonation in a telephone call. The negative consequences of modern communication technologies are alarming but the solution is not simply to avoid using technology. Rather, designers of communication technologies can try and support the emotional needs of users (Kanjo, Al-Husain, & Chamberlain, 2015). There is a research opportunity to develop technologies that support emotion regulation, both through social sharing and self-reflection. If we want to support the need for emotion regulation with technology, it needs to provide more than just a medium to send a message content explicitly. The communication of emotional cues that helps to strengthen the social ties also need to be supported, or it will not satisfy the need for us to connect and communicate with each other (Garde, 2013).

Several studies have explored many approaches to answer this problem, and one of them is to provide support for phatic interaction. Malinowski introduced the phatic interaction concept as a "type of speech in which the ties of union are created by a mere exchange of words" (Malinowski, 1946), and Jakobson adopted the concept into his model of communication (Jakobson, 1960). As an example in our daily life, this can be seen as 'small-talk', which facilitates further communication and maintains both physical and psychological contact between the sender and the receiver. Phatic interaction does not explicitly informing and expressing, but has the

benefit of establishing the possibility of communication and strengthen the social bonds (Vetere, Smith, & Gibbs, 2009).

Phatic technologies are technologies that provide support for phatic interaction and they do not necessarily require a large amount of data to convey significance and meaning (Gibbs, Vetere, Bunyan, & Howard, 2005). In technology, the frequent use of short text messages is one example of phatic interaction between couples, friends, or family. For example, these often involve sending tokens of affection that let each communicators know that they are thinking of each other (Licoppe & Smoreda, 2005; Thurlow, 2003). Even though the value of phatic interaction is not in the explicit information content that is being sent, the act is not a waste of effort. The act itself has a value in maintaining a relationship by making sure that the communication channels are open to support further communication.

Providing support for phatic interaction in technology is seen as one suitable approach to help social sharing of emotions because of its ability to establish a communication channel and keeping it open for social exchange. Lightweight exchanges that signal awareness and readiness to communicate are important to create the opportunity for social sharing. This provides an opportunity for designers and researchers to tackle the lack of emotional support in current communication technology. A number of studies have explored frequent lightweight communications via technology, including how it helps in connectedness: maintaining relationships and connections between people (J. J. Kaye, 2006; Nardi, Whittaker, & Bradner, 2000), and how it's being used in communicating emotion (Gibbs et al., 2005; Willis & Jones, 2012). In these works, ambiguity is the main design principle. It provides an intimate and personal experience of using the system and it requires the users to make sense of the information themselves (W. Gaver, Boucher, Pennington, & Walker, 2004). By designing a system for appropriation, users can interpret the signal on their own and adapt the technology for their own personal purpose (Dix, 2007). However, these studies have not shown how providing support for phatic interaction can benefit beyond connectedness: How can this facilitate the need to regulate emotions and to move back into the emotional equilibrium? How can the sense of connectedness which facilitated with phatic interactions can help us manage our own emotion? This is the research gap that this research attempts to fill. This research aims to establish, evaluate, and

validate design implications using the phatic interaction approach as a guideline to develop interactive technology to support emotion regulation. In the following section I explain my research questions and objectives, research contributions, research scope, and the overview of this thesis.

1.1. Research Questions and Objectives

The following research questions were established for this PhD research. Each research question (RQ) will be supported by research objectives (O).

RQ1: How do people currently share emotions and exchange gestures of empathy to facilitate interpersonal emotion regulation through social sharing? (Study 1)

O1: Understand how people experience emotion and what motivates them to engage in social contact for emotion regulation.

O2: Observe how people achieve their need to share emotion, and how other people respond back by exchanging gestures of empathy.

O3: Examine the effect of interpersonal emotion regulation through social sharing on people's affective state.

O4: Develop an initial framework for understanding emotion regulation.

O5: Establish design implications based on the findings of Study 1.

RQ2: How can phatic interactions in technology help in interpersonal emotion regulation process? (Study 2)

O6: Develop knowledge and understanding of the phatic mode of communication in technology and how it is helpful to establish a communication channel.

O7: Demonstrate that the design implications can be implemented as a mobile app that provides phatic interactions to support emotion regulation

O8: Observe what kind of interactions are exchanged within the system that provides support for phatic interaction.

O9: Examine the effect of using the system to support emotion regulation and determine how the app can be improved to support emotion regulation.

RQ3: How does reflecting on one's own emotion facilitate the emotion regulation process? (Study 3)

O10: Improve the mobile app for better support of self-reflection (intrapersonal emotion regulation).

O11: Observe the effect of self-reflection in social sharing of emotion.

1.2. Research Contributions

The contribution of the research presented in this thesis are as follows:

1) Developing a framework of knowledge for emotion regulation, and how technology can support it.
2) Establishing design implications for developing technologies with phatic interactions that support emotion regulation.
3) Designing, developing, and validating a mobile app that supports emotion regulation.
4) Demonstrating that providing support for phatic interaction in technology can help in the interpersonal emotion regulation process.
5) Demonstrating that improving support for intrapersonal emotion regulation in a phatic technology can also support better interpersonal emotion regulation with the same technology.

1.3. Research Scope

This research investigates how technology can support people to cope with daily emotional ups and downs. This research excludes the extreme cases of stress, depression, or any other mental health problems. Throughout the studies in this PhD research, I will focus on both intrapersonal and interpersonal process of emotion regulation and how they can be supported with technology. I focus on investigating these processes and supporting them with a mobile app that facilitates phatic interaction in a daily situations, where people experience daily ups and downs.

1.4. Methodology

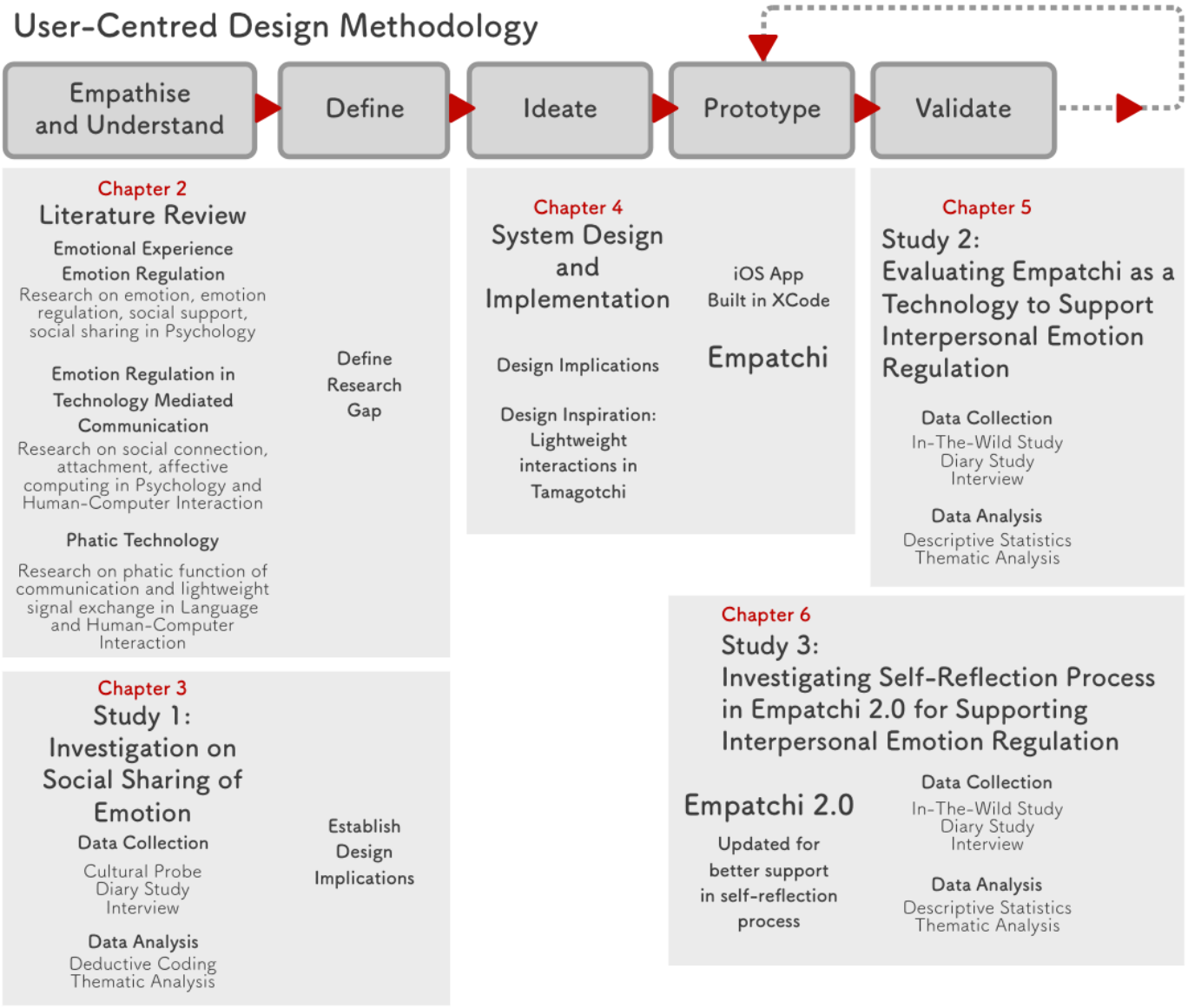


Figure 2 PhD Research Methodology

In this research, User-Centred Design Approach was adopted as the methodology. First, I conducted a literature review to get a thorough understanding of the topic related to my PhD research (Chapter 2). I looked at research from the psychology field on human's emotion and human's basic need for emotion regulation, which involves both intrapersonal and interpersonal process (Section 2.1). This informs the understanding of what is emotion, what happens when we experience emotion, and why do we need social support from others to manage our emotion. Next, I looked into the works of literature both from Psychology and Human-Computer Interaction field where I will show evidence of how the unhealthy consumption of technology can harm our life and the lack of support for emotional communication channels in current communication technology (Section 2.2). This serves the purpose of identifying the gap in the current technology to facilitate human's need to manage emotion. Third, I looked at how providing support for phatic interaction in technology is seen as one suitable approach to help social sharing of emotions because of its ability to establish the communication channel and keeping it open for social exchange (Section 2.3). This informs the phatic function of communication and how it can be implemented in technology to fill the gap we have identified. Finally, I conducted a literature review of how emotions are observed in the Human-Computer Interaction field and overviewed interactive technologies that support communicating emotion by providing support for phatic interaction (Section 2.4). This step is useful not only to position the research I develop but also to explore possibilities and limitations in designing new interactive technology to support interpersonal emotion regulation.

Next, I conducted Study 1 to understand people's behaviour in sending and receiving support in interpersonal emotion regulation (Chapter 3). I started by studying the empirical research about cultural probes method that inspired me to design the data collection method for this study. Cultural probes are a novel collection of techniques gaining insights in interactive systems design that has been introduced and widely used especially in conditions that are difficult to approach with traditional observation methods. I also studied specific examples of how HCI researchers have interpreted this method. Based on this review, I developed a user observation study method by implementing cultural probes approach in mobile technology. Diary study and

interviews were also conducted for my data collection purpose. Finally, I analysed the results with deductive coding and thematic analysis, followed by the establishment of design implications to define the aspects that are important in designing technology to support interpersonal emotion regulation. This is a good first step towards answering research question RQ1 and RQ2.

The result from Study 1 gave us insight and inspiration on the characteristics that have to be provided by our next design. In the Ideation phase, I explored the concept of Empatchi: Human Tamagotchi as a design idea, which implements all the design implications established from Study 1 (Chapter 4). As a design inspiration, I looked at examples of lightweight interactions that have been implemented Tamagotchi. Tamagotchi is a virtual pet simulation game introduced in 1996 by the Japanese toy manufacturer, Bandai Co. In the prototype phase, I explored how the design concept can be implemented into a mobile app. This step demonstrated that design implications can be implemented as a mobile app that provides phatic interactions to support emotion regulation.

Next, I conducted study 2 to explore how phatic interactions in technology, especially in Empatchi, can facilitate the interpersonal emotion regulation process (Chapter 5). This phase serves a purpose to validate the prototype that has been developed in the previous phase. I adopted in-the-wild study, diary study, diary study, and interview as data collection method, and descriptive statistics and thematic analysis as the data analysis method. In this phase, I demonstrated that phatic interactions can help to support the interpersonal emotion regulation process. I also reported the findings and explained how each of the design implication that has been implemented in Empatchi can support interpersonal emotion regulation process. Moreover, in this phase, I observed what kind of signals are exchanged within Empatchi, examined the effect of using the mobile app to support interpersonal emotion regulation and specified how the app can be improved to support both interpersonal and intrapersonal emotion regulation.

Based on the result of study 2, I conducted an iteration cycle of prototype and validation phase to improve the prototype and validate it in Study 3 to explore how reflecting on one's own emotion can facilitate the emotion regulation process (Chapter 6). Study 3 adopts in-the-wild study, diary study, diary study, and interview as data collection method, and descriptive statistics and

thematic analysis as the data analysis method. I reported the results of the study and identified how self-reflection influences social sharing of emotion.

Finally, I reflected the findings of the research and outlined the possible directions of future research (Chapter 7). I reviewed all the research questions of this PhD research and summarise the answers provided by the research studies, including the clear contribution of this research, its scope and limitation.

1.5. Overview of Thesis

Throughout the thesis, I describe the journey of my PhD research to answer the research questions and achieve the research objectives in 7 chapters. Based on the phases decribed in the methodology section, this thesis is structured as follows.

In Chapter 2, I describe related works about emotion, emotion regulation, emotion regulation in technology mediated communication, phatic communication, and studies of affective systems. This chapter gives fundamental understanding about topics related to this PhD research, identifies the research gap, and helps to position the research I develop.

Chapter 3 describes Study 1 that was conducted to understand people's behaviour in sending and receiving support in interpersonal emotion regulation and demonstrates that there are important aspects of interpersonal emotion regulation that can be supported by technology. The contribution of this study is to collect and develop knowledge and understanding on interpersonal emotion regulation based on our observation of participants. This study has also established design implications that are useful for our system design.

In Chapter 4, I propose a concept of *Empatchi*: Human *Tamagotchi* as a design idea, which implements all the design implications presented at the end of Chapter 3. This chapter demonstrates that the design implications can be implemented as a mobile app that provides phatic interactions to support emotion regulation.

Chapter 5 describes Study 2 which explores how phatic interactions in technology can facilitate the interpersonal emotion regulation process. In this chapter, I demonstrate that phatic interactions can help to support the interpersonal emotion regulation process. Moreover, this

chapter observes what kind of signals are exchanged within *Empatchi*, examines the effect of using the mobile app to support interpersonal emotion regulation and specifies how the app can be improved to support both interpersonal and intrapersonal emotion regulation.

Chapter 6 describes Study 3 which explores how reflecting on one's own emotion can facilitate the emotion regulation process. Study 3 identifies how self-reflection process influences social sharing of emotion.

Finally, in Chapter 7, I provide the review of all the research questions of this PhD research and summarise the answers provided by the research studies, including the clear contribution of this research, its scope and limitation.

2. Related Work

In this chapter, I present the literature review strategy I conducted. I start by telling the story behind the original motivation of this research. The motivation behind this research originally comes from my personal experience living in Japan. In the Japanese language, there is a unique expression to show thoughts on empathy and appreciating someone's effort called "Otsukaresama". For example, at the end of the day at work, colleagues say it to each other a signal that acknowledges that they are part of the rhythms of the day. It represents thoughtfulness to someone and a reward of their achievement, and it reflects the psychological nature of the human fear of loneliness and the desire for support from others. It is a unique way to express their thoughts on providing support and validation, and at the same time is a powerful phrase that communicates appreciation and cultivates empathy. I became interested in looking at if there is any particular field of research specifically looking at this phenomenon, where people seek others affirmation on a daily basis. In the same time, I read several works of literature that talks about how our unhealthy behaviour in consuming technology is increasing loneliness and undermining empathy, for example from Sherry Turkle. At this point, I realise that even though human needs constant social support from others, there is a gap in the current technology to facilitate that need. This is the motivation of this PhD research that starts the process of literature research..

2.1. Literature Review Strategy

As a literature review strategy, I used snowballing method to get a thorough e Using the CityLibrary database provided by City, University of London, I focused on searching the following topics in this order: Fundamental understanding of what is emotion and how do people cope with their emotion, how are these addressed with technology, and what are the effects of the current technology in experiencing and managing emotion. From the search results, I started looking at articles that were published in major publications (conferences, journals, or books) to understand the major development of a particular topic. As the next step, I looked into both 1.) Works cited in the article to understand deeper about the theory, framework, and knowledge that the article was

based on, and 2.) Works that cited the article to understand the most recent updates and development of that particular topic. Moreover, for further understanding, more related works that are significant and influential to my PhD research topic were added based on the discussions conducted with my supervisors.

To understand how I conducted these strategies and how the works of literature were structured into this chapter, I will explain about each section of this chapter, and why I decided to conduct a literature review on that particular topic. First, I looked at research from the psychology field on human's emotion and human's basic need for emotion regulation, which involves both intrapersonal and interpersonal process (section 2.1). It is important for me to be informed about the fundamental understanding of what is emotion, what happens when we experience emotion, and why do we need social support from others to manage our emotion. Next, I looked into the literature from both Psychology and Human-Computer Interaction field where I will show evidence of how the unhealthy consumption of technology can harm our life and the lack of support for emotional communication channels in current communication technology (section 2.2). This serves the purpose of identifying the gap in the current technology to facilitate human's need to manage emotion. Using the snowball method, after looking at works of literature about communicating emotion with technology, I discovered that a providing support for phatic interaction in technology is seen as one suitable approach to help social sharing of emotions because of its ability to establish the communication channel and keeping it open for social exchange, which will be explained in Section 2.3. This section informs the phatic function of communication and how it can be implemented in technology to fill the gap we have identified. Finally, this is followed by a brief review of related work, including how emotions are observed in Human-Computer Interaction field and an overview of interactive technologies that support communicating emotion by providing support for phatic interaction (section 2.4). This section is not only to position the research I develop but also to explore possibilities and limitations in designing new interactive technology to support interpersonal emotion regulation..

2.2. Experiencing Emotion and Making Sense of It

To inform the conception of interpersonal emotion regulation as our attempt to cognitively manage our emotional experiences, we need to find out how we experience emotions, and why we need to clarify and resolve the emotions we experience. In the scientific literature, emotions are described as coordinated sets of responses to internal or external events that have significance for us (Lazarus, 1993). These response sets aim to establish the best possible response to significant events and may include cognitive, behavioural, physiological, and neural mechanisms (Berking, 2014). In this section, I will review empirical theories and studies in these areas: 1) Emotional Experience, and 2) Emotion Regulation Through Social Sharing, both in Positive and Negative Emotion.

2.2.1. Emotional Experience

Experiencing emotions is a fundamental aspect of human life. Psychological researchers often assume that humans experience emotion because they have "emotions": internal mechanisms for a small set of reactions (Barrett, 2006). We worry about our parents' health, we got praised for our presentation, we argue with our partner, we receive presents, we got stressed with the traffic, or got scolded by our boss. These are the ups and downs in our daily activities, and most of them elicit either positive or negative emotion inside our self, which Gable and Reis define as an emotional experience (Gable & Reis, 2010).

Carver and Scheier explain positive and negative emotion by their correlation with goal-reaching activities that have always been a part of our daily life (Carver & Scheier, 1990). We experience positive emotions when our goal-reaching activities are accelerated and are accomplished sooner than what we expected. When this happens, our self-system is strengthened, resulting in higher self-esteem, enhanced self-confidence, and greater feelings of self-competence. On the other hand, we experience negative emotion like anger, sadness, fear, or shame, when there are conditions that conflict with these activities, for example when they are slowed down, or even blocked. When experiencing daily ups and downs, we often try to improve on the feelings these experiences bring us. A positive or negative emotional experience can leave social and cognitive

traces, and it is common for people to cognitively reassess the experience to make sense of it (Bazarova, Choi, Schwanda Sosik, Cosley, & Whitlock, 2015). In the following subsection, we will continue to investigate the importance of regulating both our positive and negative emotion.

2.2.2. Emotion Regulation: Intrapersonal and Interpersonal Process

Emotional experience triggers an emotion regulation process which helps us to move back into our emotional equilibrium: a regulated state where we can accept and allow our current affective state, which enables us to have more control of our responses (Rimé, 2007). When we are exposed to an emotional experience, we try to control it in many ways such as avoiding the distress itself, or by changing our perception to the situation. The ability to have control over our emotional experience has been described as emotion regulation (Thompson, 1994). In addition, A study conducted by Gross explained that in emotion regulation process, people try to make sense of their emotional experience: what, when, how, and why it happens (GROSS, 2002). According to these definitions, the regulated state that we try to achieve with the emotion regulation process (or what we call emotional equilibrium), is not a classic homeostatic point-of-view, where our attempts to intensify or dampen emotion are seen as a way to reach a neutral-valence stable state (Rimé, 2007). In emotion regulation, we try to manage our emotion by intensifying, dampening, or maintaining our emotion to accept and understand the meaning behind it, so that we can reach a state where we have the power to take control, and not being controlled, over how we respond to a certain emotional experience. This state is what we define as a regulated state or emotional equilibrium.

Emotion regulation starts with an internal private process (intrapersonal: self-reflection, reappraisal)(Ayduk & Kross, 2010), which will later lead to the social sharing of emotions with others (interpersonal: receiving support and social validation) when a certain intensity threshold is exceeded (Luminet, Bouts, Delie, Manstead, & Rime, 2000; Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998). The process of emotion regulation happens not only in negative emotional experience, but also the positive ones (Hofmann, 2014).

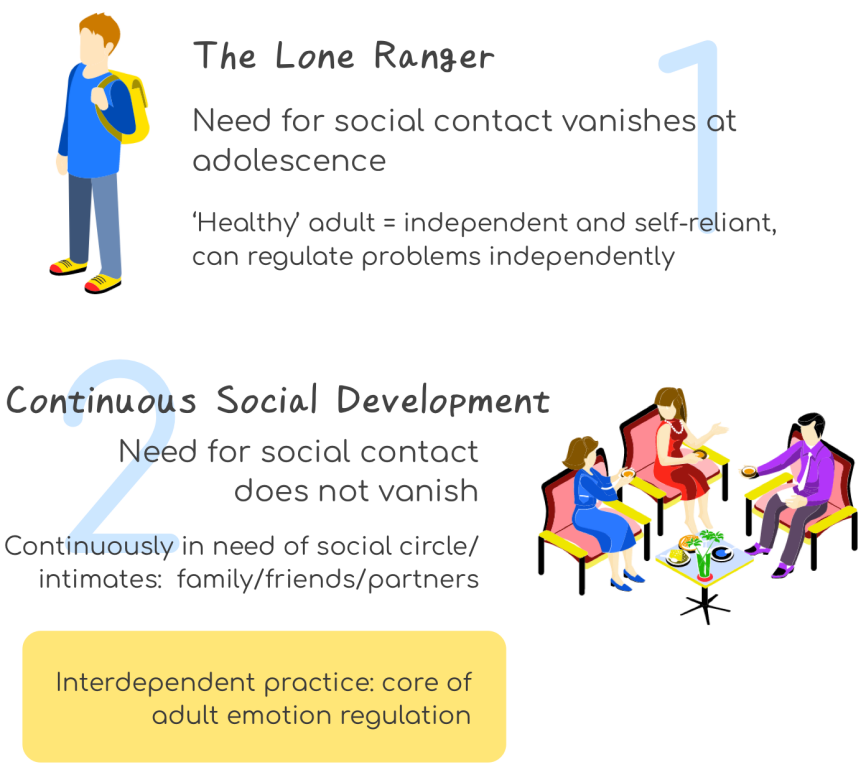


Figure 3 Two Theories of Social Dependence in Emotion Regulation

In psychological research, a healthy adult is seen as someone who is "self-contained, independent and self-reliant, capable of asserting himself and influencing his environment", a theory called "rugged individualism"(Riger, 2002) or the "lone ranger" (Dunahoo, Hobfoll, Monnier, Hulsizer, & Johnson, 1998). This view implies that emotional coping in adults eliminate social dependence, and one must show the ability to regulate emotion independently of external influence. On the other hand, a number of studies have challenged this view and discarded this perspective of adult emotion regulation, revealing that the need for social contact when experiencing emotion does not vanish as we grow up (Festinger, 1954), as it continuously develops as an interdependent act between us and our social circle to manage our emotion (Rimé, 2009). According to this view, the target of social sharing evolves with age. Parents are the main target during our childhood, and it expands to new attachment figures like siblings and friends in teenagers, friends and romantic partners in young adults, and spouses in mature adults (Pennebaker, Rimé, & Blankenship, 1996; Rime, Mesquita, Philippot, & Boca, 1991).

2.2.2.1. Self-Focused Emotion Regulation

Being exposed in an emotional experience starts an internal private process called intrapersonal emotion regulation. In this process, the person exposed in the emotional experience begins a self-evaluative process, comparing the current affective state with his or her own standard. Specifically, a model introduced by Duval and Wicklund states that if the current state surpasses the standard, a positive affect is experienced. On the other hand, if the current state is lower than the standard, a negative affect is experienced (Duval & Wicklund, 1972). In general, there are two types of strategies in self-focused emotion regulation: suppression and cognitive reappraisal. The first strategy tends to suppress or eliminate the emotion, while the latter tries to accept and reappraise/reframe the emotion. Many researchers argue that the cognitive reappraisal is the effective strategy for regulating emotion. In one study, Gross and his team demonstrated that when the participants were asked to reappraise emotional pictures that were being used in the experiment, they report less distress and arousal compared to the participants who were asked to suppress their emotion (GROSS, 2002). This is consistent with another study by Wegner and his team. When participants were asked to think for one minute about anything except a white bear (which in this case is an emotion-eliciting object), they reported an unpleasant effect. According to the study, the cognitive process which was required for suppressing the emotion becomes intrusive and it increases the unpleasantness of the emotion itself. Furthermore, the intrusiveness of the suppressed thought stays and continues even after the suppression period (Wegner, Schneider, Carter, & White, 1987). Another experiment by Campbell-Sills, Barlow, and Hofmann also demonstrated that participants with anxiety and depression report less distress and lower arousal when they are instructed to accept their emotion (Campbell-Sills, Barlow, Brown, & Hofmann, 2006). Other studies have also shown that trying to suppress the emotion and ruminating negative emotion can prolong anger and depression (Nolen-hoeksema & Morrow, 1993). However, there are situations where suppression is more appropriate to answer social demands, such as suppressing anger in some public/social situations, or suppressing to laugh at a funeral (Hofmann, 2014).

2.2.2.2. *Social Sharing of Emotion: A Fundamental Need*

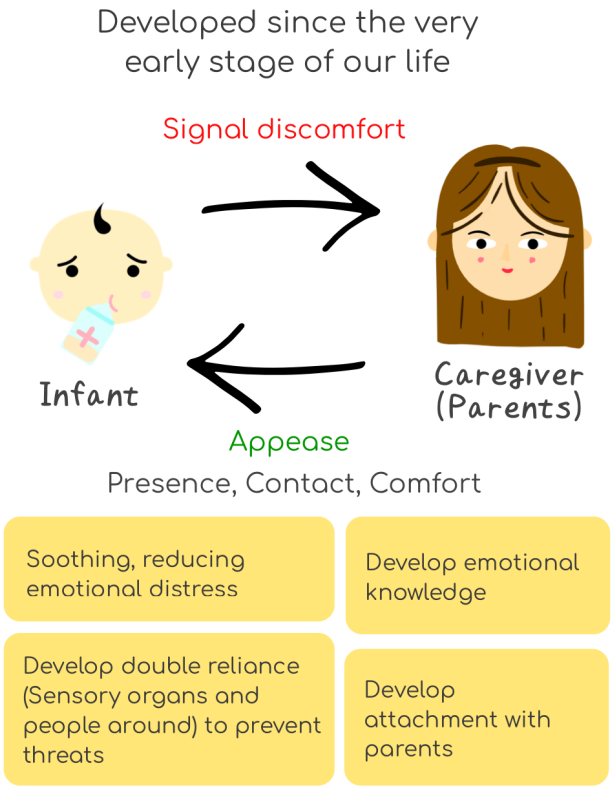


Figure 4 Early Development of Social Sharing of Emotion

Most of the empirical studies of emotion regulation have been limited to intrapersonal process of emotion regulation. However, we need to also understand that in our life, we form a complex network of social relationship that are also closely related with how we experience and make sense of emotion. As mentioned in the previous section, the need for social contact when experiencing emotion does not vanish as we grow up (Festinger, 1954), as it continuously develops as an interdependent act between us and our social circle to manage our emotion. Humans have a basic need to share feelings in response to emotional events and to receive feedback from others, a behaviour known as social sharing (Rimé, 2009). The feelings shared in social sharing are often described in a socially-shared language (Rime et al., 1991). As we can see in mammals, where they 're using body contact to regulate their children's emotion, humans also develop this behaviour with our own language since the very early stage of our life (Bowlby, 1990), as shown in Figure 4. When we were babies, we signal discomfort to our parents which gives them the opportunity to appease us by comforting us, showing loving and caring gestures, or by their mere presence

(Bowlby, 1990; Eisenberger, 2013; Harlow, 1959)This is crucial for babies to reduce their emotional distress (Rimé, 2009), helping them develop double reliance from their sensory organs and the people around for preventing threats (Harlow, 1959), early development of their emotional comprehension (Rimé, 2009), and develop the attachment with parents (Bowlby, 1990).

2.2.2.3. Characteristics of Social Sharing

Telling our loved ones that we just got a good grade on an exam, or got promoted at work, establishes social sharing because this event will likely evoke an emotional response. When someone experiences an emotional experience, it requires him/her to label the affective state before expressing or communicating it with others (Zaki & Williams, 2013). It begins in his or her own self as an internal private process (intrapersonal: self-reflection, reappraisal)(Ayduk & Kross, 2010), which will later lead to the social sharing of emotions with others (interpersonal: receiving support and social validation) when a certain intensity threshold is exceeded (Luminet et al., 2000; Rimé et al., 1998). Intrapersonal and Interpersonal regulation occur in continuous sequence (Zaki & Williams, 2013), and this process helps us to move back into our emotional equilibrium (Rimé, 2007). After experiencing emotional experience, people usually engage in the act of interpersonal emotion regulation: we try to cope with these situations by choosing not to go through it alone, but instead seeking help from others in understanding and managing our emotions. (Zaki & Williams, 2013). In his studies, Rime revealed that the sharing of emotion often initiated early after the experience, taking place during the day of the experience in about 60% of the cases across studies (Rimé, Philippot, Boca, & Mesquita, 1992). This interpersonal act of managing emotion happens regardless of the valence of the emotions involved (Rimé, 2009). Social sharing of emotions also occurs independently of age, gender (Rimé et al., 1998, 1992) and culture (Mesquita & Frijda, 1992; Pennebaker et al., 1996; Singh-Manoux & Finkenauer, 2001).

2.2.2.4. *Interpersonal Dynamic of the Social Sharing of Emotion*

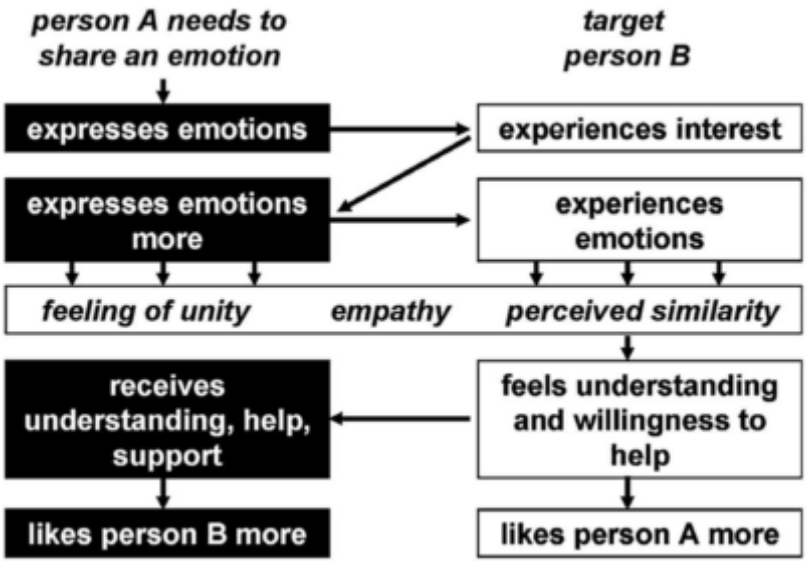


Figure 5 Interpersonal Dynamic Between Sharer and Listener (Rimé, 2009)

When emotion is shared within a strong-tie relationship group, the target is generally willing to lend him/herself to listen (Rimé, 2009), and often tries to help and manage sharer's emotion through empathic and prosocial behaviours (Batson, 1991; Thoits, 1996). This process entails an interpersonal dynamic between the sharer and the listener, which is shown in Figure 5. When Person A shares emotion to Person B, Person B as a listener will experience interest, as humans tend to get fascinated in an emotional material (Rimé, 2007), which then lead Person A to express even more emotion. Being exposed to an emotional narrative can also elicit emotional experience to the listener (Archer & Berg, 1978; Lazarus, Opton, Nomikos, & Rankin, 1965), which will enhance Person B's empathy and willingness to help Person A. This can be seen in the form of support and reassurance (Epstein, 1973), material help and assistance (Stroebe, Stroebe, Abakoumkin, & Schut, 1996; Thoits, 1984), social recognition and validation (Wortman & Lehman, 1985) or mere presence of others (Beckes & Coan, 2011; Coan, Schaefer, & Davidson, 2006). This process will result in an improved relationship between the sharer and the listener. According to Gross, Sheppes, and Urry (2011), in this process Person A involved in intrinsic interpersonal regulation (attempts to regulate his/her own emotion), where Person B involved in extrinsic interpersonal regulation (attempts to regulate other person's emotion) (Gross, Sheppes, & Urry, 2011).

The social sharing process contributes to fulfil the socio-affective needs of the emotion sharer by providing him or her with feedback from the listener that have many benefits like reducing the distress of an emotional experience and enhancing social bond with the listener. Further in his research, Rime explains about another social sharing mode called cognitive-sharing mode. In this mode, cognitive processing of emotional experience takes place and opens an opportunity for professionals (e.g., teachers, psychologists) to get involved in reframing the problem that the sharer has. This may lead to the obvious impact of social sharing: emotional recovery, and this process will more likely happen in a more intense experience that requires further cognitive work to assess perception/opinion of others. This does not mean that the socio-affective mode is less important than the cognitive-sharing mode. As mentioned earlier, most of the sharing process develops immediately after the experience, where the sharer is generally not ready for a deep cognitive work like reframing the problem or trying to figure out the meaning of the experience. In this case, the comfort and reassurance that can be gained from socio-affective mode of social sharing can be helpful for future cognitive thinking of the emotional experience when it is needed.

Expressing our feelings through social sharing helps us clarify and resolve the emotions we experienced in those events. It has many benefits like stimulating social exchange (Schachter & Stanley, 1959), initiating communication (Willis & Jones, 2012), improving emotional well-being (Mina Choi & Toma, 2014), affirming connection (Planalp, 1999), and increasing intimacy by allowing others to provide empathy, validation, and support (Rimé, 2009). By reviewing the empirical theories on emotion regulation, we learned the importance of both self-centered emotion regulation (intrapersonal), and sharing our emotions and receiving feedback from others (interpersonal). In two following sub-subsections, we will take a look at the effect of interpersonal emotion regulation as an intensifier of positive affect (Gable & Reis, 2010) and as a resource to reduce stress when experiencing negative emotion (Uchino, Cacioppo, & Kiecolt-Glaser, 1996).

2.2.2.5. Capitalising on Positive Events

In subsection 2.1.1, we learned that when we experience positive emotion, our self-system is strengthened, resulting in a higher self-esteem, enhanced self-confidence, and greater feelings

of self-competence. Based on this theory by Carver and Scheier, positive emotions can improve our well-being in two ways: (1) by the increase of the level of positive affect that they cause and (2) by the positive feedback that a successful experience brings, both from self-centered emotion regulation and social sharing (Rimé, 2009). When this happens, the joy from the positive experience is amplified (Langston, 1994). Moreover, when the experience is especially good, we do not hesitate to share it with strangers (Reis et al., 2010). For example, imagine that you are working in a company and your boss just called you to his room to tell that you have just promoted—a highly positive event. Immediately upon experiencing a highly positive event, you might call your family or friends to let them know or to celebrate. You might also post an overjoyed status update on social media, like Facebook or Twitter. You might also share the good news with a colleague sitting next to you in the office, even though you do not know them very well. Figure 6 shows the social sharing process when experiencing positive emotion.

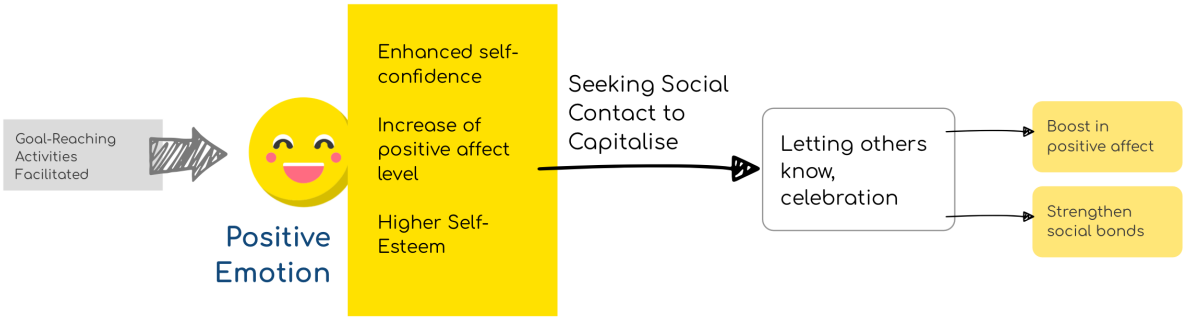


Figure 6 Social Sharing of Positive Emotion

Studies of social media users revealed that positive emotions are more shared in channels with greater visibility, such as public status updates or tweets, compared to private messages. This visible sharing is reported to be linked to positive affect and satisfaction (Burke, Develin, & Park, 2016). Individuals experiencing positive events tend to engage in prompt and immediate expression more than those experiencing negative events. This is caused by social norms which dictate that good news should be shared quickly so that your close ones can also share the joy (Argyle & Henderson, 1984; Dibble & Levine, 2013). Responding to a good news can be as simple as a congratulation, and can also result in stronger bond and trust between individuals (Gable & Reis, 2010; Reis et al., 2010).

2.2.2.6. *Relief after Negative Events*

According to Carver and Scheier (1990), we experience negative emotion when our goal-reaching activities slow-down or even blocked (Carver & Scheier, 1990). For example, when we expected to arrive early at the office to finish preparing the slides for a presentation to a client, the traffic turned out to be heavier than usual because of heavy rain, causing many delays and we turned out to be late for work and even missed the presentation. In another research, Mandler (1961) also mentioned that we may experience negative emotion when our expectation does not occur or when something outside our expectation occurs (Mandler, Mandler, Kremen, & Sholiton, 1961). This may cause a temporary destabilisation of a person (reduced self-confidence, lower self-esteem, anxiety, or loneliness) that he/she will be highly motivated to reduce to return to his/her emotional equilibrium: a regulated state where one can accept one's current affective state, which enables them to have more control of their responses. A negative affective state will trigger cognitive work to assess others' perception and opinion (Festinger, 1954) and activates attachment system with others (Ainsworth, Blehar, Waters, & Wall, 1978; Epley & Cottrell, 1977)that may result in reduced distress and emotional relief (Rimé, 2009). Figure 7 shows the social sharing process when experiencing negative emotion.

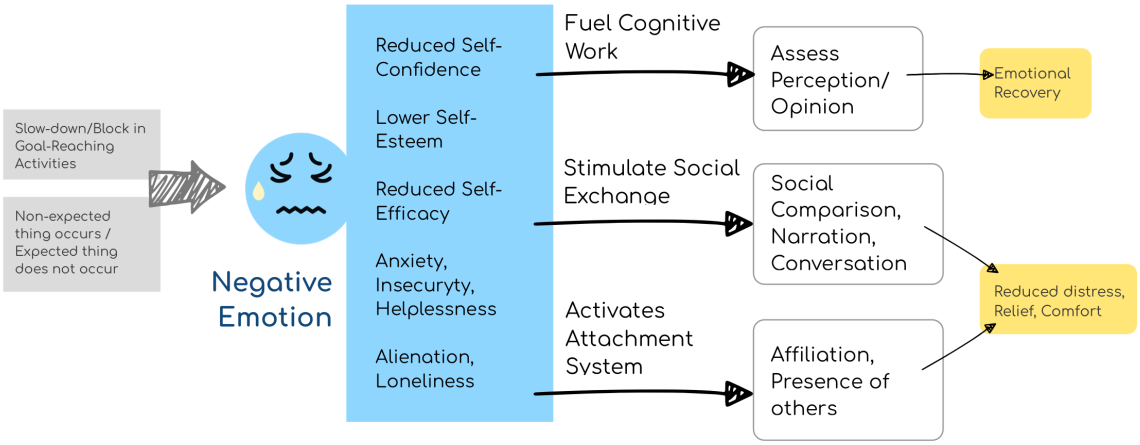


Figure 7 Social Sharing of Negative Emotion

When experiencing negative emotions, letting out frustrations can help us cope (Pennebaker & Chung, 2007). However, because of the unwritten norm in our society, most of us also hesitate

when it comes to sharing negative emotions (Bond & Anderson, 1987). Contrast to the positive event, imagine you experience a negative event: you failed an important exam. You may not tell people from your immediate surroundings (e.g., classmates, co-workers) because you do not want them to judge you negatively. You may keep the news to yourself for a while until a close friend or family member is available to talk. Hesitation in sharing negative emotion causes us to underestimate negative emotional experiences that we suffered and at the same time overestimate the positive emotional experiences (Jordan et al., 2011). We can also see these phenomena in online social media. Many studies of the usage of Facebook and Twitter being used as a media to share emotions reveal that positive emotions are being shared more than negative emotions (Lin & Utz, 2015). This causes us to ignore posts that are containing negative emotions to discourage negativity, especially more extreme expressions such as low self-worth. On Twitter, we can see lower responses on tweets that express loneliness (Funda, Ting, Brubaker, & Teodoro, 2014). However, another study has shown that more than one-third of emotions shared in Facebook status updates are negative emotions. This confirms that when people share emotions in public channel, it is not always limited to positive news (Burke et al., 2016). In their study which focuses on Social Sharing on Facebook, the viewers of these posts containing negative emotions respond with increased emotion and supportive language. Although these posts are shared publicly, negative self-worth posts are often responded by the viewers via private channels like direct message. This aligns with Schachter's theory that negative emotional state can also stimulate social exchange and activates the attachment system. He demonstrated that being exposed to an emotional condition evokes a person's motivation to seek social contact, and will trigger verbal conversation (Schachter & Stanley, 1959).

On the other hand, further in his research, Rime also revealed several conditions that make someone avoid engaging in social sharing. Among those conditions are when the emotion is especially associated to the feeling of shame and guilt (Finkenauer & Rimé, 1998; Tangney, 1991), when the experience is extremely traumatic, or when it may elicit harm to listeners (Rimé, 2009).

Based on the knowledge that have been gathered in this section, I summarise the emotion regulation process in Figure 8. In the following section, I continue to explore the emotion

regulation process in technology mediated communication, focusing on the aspects that can inhibit emotion regulation process, and the approaches we can use to tackle those challenges.

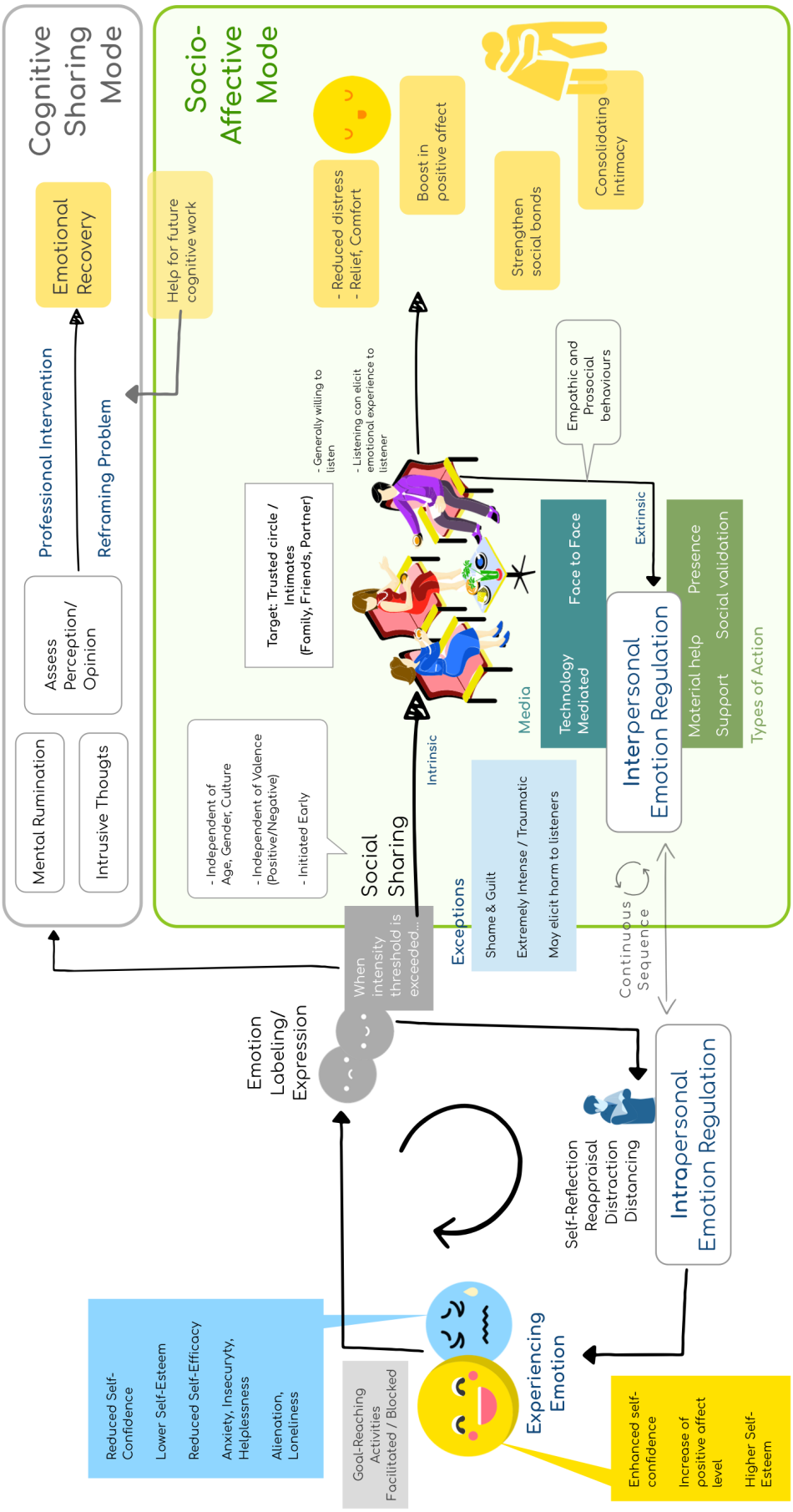


Figure 8 Overview of Emotion Regulation Process

2.3. Emotion Regulation in Technology Mediated Communication

The advancement of technology has brought us communication tools that enable us to interact with others over distance socially. Telephone, text messaging, video call, social media, and other communication technologies around us are invented with a promise to save our time and to keep us connected with others. However, as we use these technologies through time, we became more distracted and isolated than we were in the past. Research suggests that, rather than helping, technology is even increasing loneliness and undermining empathy (Turkle, 2011). A number of studies have also found that our unhealthy behaviour in consuming technology is harming our capability to interact with each other, where the feeling of isolation is growing as empathy is declining in communication (Gergen, 2003; Jordan et al., 2011; Konrath et al., 2014; Kross et al., 2013). Current technologies also provide poor support for our emotion regulation needs, which is caused by the lack of channels for transmitting emotion as an important cue in communication that helps us to strengthen social bonds and intimacy (Willis & Jones, 2012).

Sherry Turkle on her book, Alone Together: Why We Expect More from Technology and Less from Each Other, examines how recent cultural and technological shifts are actually harming our capability to interact with one another genuinely. She stated that feelings of isolation are growing at the same time as empathy is declining in communication. In this book, Turkle emphasised three areas. On the first area of sociable robotics, Turkle notices that, surprisingly, people are willing to accept simulated relationships when real people are not available. Second, on oversimplification of people and relationship, Turkle explained that we oversimplify the way we see how we connect with each other. Lastly, in the third area, Turkle states that we are in danger of these unhealthy addictions to technology, and we must design it differently. Our current technology is making it very easy for us to interact with each other in certain harmful ways, and we have to find a way to redesign and make it work to serve its original purpose (Turkle, 2011). In the same time, maintaining long-term relationships with friends, family, and our loved ones have become even more complex (Cacioppo & Patrick, 2008). In families, children lack a broader range of social support from their parents. Researchers at the University of Michigan found that, since

the year 2000, young people are dramatically less interested in other people. Nowadays, college students are much less likely to say that it is valuable to try to imagine oneself in someone else's place or attempt to understand their feelings (Konrath et al., 2014). In a family, we may find many examples where they are not psychologically connected, although they are living together in the same place (Gergen, 2003). Other people have also noticed the same problems. Ethan Kross with his team has found the relationship between isolation and the usage of Facebook, one of the most popular social networking service. They found that the lonelier a person felt, the more he used Facebook over time (Kross et al., 2013). In their research, they found for both male and female, Facebook usage predicts a decline in affective well-being whether people were lonely or not at the start of the study. They concluded that Facebook usage undermines our state of well-being, instead of enhancing it. "Image crafting", or the way people construct a positive image of themselves on social media, may be the cause of these negative effects (Jordan et al., 2011). As they use the service, they keep comparing their own lives with the crafted and idealised personas they see on the social network. Hence, this kind of social media service promotes comparison and competition, rather than empathy and meaningful connection. As a result, people feel lonelier and less happy with their lives, instead of feeling closer to others. This is alarming, but the solution is not to avoid technology. Giving more attention and awareness on emotion and empathy in the interaction design, grounded in solid research, could fix the current situation (Kanjo et al., 2015). This provides an opportunity for designers and researchers to develop technologies that aim to support social sharing of emotions.

The negative side effect of technology mentioned earlier may have caused by the lack of channel for transmitting emotion, an important cue in communication, in the existing technologies, which leads to poor support for emotion regulation (Willis & Jones, 2012). These technologies do not satisfy the need for us to connect and communicate with each other (Garde, 2013). Other researchers argue that the existing technologies are focused on communicating explicit content, without considering too much about implicit emotion cues to support the communication (Kuwabara, Watanabe, Ohguro, Itoh, & Maeda, 2002). We can see this non-verbal cue of emotion as body gestures in face-to-face communication, or voice intonation in a telephone call. If we want to support the need for emotion regulation with technology, it needs to provide more than just a

medium to send a mere explicit message content. The communication of emotional cues that helps to strengthen the social ties also need to be supported, or it will not satisfy the need for us to connect and communicate with each other (Garde, 2013).

What we can learn from this section is that many communication platforms, which were originally created to improve our relationship with others, are actually isolating because of our behaviour on consuming them. One approach that has been explored by many studies to tackle this challenge is to provide support for phatic interaction, which encompasses lightweight exchange that strengthens social ties and establishes the possibility for further conversation (Vetere et al., 2009). Providing support for phatic interaction in technology is seen as one suitable approach to help social sharing of emotions because of its ability to establish the communication channel and keeping it open for social exchange. I continue to describe about phatic communication approach in the next section.

2.4. Phatic Communication: Lightweight Exchange for Signalling Awareness and Readiness to Communicate

Malinowski introduced the phatic communication concept as a “type of speech in which the ties of union are created by a mere exchange of words” (Malinowski, 1946), and Jakobson adopted the concept into his model of communication (Jakobson, 1960). According to Jakobson’s model of communication, the phatic function of communication is related to the awareness of the possibility of communication. The purpose of phatic lies on the act of communication itself and not on the contents that are being exchanged, which includes: deciding to continue or stop communication, attracting attention, checking if a communication channel is operational, or confirming attention.

Phatic is the "primordial function of communication", which can be seen in our early stage of life. The first verbal function in an infant serve as phatic communication, as it is able to communicate signals to parents before the infant can learn verbal languages that are capable of sending informative message. Phatic mode of communication has the characteristics of not explicitly informing and expressing, but focuses in signalling awareness and readiness to

communicate, and has the benefit of establishing the possibility of communication and strengthen the social bonds. As an example in our daily life, this can be seen as "small-talk", which facilitate further communication and maintains both physical and psychological contact between the sender and the receiver (Vetere et al., 2009). According to these descriptions and examples, we understand that phatic is a type of interaction that is low in the amount of information, but has a high significance or meaning in the act of communicating itself.

Phatic technologies are technologies that have the phatic communicative function that does not necessarily require a large amount of data to convey significance and meaning (Gibbs et al., 2005). As mentioned earlier, in daily life Phatic interaction can be seen as "small-talk", which facilitate further communication and maintains both physical and psychological contact between the sender and the receiver. In technology, the frequent use of short text messages is one example of phatic exchanges between couples, friends, or family. These exchanges can be seen as tokens of affection that let each other know that they are thinking of each other (Licoppe & Smoreda, 2005; Thurlow, 2003). Even though the value of phatic interaction is not in the information that is being sent, the act is not a waste of effort. The act itself has a value to maintain the relationship make sure that the communication channels are open to support further communication. Another example is a study on an experimental interactive pillow that remotely exchanges haptic feedback, which was developed "for establishing communication rather than precise communication acts" (Schiphorst et al., 2007). In social media, this phenomenon happens in Facebook's poke button. Although it was made "without any specific purpose", it was found that these phatic messages can benefit in keeping people in touch and let others know that you were thinking of them. Other studies have also explored frequent lightweight communications in technology, including how it helps in maintaining connections between people (J. J. Kaye, 2006; Nardi et al., 2000), and how it's being used in communicating emotion (Gibbs et al., 2005; Willis & Jones, 2012).

Despite of its importance and significance, most of the time the phatic function of communication has not been the main focus in research, although it leaves many opportunities to discover (Vetere et al., 2009). In the next section, we will see some more examples of this type of technology. I introduce how emotions are being studied in Human-Computer Interaction field and

examples of interactive technologies that support communicating emotion by providing support for phatic interaction.

2.5. Studies of Affective Systems

In this section, I will introduce the examples of studies of affective systems that are related to my PhD research. There are several approaches on how interactive technology to help in emotional and empathic communication were designed.

In the recent years, users' emotions, affects, motivations, and values are given more attention in the field of Human-Computer Interaction. Law and Van Schaik, in their study, stated that user experience does include not only usability. Users' enjoyment, decision, and desire to use, are also need to be considered as the cognitive and affective aspects of users' experience during the interaction with the artefacts (Law & Van Schaik, 2010). Affect and emotion play a major role in our daily life and is generally reported in the literature as a spontaneous mental feeling or state. It can overwhelm the human body, which responds through various signals that are shown in physical and physiological forms. Research by Jannsen, Ijsselteijn, and Westernik (2014) explain how affective technologies can influence intimate interactions and improve social connectedness. Affective computing aims to improve our awareness, reducing loneliness and improving health and well-being, by developing smooth, simple, and integrated methods of communicating emotions within our close social network. In their study, they investigated the effects of quantity of emotion communication on perceived intimacy in mediated settings. One interesting finding that they discovered is that increases in intimacy are elicited by increases in self-disclosure. Their work also explains that CMC (Computer Mediated Communication) interactions tend to be more intimate than face-to-face interactions. First, people are more comfortable and less hesitant in sharing personal information in CMC, which is likely caused by anonymity and a lower number of nonverbal cues. Second, people have more control over their self-presentation in CMC than in face-to-face communication. Third, they tend to interpret the cues they do receive more strongly due to the limited number of cues available. Emotional self-disclosures have a stronger impact on perceived intimacy than factual self-disclosures. Affective technology would allow communication

devices to keep partners emotionally in touch by making it easier to communicate emotions in an effortless manner (Janssen, Ijsselsteijn, & Westerink, 2014).

Many new technologies within the field of human-computer interaction research are concerned with human connection and put focus on how to recreate the experience of real-time face-to-face communication. The goal is to make communication across distances as close to physical face-to-face communication as possible, to simulate the sense of being there physically. However, on the other hand, technologies can connect people using many other representations and abstractions that may or may not have any basis in the physical world. In their influential paper "Beyond Being There", Jim Hollan and Scott Stornetta conclude that actual face-to-face communication will always be better than a simulation of face-to-face communication no matter how realistic the simulation is (Hollan & Stornetta, 1992). They define "beyond being there" as they argued that a better way to solve the telecommunication is not to focus on the tele- part, but the communication part. We need to design the technology to satisfy the needs of communication so well that people prefer to use it, regardless if they are separated or sharing the same physical space. Instead of focusing on recreate an experience as real as face-to-face communication, we can focus on how to exchange non-verbal contents that can support the needs of communication. Although this was written over two decades ago, unfortunately, not much has changed.

In the next sub-subsection, I will divide the examples of affective systems into two big categories: (2.4.1) Affective off-the-shelf technology, and (2.4.2) Affective bespoke/experimental technology.

2.5.1. Affective Off-the-Shelf Technology

In this sub-section, I introduce several studies that propose affective off-the-shelf system: a system that are already available and being used by many in a regular basis.

A study on how technology can support interpersonal emotion regulation through social sharing shows that in Online Social Media, people often show their caring gestures as responses in many ways like liking status updates, sending comments in public channel, or private messages. (Bazarova & Choi, 2014; Hong, Chen, & Li, 2017). The person who shares emotional experience

can reach both broad and targeted audiences depending on his/her needs, where the viewers can show how much they care about him/her through the interactions mentioned above. Empirical studies of Facebook likes and comments show that the post topic influences how people respond to posts related to social sharing activities. Posts that explicitly ask for support (e.g., with terms like worry about, help me, pray for) receive far more comments and likes than posts. However, bad news receives fewer likes, since likes may be interpreted as endorsement or congratulations, rather than signs of support (Wang, Burke, & Kraut, 2013). From a psychological perspective, there are two arguments why "composed" communication such as comments and messages might be perceived as more appropriate responses than likes, especially to negative emotion. The number of likes received in a post can also be interpreted as how many people have acknowledged and validated the emotional experience that are being described inside that post. Another research on Facebook communication also argues that likes require less effort to produce and thus may signal that a relationship is less valuable (Ellison, Vitak, Gray, & Lampe, 2014). This signal may decrease the value of social support. Following this argument, Burke and Kraut demonstrate people feel greater interpersonal benefits after receiving Facebook comments rather than likes. Therefore, negative emotions should elicit more personalised communication—comments and private messages—in which friends attempt to send supportive gestures to cheer up the sharer (Burke & Kraut, 2014).

In another study, Kaye et al. (2005) introduced a concept of 'minimal intimate objects': low bandwidth devices for communicating intimacy for couples in long-distance relationships, called Virtual Intimate Objects (VIO), where people can click a button that lights up a partner's button to provide a feeling of connection. The system was implemented in an off-the-shelf desktop computer and installed as a software. They found the notion of 'gifts' useful in understanding the experience of the interface and suggested that each click of the system functioned as a gift. In their paper, they explained the gift-giving interaction as follow:

"The value of a gift is dependent on who sent it, and the symbolic message intended for the recipient. Couples decided for themselves the meaning of each individual click. We found these meanings changed depending on the current situation of each of the participants. A click first

thing in the morning could mean "Are you awake?", while a click half an hour after signing off an instant message session to do work could mean "I'm thinking of you". Reciprocating clicks could mean "Yes, call me!" or "I'm thinking of you too." They suggest the feeling of intimacy comes from participation in this cycle of giving and receiving gifts. The process of exchange itself becomes a token of commitment in the relationship. " - Kaye et al. (2005), Communicating Intimacy One Bit at a Time

This explanation has shown even in the minimum interaction people can still perceive meaningful conversation. It is the limitation of the signal that allows us to subjectively interpret the meaning behind it (J. Kaye, Levitt, Nevins, Golden, & Schmidt, 2005).

Several other studies has proposed affective system as a mobile app, such as Emotishare to track and respond to each others' emotional state (Willis & Jones, 2012), or CoupleVIBE which syncs location information with a romantic partner (Bales, Li, & Griwsold, 2011). Both apps were designed to explore how mobile technology can support emotional communication. However, these studies have not shown how can the emotional communication provided inside the apps facilitate the need to manage and regulate emotions and to move back into the emotional equilibrium.

2.5.2. Affective Bespoke/ Experimental Technology

In this sub-section, I introduce several studies that propose affective bespoke/ experimental technology prototypes to support communicating emotion.

In one study, Ron Baecker with his team focus on understanding the communication needs of people with social isolation and loneliness, and how technology can facilitate the social connection. In their design implication, they adopt form factors of natural objects that many people are already using in daily life in designing interactive technology for communication (Beacker, Sellen, Crosskey, Boscart, & Barbosa Neves, 2014). On their design ideas, they suggest avoiding traditional computing aesthetics like screens or keyboards, and to design appliances, rather than computer interfaces. Natural objects can be a good source of inspiration, and the use of tangible

objects like letters, pictures, cards, or small stuffed animals, can enhance emotional supports during the interaction. They also state that the new technology should respect existing uses of devices and patterns of family communication, and should not disrupt social ties with existing family or friends. They developed several prototypes to satisfy their design implication. One of the researcher on the team observed three seniors with different degrees of isolation and loneliness, and she noticed their tendency to touch pictures of their relatives. She believed that it was a way to reconnect with their family members and treasured memories. On a prototype called Family in Touch (FIT), a wooden picture frame incorporating a touch screen display surrounded by LEDs as new message indicators, and asynchronous messaging capability leveraging tactile interaction. When the senior touches the frame, a family member may receive an email to indicate that their relative was thinking of them, and access a web site to respond with a video message. The video was then transmitted to the frame, and the LEDs' glow invited the senior to touch the frame, their touch commencing the video playback. The design focused on creating an asynchronous, unobtrusive communication tool with a simple interface and tactile user experience.

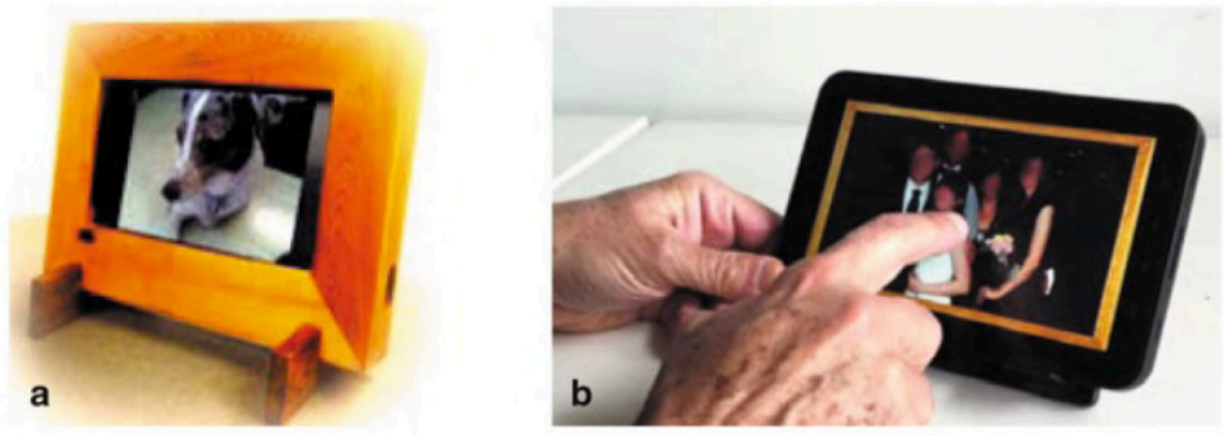


Figure 9 Family in Touch Prototypes

In another series of studies, David Kirk and his colleagues explored specifically on how to "provide connection at a distance" to maintain intimate relationships among family members through digital technology with their "Ritual Machines". In their studies, they explore the "the ritual activities" between each member of the family while living in different places and how technology can facilitate the connections between them. Through a series of ethnographic studies,

they found that each of the family members always thriving to find ways to overcome the physical absence of home or other family members. Responses from participants have also shown that it is the mundane things that they do while they are together that they miss the most while they are not sharing the same physical space. David Kirk and his team propose several approaches as possibilities of supporting this absence through interactive technology. There are 5 types of devices that they call "ritual machines" in this series of studies. The first "ritual machine" is an internet-connected beer bottle opener to facilitate drinking together while living apart. The device tries to recreate a simple shared experience of enjoying having a drink together after work at the end of the day. The study of this device explores the activities that family members enjoy together and whether they can still be maintained when not living together. The second "ritual machine" is a countdown device to a shared significant event. It syncs digital sand timer with a mobile app, giving hints to the users about the sense of anticipation of being together again (Kirk, Chatting, Yurman, & Bichard, 2016). In the third "ritual machine", they sync the movement of a robot vacuum cleaner with the movement of the absent family member. In this way, other family members at home can have a glimpse of the routines and patterns of the absent member's activities. In the fourth device, they modify a jam jar and allowing users to speak into it and replays messages to absent family member through a specially designed speaker that he/she has (Chatting, Kirk, Yurman, & Bichard, 2015). Finally, the last device is an electronic telescope specifically designed for the children that can be pointed in any direction to reveal an illustrated map (Chatting, Yurman, Green, Bichard, & Kirk, 2017). When one of the parents away, the device will leave a marker at a correct place of the location of the absent parent in the illustrated world, which will then lead to a conversation about the map between the children and the parents when they are away from each other. From this series of studies, they explored the role of ritual, a mundane everyday practice, which actually crucial and meaningful to bring all family members together and opened up possibilities for technology to support them. The signals exchanged between home and the absent family member are lightweight and phatic, but meaningful, as it brings them together even though they were not sharing the same physical space. These examples inspire us to explore more on how phatic interactions can support connectedness in an intimate circle.

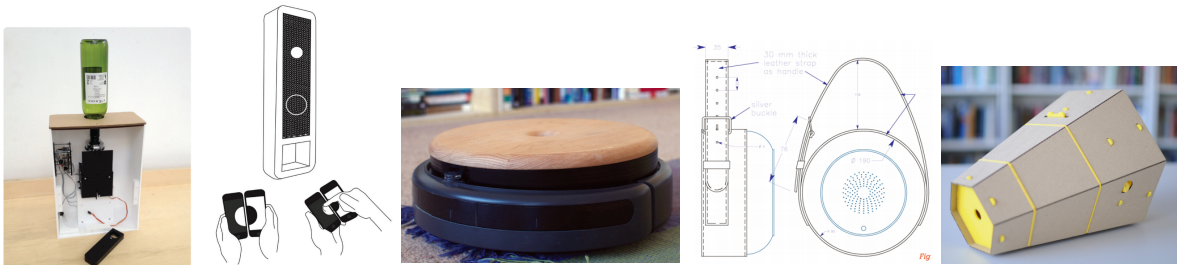


Figure 10 Ritual Machines (From Left to Right, 1 to 5)

Another researcher, Sophia Brueckner from MIT, developed Empathy Box and Empathy Amulet, wearable devices that encourage an unconscious sense of our connection to strangers (Brueckner, 2014). She investigated how wearable interfaces structure our thoughts and behaviour, and examined how this ability can be harnessed to improve both our mental and physical well-being. In her Empathy Box, if one or more people grasp the handles of their devices, everyone will feel pulsing warmth in their hands through the handles. In the experiment conducted, participants noticed how the reflective surface of the Empathy Box encouraged associations between themselves and the people they were connected to through the device. In response to the simple and abstract interface, the users of Empathy Box and Empathy Amulet constructed empathic narratives in their minds about what the other people might be thinking and feeling.

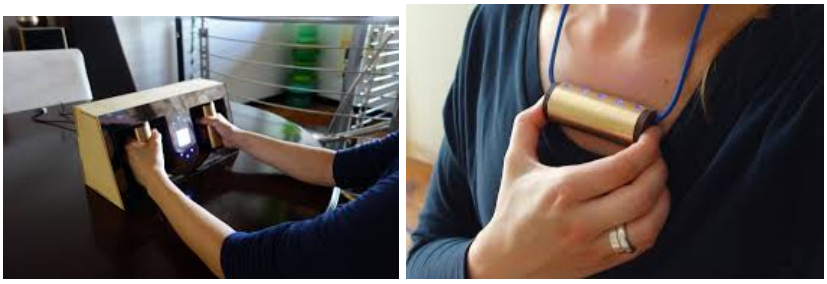


Figure 11 Sophia Brueckner's Empathy Box (left), and Empathy Amulet (right)

Jayne Wallace and Andrew Dearden explore different approaches on designing affective systems by focusing on a framework of collective understandings of experience in the area of wearable devices (Wallace & Dearden, 2005). They suggest possible ways forward in the design of wearable artefacts, which can truly be described as digital jewellery. They argue that jewellery is not simply an issue of accessory or aesthetics. Beyond that, contemporary jewellers try to communicate with their wearers and viewers. The concern of the jeweller becomes the potential

experience of the viewer or wearer in response to the piece and its setting. They argued that these aspects need to be addressed in the design implications of new wearable interactive devices.



Figure 12 Scarf form factor and modular soft circuits on Microsoft Research's SWARM Prototype

Another researchers focus on textile materials. Microsoft Research is currently developing SWARM (Sensing Whether Affect Requires Mediation), a wearable affective technology designed to help a user reflect on their own emotional state, modify their affect, and interpret the emotional states of others (Williams, Roseway, Chris, Czerwinski, & Morris, 2015). The device consists of modular soft circuits that combines conductive fabric with actuation components. It demonstrates physical sensing devices that can detect and project emotions wirelessly. In the first phase of the project, they identified which aspects of affective computing they wanted to address, designed a low-fidelity prototype, and presented the initial design to users for feedback. Scarf was selected as the form factor, as it could be wrapped around the wearer. Another reason is that scarf is fashionable and worn as an everyday garment, addressing the desire for a discreet design. SWARM explores the interaction beyond personal emotion detection to interpreting others' emotions, by trying to figure out how others are feeling by experiencing the warmth that the device receives from other devices. The final prototype was achieved by several iterations of physical prototyping and user studies.

Mentis et al. (2014) developed Lega, a natural soft interface to share expressions between users. The device consists of a hard-inner shell made from plastic, housing and protecting most of the electronics, including accelerometers, touch sensors, and radio communication/location hardware. The aim is to learn more about the possibilities and limitations of expressing emotion

with gestures, to create a system where body gestures are the main components of the social interactions, and to make design guidelines for future expressive systems using sensors and actuators. Users can move the Lega around, shake the Lega, squeeze the Lega, or lightly touch the belly of the Lega. It shines in the color of the originating device, and a vibration pattern is played on the belly of the device. When pressure is applied to the indentation, the servo kicks in and pulls the button down, making the indentation deeper, which indicates that an expression is being shared. While an expression is being shared, the LEDs on top shine in the identifying color of that device (Mentis, Laaksolahti, & Höök, 2014).



Figure 13 Lega assembled device (left), and its usage to share experience in exhibition space (right)

Several other studies has proposed affective system as a bespoke/ experimental prototype, which include RUFUS, a wearable prototype for runner support system, which allows signal exchange: support and feedback between supporters and the runner during a (Woźniak, Knaving, Björk, & Fjeld, 2015), Emotion-Bracelet, which expresses and shows emotions with a wearable bracelet prototype with LED matrix using five emoticons that represent positive, very positive, negative, very negative, and neutral states (Martinez, Estrada, Molina, Mejia, & Perez, 2016), and RingU, with a wearable ring form factor, that allows user to send haptic message to his/her loved one to prime emotion in a text message (Pradana, Cheok, Inami, Tewell, & Choi, 2014).

The previous studies mentioned here inspired us to develop a prototype with lightweight signals that can enhance the sense of being connected and incorporate meaningful interactions with our loved ones in specific situations, without being unnecessarily distracted with too much information. In these works, ambiguity is the main design principle. It provides an intimate and personal experience of using the system and it requires the users to make sense of the information

themselves (W. Gaver et al., 2004). By designing a system for appropriation, users can interpret the signal on their own and adapt the technology for their own personal purpose (Dix, 2007).

2.6. Research Gap and Conclusions

The review of related affective systems, including phatic technology, helped to position the research I develop, and can also explore possibilities and limitations in designing new interactive technology to support emotional communication through interactive technology. Most of these related systems provide lightweight exchange to promote a sense of connection and limit the interaction inside the technology to reduce the distraction it can cause. However, these studies have not shown how providing support for phatic interaction can benefit beyond connectedness: How can this facilitate the need of social sharing of emotion and help one's attempt to regulate emotions and to move back into the emotional equilibrium? This is the research gap that I am trying to answer by establishing, evaluating, and validating design implications that will be implemented as an interactive technology to support interpersonal emotion regulation. My research will contribute in demonstrating how lightweight interactions in technology can support emotion regulation, by bringing people to more meaningful conversations while overcoming the challenge of unhealthy consumption behaviour of technology by reducing the distraction it can cause.

In this chapter, I described previous research that has motivated my research. I explained about social sharing, and how important it is to share our feelings and emotions with others that help us to clarify and resolve the emotions we experienced. I also explained how our cultural behaviour in using technology is reducing our ability to communicate with one another in a meaningful way and making us more socially isolated. I gave specific examples of studies that aimed to solve problems related to this topic, and one of the approach is by using phatic mode of communication. I also introduced the examples of affective studies of systems that are related to this PhD research. Most of these related systems provide lightweight exchange to promote a sense of connection and limit the interaction inside the technology to reduce the distraction it can cause. However, these studies have not shown how providing support for phatic interaction can benefit beyond connectedness: How can this facilitate the need of social sharing of emotion and help one's

attempt to regulate emotions and to move back into the emotional equilibrium? This is the research gap that I am trying to answer.

In conclusion, after examining these examples, there is a strong need for researchers and designers to design new interactive technologies that can support meaningful emotional connection to each other and to facilitate the need of emotion regulation. These technologies need to help users not to get distracted overwhelmed by the technology itself, which can lead to social isolation, but rather to be more aware and focus on the meaningful connection with people around them, as a way to support the process of interpersonal emotion regulation. The review of related affective system can position the research I develop, and can also explore possibilities and limitations in designing new interactive technology to support emotion regulation through interactive technology.

3. Study 1: Investigation on Social Sharing of Emotion

A paper that details the study discussed in this chapter was presented at the 3rd International Human-Computer Interaction and User Experience Conference in Indonesia (CHIuXiD 2017), April 2017, Jakarta, Indonesia. This paper is included in Appendix 23.

3.1. Introduction

In this chapter, I explain about Study 1 that was conducted to answer RQ1 of this PhD research: How do people currently share emotions and exchange gestures of empathy to facilitate interpersonal emotion regulation through social sharing?. There are three aspects that we need to understand to answer this question. The first one is we need to understand how people experience emotion and what motivates them to engage in social contact for emotion regulation process (O1). The second one is we need to observe how people achieve their need to share emotion, and how other people respond back by exchanging gestures of empathy (O2). And the third one is we examine the effect of interpersonal emotion regulation through social sharing (O3).

Before describing Study 1, First, I review empirical research about cultural probes method that inspired me to decide data collection method for this study. Cultural probes are a novel collection of techniques gaining insights in interactive systems design that has been introduced and widely used especially in conditions that are difficult to approach with traditional observation methods. We are also going to learn how HCI researchers interpret this method, as well as some specific examples of how this method has been used for an observation to design technology to mediate intimacy. We can understand that this approach can provide opportunities to discover new ideas. Based on this review, I explain how this approach can be adopted as a study method in my research to observe people's behaviour of sending and receiving gestures of appreciation, support, and social acceptance during their daily activities. We are going to see how this method is useful to provoke inspirational responses that can be applied to our design. Next, I explain about a user observation study method that I have designed by implementing cultural probes approach in mobile technology, including its implementation, results, analysis. Finally, I discuss the analysis of the results, followed by design implications.

Study 1 provides an understanding of people's behaviour in sending and receiving support in interpersonal emotion regulation and demonstrates that there are important aspects of interpersonal emotion regulation that can be supported by technology. The contribution of this study is to collect and develop knowledge and understanding on interpersonal emotion regulation based on our observation of participants. This study has also established design implications that are useful for our system design. This is a good first step towards answering research question RQ1 and RQ2.

3.2. Methods

This study was inspired by cultural probe as a data collection method. Cultural probe was introduced by Bill Gaver. This method aims to solve common challenges in developing projects for unfamiliar groups (B. Gaver, Dunne, & Pacenti, 1999). The package that is utilised in this method includes maps, postcards, and other materials. Postcards are used to ask casual and informal questions that encourage open answer from participants that can be useful insights for design ideas. This method approaches research into new technologies from the traditions of artist-designers rather than the more typical science and engineering-based approaches. The method does not emphasise precise analysis or carefully controlled methodologies. Cultural probe approach explores uncertainty and subjective interpretation as ways of dealing with those limits. It concentrates on the cultural implications and ways to open new spaces for design. The results are "inspirational data" with the probes, to stimulate our imaginations rather than define a set of problems. Bill Gaver later improved the method to ask specific questions and produce comprehensible results. They summarise the results, analyse them, even use them to produce requirements analyses (W. Gaver et al., 2004).

In the HCI field, many researchers have adopted this method in their study. The open-ended nature of the cultural probe method gave different interpretations among different researchers, which many of them tend to readjust the probes for data collection approach. Many variations that were adopted in many studies may different from the original method introduced by Gaver et al., depending on their needs (Boehner, Vertesi, Sengers, & Dourish, 2007). For example, researchers from Delft, Netherlands adopt cultural probe combined with interviews to

study how people experience life and create atmospheres at home. The insights that they gathered from the study were used for their prototype ideas (Kuiper-Hoyng & Beusmans, 2004). Other study have adopted cultural probe as an approach to understanding users' needs in the use of technology to convey awareness of others who don't share the same physical space (Howard, Kjeldskov, Skov, Garnæs, & Grünberger, 2006). Fitton et al. adopted the method to explore the daily usage of their prototype of technology to share latest status update. In their study, they found that their prototype itself act as a probe to gather participants' data (Fitton, Cheverst, Rouncefield, Dix, & Crabtree, 2004). The approach of using technology as probes has also been introduced by Hutchison et al. with their messageProbe and videoProbe to understand the real-life use scenarios of their prototypes (Hutchinson et al., 2003). In a more specific context, Vetere et al. (2005) used cultural probes and contextual interviews to investigate how interactive technologies are used within intimate relationships. They seek to understand how intimate relationships between close family members and explore ways how it might be supported by interactive technologies (Graham, Rouncefield, Gibbs, Vetere, & Cheverst, 2007). Intimacy covers several factors like physical, non-verbal, self-disclosure, presence, cognitive, affective, commitment, and mutuality. They conducted a study by combining cultural probes and a series of contextual interviews, which gives participants to explain, clarify, and expand upon the materials they have collected. They analysed the result using thematic analysis and categorised the themes into three main categories. The first one is Antecedents, which are conditions that precede the experience. The second one is Constituents, which are conditions that characterise the act. The last one is Yield, which are the results that reflect the consequences of the act. The result revealed a strong need to support presence in absence. Most of the communications are emotional rather than factual, and often ambiguous and incomplete (Vetere et al., 2005).

The advances in mobile technology allow us to interact instantly and in real-time. I have designed a novel user observation study method inspired by cultural probes approach in mobile technology. With this method, participants can interact with artefacts that are being used in traditional cultural probes, such as postcards, maps, camera, and diary, through mobile technology. We are going to see how participants were encouraged to interact with these artefacts through the smartphone application and widget during their daily activities. We understand that the ease of

access to interact with a quick widget will increase participants' engagement with the system, which can lead to more extensive responses during their daily activities' observation. While a widget fits the need to record simple and quick responses, self-reflection responses still have to be typed and recorded from the smartphone application after they finished their daily activity and ready to spend more time to reflect their day. In traditional cultural probes study, artefacts that participants interact with are assembled into a probe pack. In my study design, these probes are represented as action buttons and virtual postcards inside a smartphone application for ease of access to the participants. Cultural probe was not used as the method of this study, but rather, as an inspiration to provide feedback mechanisms associated with cultural probes in digital format.

3.3. Study Setup

3.3.1. Participants

3.3.1.1. This study was conducted with 8 participants, male and female with the age range of 20 to 30 years old, with a regular routine of work or study across the week. The participants were recruited through posting several recruitment posters in the University. Potential participants that were interested contacted the researcher via e-mail for further discussions and arrangement, including meeting for initial briefing and setup. The participants consist of 4 males and 4 females with the following coding in the next sections:

- P1: 28 years old, Male, Working Professional
- P2: 22 years old, Male, Undergraduate Student
- P3: 23 years old, Female, Undergraduate Student
- P4: 22 years old, Female, Undergraduate Student
- P5: 26 years old, Female, Graduate Student
- P6: 27 years old, Male, Working Professional
- P7: 25 years old, Male, Graduate Student
- P8: 25 years old, Female, Graduate Student

3.3.2. Procedure

There are three types of observation method that was used during data gathering period in this study. The first one was a longitudinal study of light interactions with simple action buttons on a widget/app extension on a smartphone. The second one was a diary study inspired by traditional cultural probe method of providing postcards with provoking catchphrases and questions to provoke participants' responses. The third one was to indirectly observe how participants capture moments of their daily activity from the photos/pictures that were taken during the observation period. The data gathering period was followed by an interview, which will

give participants opportunity to explain, clarify, and expand upon the materials and responses they had collected.

To facilitate our first observation method, I developed a smartphone app to record participants' feeling during their daily activities. Next, to facilitate the diary study, I used an app called Grid Diary, which is publicly available for download on the Apple App Store. The app allowed me to modify the catch-phrases and questions that will be provided to the user to provoke reflection on their daily activities. Finally, the third observation method was facilitated by the built-in camera function on participants' smartphone. The photos that were taken were uploaded as their daily responses via the same app (Grid Diary).

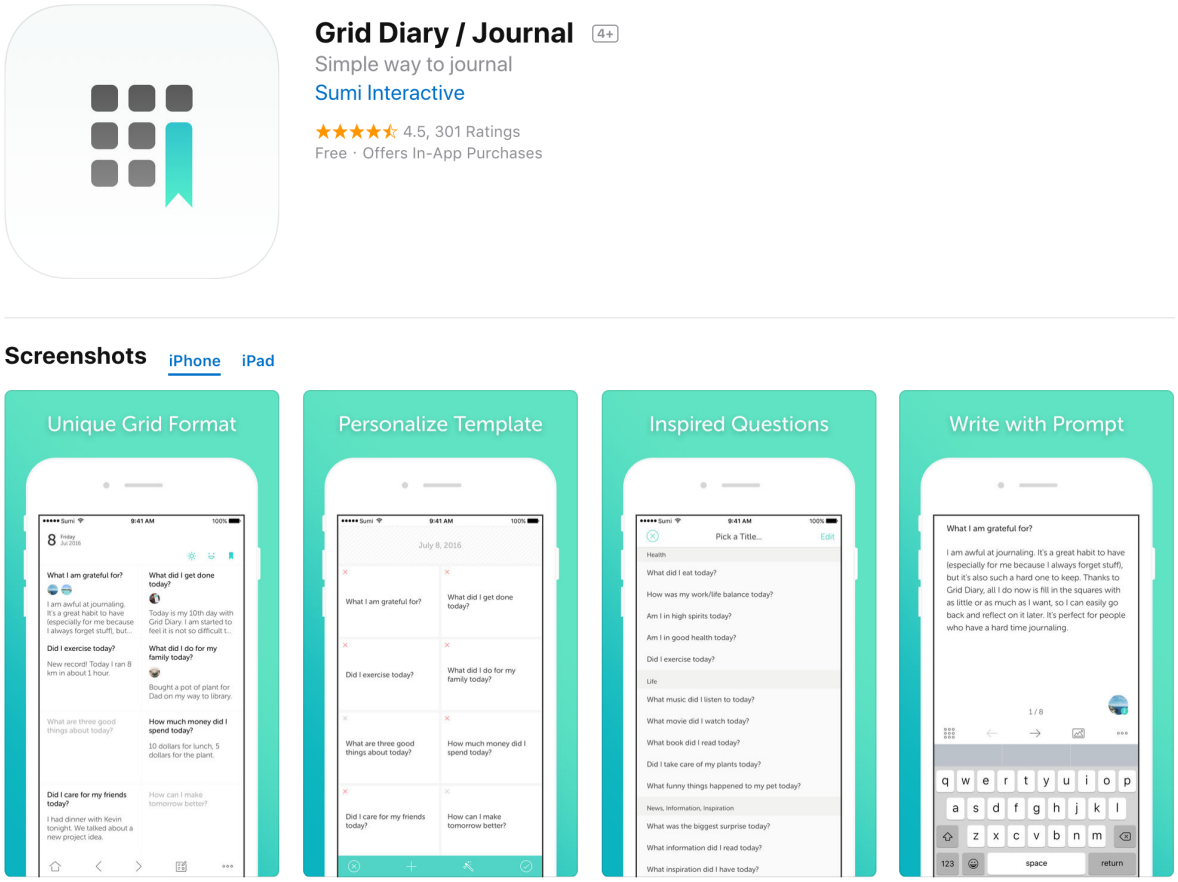


Figure 14 Grid Diary App for iOS that was utilised for diary study

Each of the participants was instructed to interact with the system for one week. The system that was installed on their smartphone was used to elicit when and how they feel that they need appreciation and support from other people. Participants were suggested log their emotion with the provided system, and take pictures during their daily activity in a way that it does not

distract. Activities that require more attention, such as reflecting on their responses and answering the questions and catchphrases, were suggested to be done in their spare time or when they finish their day.

3.3.3. Materials

3.3.3.1. Emotion Logging via a Widget/App Extension on Smartphone

The app that was built for the first observation method has a simple interface and divided into two parts: the main application and the extension widget. Although the extension widget is intended to be the main interaction, the main application is still needed for controlling and storing the recorded data, as the widget cannot be run stand-alone. Figure 15 shows the user interface for this smartphone app. The app interface on the left side is the only interface available on this app and is shown immediately after participant tap on the installed app icon on their home screen. The widget interface on the right side provides the same functionality and is accessible by performing swipe-down gestures from the top side of their smartphone screen. This interface is accessible anytime, even when running another smartphone app, or even from the lock screen. This interface provides a quick and easy access for participants to log their emotion.

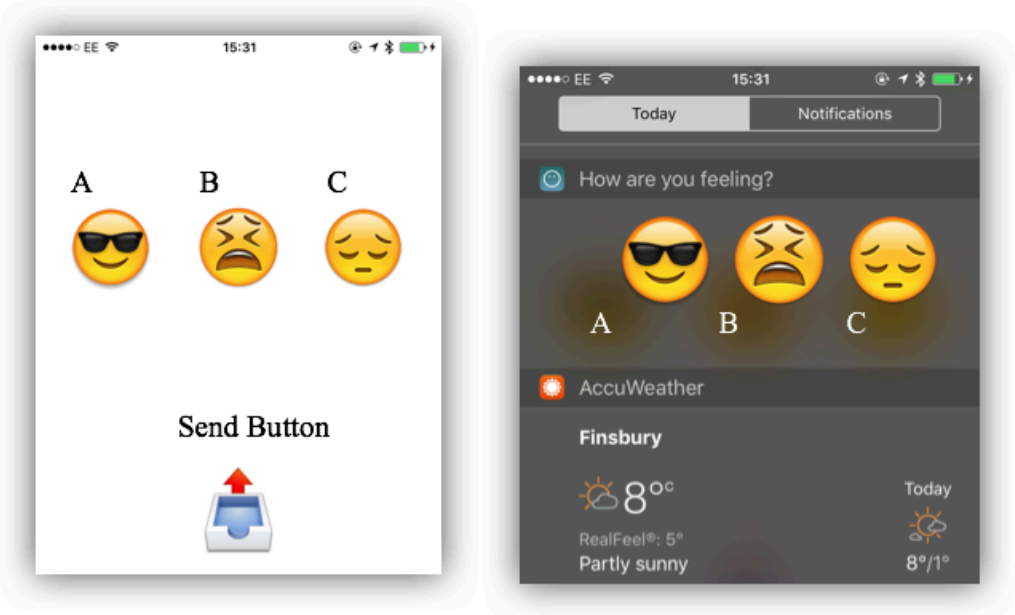


Figure 15 Light interactions with simple action buttons within an app (left), and widget/ app extension on a smartphone (right)

Both the app and the widget contains three main buttons, which correspond to different types of feeling. These buttons are provided for participants to press in the following situations:

- Button A was provided for participants to press when they are feeling accomplished and happy, and they want to share the feeling with their loved ones, family, or friends.
- Button B was provided for participants to press when they are feeling down or facing a hard time, and they need or expect supports from their loved ones, family, or friends.
- Button C was provided for participants to press when they are feeling down or facing a hard time, and they just need to be alone to sort out their feeling.

The decision is based on the study that stated that positive emotion is shared more quickly (Argyle & Henderson, 1984; Dibble & Levine, 2013), where most of us hesitate and need time to decide when it comes to sharing negative emotions (Bond & Anderson, 1987). The time when the buttons were pressed were recorded. When the participant pressed each button, both inside the app or via the widget, the phone gives haptic feedback to indicate that their response has been successfully recorded. At the end of each day, the participant was required to press the send button inside the app at the bottom part of the screen. When this button is pressed, a native iOS mail dialogue opens, and the participant was able to send email to the researcher containing their responses throughout the day. This app is a stand-alone app and does not have access to or interact with any other apps like participant's contacts. The app only records participant's time when they press the button. The data was kept locally on participant's phone in a local database and at the end of the day will be sent through email in CSV format to my City University Email address. This app was installed manually on participants' smartphones (iOS) from my Mac via XCode with official Apple Developer's account.

3.3.3.2. Diary Study via Grid Diary App

After participants had finished their daily activities, they were asked to interact with virtual postcards within a smartphone application. These postcards act as a self-reflection after the day is finished. These catchphrases and questions are provided to provoke reflection by the participants. For this purpose, I used one app called Grid Diary, which is publicly available for download on the Apple App Store. The app allowed me to modify the catchphrases and questions that will be

provided to the user to provoke reflection on their daily activities. These responses were collected and sent to the researcher as a diary compiled by the Grid Diary app in PDF format. This diary was used to study if there is a common form of how participants are currently perceiving, sending, and receiving empathic gestures of support, appreciation, and social acceptance, including what kind of things do they find comforting during their day. This study adopts the Experience Sampling Method (ESM) as a longitudinal approach to gather participants' behaviour, thoughts, and feeling on a certain occasion over a period of time. ESM is an established method in research used to study what people do, how do they feel and think by asking questions at a certain occasion when they are conducting daily activities (Larson & Csikszentmihalyi, 2014). In this study, the responses to each question were used and analysed as follows:

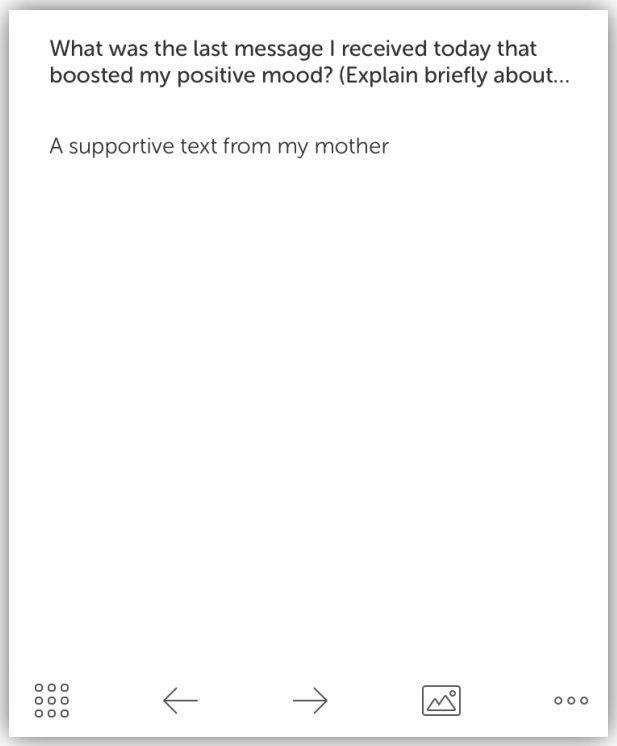


Figure 16 Virtual postcards containing catchphrases and questions provided by the Grid Diary App

1. Who is the first person I should thank today? : To identify the person who positively influenced participant's day the most. This is related to the actors of

sending support activities, who tend to be the trusted circle of the emotion regulation target (Pennebaker et al., 1996; Rimé, 2009; Rime et al., 1991).

2. What do I wish I could have done better today? : To understand about positive and negative emotional experience and their correlation with participants' goal-reaching activities (Carver & Scheier, 1990).
3. How did I care for my close ones today? : To identify how does the participant act as a supporter. This is related to the sending support activity with participants' trusted circle (Pennebaker & Chung, 2007; Rimé, 2009; Rime et al., 1991)
4. What was the last message I received today that boosted my positive mood? (Explain briefly about the sender and the relationship) : To understand what kind of message do participants find comforting or supporting. This is related to types of social sharing and support in interpersonal emotion regulation (Beckes & Coan, 2011; Bowlby, 1990; Epstein, 1973; Rimé, 2009; Stroebe et al., 1996; Wortman & Lehman, 1985)
5. When and what was I doing when I read the message? : To understand the time and situation of when the social sharing initiated (Rimé et al., 1992).
6. What am I grateful for? : To identify things that participant feels comforting/ leading to a positive mood. This is related to types of social sharing and support in interpersonal emotion regulation (Beckes & Coan, 2011; Bowlby, 1990; Epstein, 1973; Rimé, 2009; Stroebe et al., 1996; Wortman & Lehman, 1985).

Participants were encouraged to answer all of the reflecting questions. However, they can skip some questions if they do not feel comfortable to answer.

3.3.3.3. Capturing Moments with Smartphone Camera

Within the smartphone application, participants were asked to take at least two pictures of anything (object, scenery, event, or person) that have significant emotional values to them during the day. Participants were also asked about the reason for taking those pictures during the self-reflection session within the smartphone application. For example:

- Starting the day: A beautiful scenery from the apartment. (Reason: This scenery makes me really happy. Today is going to be a productive day.)
- During work: A box of chocolate (Reason: A colleague gave me this during lunch. I feel good, and I feel like I can make through the day.)

The pictures taken by the participants were attached and included together with the virtual postcards and was sent to the researcher as a diary via the Grid Diary app.

3.3.3.4. Follow-Up Interview

The data gathering period was followed by an interview, which will give participants opportunity to explain, clarify, and expand upon the materials and responses they had collected. This session was audiotaped and lasted about 45 minutes. The interview was a reflective discussion based on the responses collected from the participant. Their responses during the observation period were the starting point for the conversation between the researcher and participants, that revolved around the times when participants needed appreciation and supported the most during their daily activity. Participants were also asked if they have an image or wish of a technology that can mediate or support them in such situation. The examples of questions asked based on participant's responses were as follows:

- Could you tell me more about the situation when you pressed button B, for instance, do you expect to receive immediate support from your loved ones?
- How did a text from your mother comfort you when you were feeling down? Did you tell her that you are currently facing a problem on your job?
- Did you tell about your current problem during your conversation on your phone call with your family?
- How did you find your connection with your mother (or your family), who are far away from you, after you got the text message and had a conversation on the phone after work?
- In what way do you find current technologies that you are using help you to feel the support from your family the most? Do you find any difficulties when sending/expressing or receiving/feeling support from them?

- (About photograph that was taken): Why did you decide to take this photo? How did the object affect you emotionally during the day?

Any identifying data collected was anonymised. Participant names were not be associated with the recordings or any other data, and will not appear on any reports or presentations. All data was password protected, stored securely, and backed up. Only myself and my supervisors have access to the data. Participants had the right to withdraw from the study at any time, and all of their collected data will be destroyed when they decide to do so.

3.3.4. Analysis Method

Implementing cultural probe as an observation method helped us to understand participants' need of being appreciated, supported, and socially accepted during their daily activities when they experienced positive or negative emotion, and how interactive technologies are used as the media to send and receive those gestures. Their responses and self-reflection on the diary can also help to explore design possibilities that can be implemented in our design. Gathered data (timestamp log, and diaries) supported by the follow-up interview contents, were thematically analysed by coding the responses to major themes, ideas and concepts. I performed a deductive coding method and analysis based on previous studies in emotion (For example, correlation with goal-reaching activities, the actor of social sharing, and types of social sharing and support messages). The coding method was decided after several discussions with my supervisors, and we continued discussing about the coding during the analysis process. The coding was conducted based on the following themes, definitions and rules.

1. Experiencing positive emotion (Applicable on Q3 and Q4, photos, and interview responses)
    a. Achievement: Participant mentioned about their achievement (Carver & Scheier, 1990).
    b. Good news: Participant mentioned about hearing good news from other people or their environment (Gross et al., 2011; Rimé, 2007).
2. Experiencing negative emotion (Applicable on Q2, Q3, and Q4, photos, and interview responses)

a. Failure/ Not as expected: Participant mentioned about an experience that was not as expected (Carver & Scheier, 1990).

b. Human relationship problem: Participant mentioned about a problem on a relationship with someone else (Lazarus et al., 1965).

3. Actor: Indicates the people involved in a specific event or interaction (Pennebaker & Chung, 2007; Rimé, 2009; Rime et al., 1991).

4. Types of interaction (Applicable on Q3,4,6, photos, and interview responses): Indicates types of social sharing interaction (Beckes & Coan, 2011; Bowlby, 1990; Epstein, 1973; Rimé, 2009; Stroebe et al., 1996; Wortman & Lehman, 1985).

    a. Conversation: Real conversation happened in a shared physical space

    b. Phone call: Interaction mediated by a phone call

    c. Voice note: Interaction involving leaving voice note on recipient's phone

    d. Text-based messages, like SMS, chat, or e-mail

    e. Video call, like Skype or Facetime

    f. Object: Interaction involving physical object, like exchanging physical gift

    g. Photo: Interaction involving exchange of photos/ pictures

5. Immediacy (Applicable on Q3,4,6, photos, and interview responses): Indicates the immediacy of a support given/ will be given. Immediate means participant demanding or receiving support right after an emotional experience, while Later/ Involve Anticipation means the support will be received later, or participant is anticipating that he/she will get support (will meet, or will talk) with someone later (Rimé et al., 1992; Zaki & Williams, 2013).

6. Shared experience (Applicable on Q3,4,6, photos, and interview responses): Indicates shared experience with other people (Beckes & Coan, 2011; Bowlby, 1990; Coan et al., 2006; Eisenberger, 2013; Harlow, 1959).

7. Cheering and Caring Gestures (Applicable on Q3,4,6, photos, and interview responses): Indicates cheering and caring gestures sent or received to or from someone (Epstein, 1973; Lehman, Ellard, & Wortman, 1986; Wortman & Lehman, 1985).
8. Notion of Gift (Applicable on Q3,4,6, photos, and interview responses): Interactions involving notion of gift, whether it is an actual physical gift or notion of gift in digital interaction (Stroebe et al., 1996; Thoits, 1984).
9. Picture sharing (Applicable on Q3,4,6, photos, and interview responses): Interactions involving exchange of pictures (Beacker et al., 2014; Park, Cho, Kim, Seo, & Kim, 2013).
10. Yields (Applicable on Q3,4,6, photos, and interview responses) (Mina Choi & Toma, 2014; Rimé, 2009; Schachter & Stanley, 1959)
    a. Feeling grateful (Applicable on Q3,4,6)
    b. Positive mood boost: Participant experienced an emotional event that has positively boosted his/her mood
    c. Relief: Participant experienced an emotional event that has made him/her relieved

3.3.5. Ethical Considerations

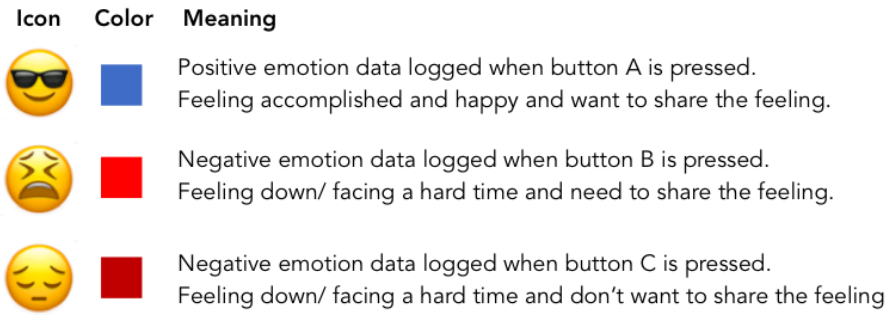
This study has been approved by City, University of London Computer Science Research Ethics Committee. During the ethics application process, there are several ethical issues that need to be considered for this study. The first one is how to deal with the sensitive data of people's emotion that were logged within the system. I overcame this issue by ensuring that the system is a stand-alone application and does not have access to or interact with any other apps like participant's contacts. No one will be notified when participant presses any of the buttons. I also ensure that the data are kept locally on participant's phone in a local database and at the end of the day will be sent through email in CSV format to researcher's City University Email address and will only be used for the research purpose. All data gathered were password protected and stored securely, where only the researchers have access to the data. I also make sure that participants have right to withdraw from the study at any time, and I will destroy all of their collected data when they decide to do so. In the future studies, which will involve sending these data to a server and

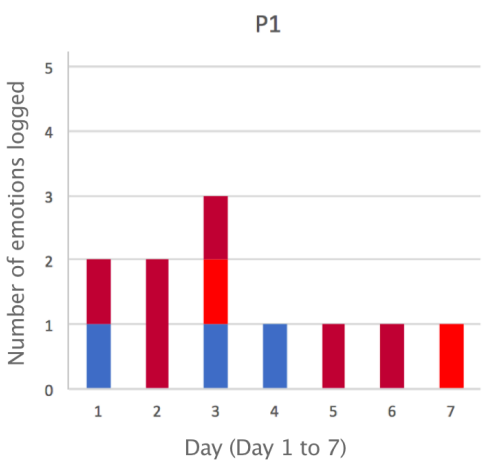
share it with other people, this issue will need to be reconsidered. Another issue is to ensure that the system will not make people feel worse by using it. However, unlike another system where people explicitly write on negative emotional experience which can affect other people's emotion, this system does not share and does not focus the content of the reason be-hind that experience. I also ensure that my study focuses on a daily situation, where people experience daily ups and downs and will exclude the extreme case of stress, depression, or any other mental health problems. The ethics approval form is provided in the appendix.

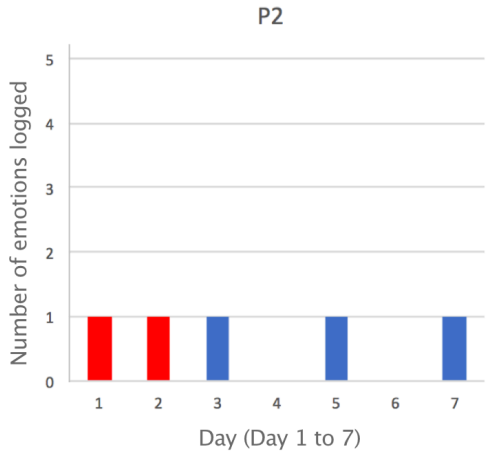
3.4. Study Results

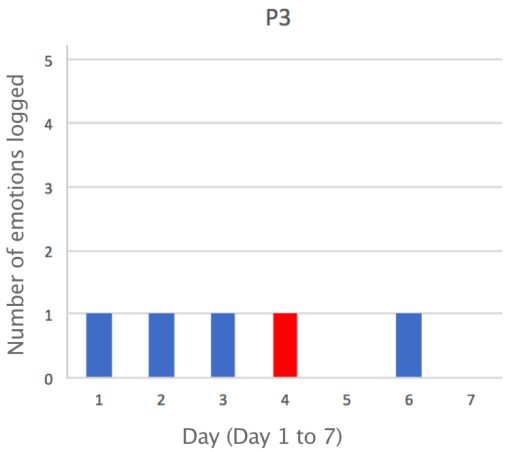
3.4.1. Sharing Emotions

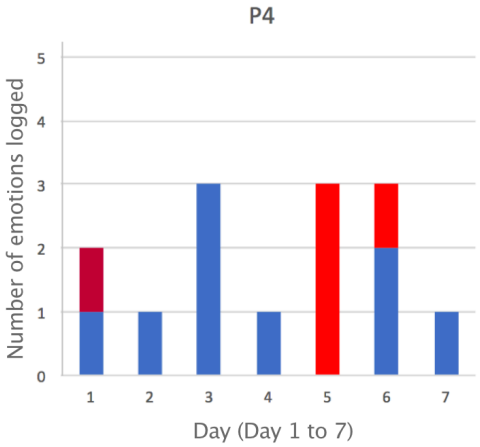
The emotion log and timestamp data that were recorded during our data gathering period clarify whether participants are experiencing both positive and negative emotion during the day, and their need of regulating the emotion by sharing it with their close ones. Bar charts with different bar colours are used in visualising the result of this study because we want to look and try to understand the frequency/ the amount of emotion shared for each level of valence and and each level of arousal. The x axis of the bar chart shows the different day of week. The results are shown on the tables and graphs in Figure 17. The tables and graphs are presented separately for each participant (shown in Figure 17 as P1 to P8).

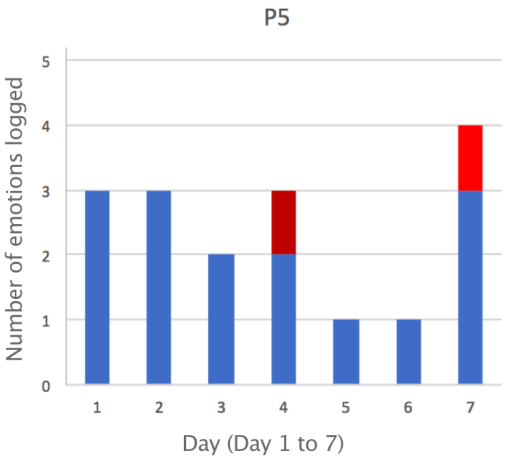


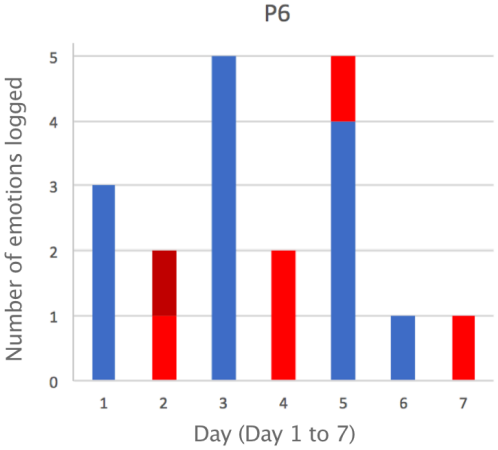

P1
Number of emotions logged
0
1
2
3
4
5
1
2
3
4
5
6
7
Day (Day 1 to 7)


P2
Number of emotions logged
0
1
2
3
4
5
1
2
3
4
5
6
7
Day (Day 1 to 7)


P3
Number of emotions logged
0
1
2
3
4
5
1
2
3
4
5
6
7
Day (Day 1 to 7)


P4
Number of emotions logged
0
1
2
3
4
5
1
2
3
4
5
6
7
Day (Day 1 to 7)


P5
Number of emotions logged
0
1
2
3
4
5
1
2
3
4
5
6
7
Day (Day 1 to 7)


P6
Number of emotions logged
0
1
2
3
4
5
1
2
3
4
5
6
7
Day (Day 1 to 7)

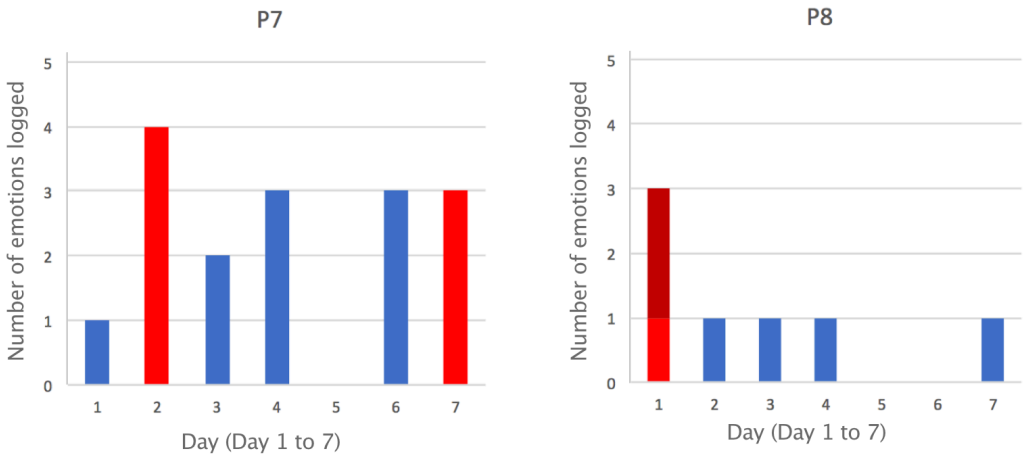


Figure 17 Emotion Log Data Recorded from Participants

The graphs shown in Figure 17 showing the day (day 1 to 7) in the x-axis and the number of emotions logged in the y-axis. The different colour indicates the different type of emotions logged into the system. These colours are represented in icons on the tables shown in Figure 17. These colours and icons explanation was provided on the legend at the beginning of Figure 17. These graphs show the types of emotion that were logged by each participant during the observation period. For example, for P1, on the first day of observation, he pressed A button once and pressed C button once. The logs that were recorded have shown that participants were logging their emotion regularly, with the minimum of 0 emotion logged and the maximum of 5 emotions logged daily into the system. The graphs also show that participants can experience both positive and negative emotions in one day period. We can also understand from the graphs that positive emotions were recorded more frequent than the negative emotion. This aligns with the study that stated that positive emotion is shared more quickly (Argyle and Henderson 1984; Dibble and Levine 2013), where most of us hesitate when it comes to sharing negative emotions (Bond and Anderson 1987). This data, combined with virtual postcards responses, taken photographs, and interview, helped us to confirm and support the collected data of their daily ups and downs and their need for interpersonal emotion regulation.

3.4.2. Emotion Regulation and Social Sharing

Cultural Probes are designed to elicit inspirational responses and clues from people about their thoughts and behaviour. By visualising the collected probe data as a schematic view of themes

induced from qualitative data, and by identifying affinities and patterns between those data, my results can be analysed and presented less fragmentary, which help to communicate all the information of our study result. Figure 18 shows a schematic view of the primary themes distilled from the qualitative data, which are arranged according to the affinity with their neighbours.

As inspired by a study by Vetere et al. (2005), in this figure, I categorise the themes into three main categories. These categories are structured according to the themes that precede its experience (Antecedents), characterise the act itself (Constituents), and reflect the consequences of the act (Yields) (Vetere et al., 2005). For example, 'Experiencing Negative Emotion' is an antecedent or a pre-condition of the need of interpersonal emotion regulation gestures. Sending 'cheers' is recognised as one characteristic of the act of interpersonal emotion regulation, especially in showing support. 'Positive mood boost' is a condition that results from an empathic gesture exchange, which can lead to, for example, increased motivation. These results will be explained with schematic view which helps to achieve our three research objectives that was described in the beginning of this chapter. The first one is we need to understand how people experience emotion and what motivates them to engage in social contact for emotion regulation process (O1). The second one is we need to observe how people achieve their need to share emotion, and how other people respond back by exchanging gestures of empathy (O2). And the third one is we examine the effect of interpersonal emotion regulation through social sharing (O3). In the following sub-subsections, I will show the responses for each theme, which will be explained thoroughly in the following discussions.

3.4.2.1. Antecedents: Experiencing Positive and Negative Emotion

In study 1, All participants reported emotions in their daily experience. 7 out of 8 participants talked about their positive emotional experience as an antecedent to emotion regulation. Achievement, especially in a work context, was stated as an antecedent 14 times across all the data. For example:

“One time I won a competition, and I immediately call my sister, I wanted her to know, and it feels just nice when she appreciated what I had just achieved. I sometimes think when people brag about their achievement in social media, they just basically need appreciation from their friends or family.” (P1)

another participant also addressed:

" When I successfully made something, I will share it with my close friends. I will send pictures to them like, "Look at this cake I just made!", and they would respond "Wow, it's so pretty!" " (P5)

On another response, we can also see that people experience positive emotion after hearing good news from others, as we can see on P7's diary response that the message from his old friend, telling him that he's doing okay in a new country, boosted his positive mood.

On the other hand, all participants talked about their negative emotional experiences as an antecedent to emotion regulation. The negative experiences that were occurred when the goal-reaching activities are slowed down or even blocked were mentioned 36 times across all the data, while negative experiences related to human relationship problems were mentioned 6 times. We can see these examples in participants' responses. One of the participants said:

“I don’t want to tell, or show, that I am feeling down. I am afraid that they will get the negative energy from my story, and it makes them feel sad.” (P6).

Another participant also stated,

“I rarely tell anyone about the problem that I’m currently facing. I tend to find distraction from the problem while I’m figuring out the solution (to the problem).” (P1)

We also learned from Schachter, where he showed that individuals facing stress would attempt to reduce anxiety by verbally interacting with others sharing the same fate, and using others as a gauge for evaluating their own emotional state (Schachter & Stanley, 1959). On this phenomenon, one of our participants recalled her experience,

“Knowing that my friend is also going through the same pain keeps me pushing myself to not giving up on my tasks.” (P3)

By looking at these examples, we understand that people experience different psychological needs for expression and feedback. We can also conclude that people are more hesitant in sharing negative emotion, as some participants stated:

"On bad news, it takes more time for me to decide whether to share it or not. I need to digest, and I need to think. When it's a good news, it's more spontaneous." (P2)

"When I feel down, I don't really feel the immediate urge to share it with my friend. I need time to think, ... should I tell it to someone? But when I feel great about something, I feel like I have to tell someone right away." (P8)

We can also learn that some people anticipate for a later conversation that is not immediate, and the anticipation itself has the immediate effect to regulate the emotion. As one of the participants stated:

"Sometimes, by just knowing that I can meet and hang out with my close friends after school, I feel like I can go through all those hard essay assignments." (P3)

Study 1 result on experiencing emotion is shown in Appendix 1 and 2. More about the immediacy of the response will be discussed later in the sub-subsection of "Discussions: Immediacy of Feedback".

3.4.2.2. Constituents: Shared Experience

7 out of 8 participants talked about sharing experience with their close ones as a constituent of interpersonal emotion regulation. Experiences on sharing meal was mentioned 13 times, Going on a vacation together was mentioned 2 times, and hanging out with friends was mentioned 15 times. These results are shown in Appendix 3. Sharing the same physical space and experiencing the same thing together with close ones is crucial in human relationship. Hanging out with friends, having dinner together with parents, or dating with your partner over coffees, are the important

moments that can strengthen relationship. The anticipation to have face-to-face communication with friends or family, where someone can share both verbal and non-verbal language in a real-life conversation, was seen as one important factor to help participants to cope up with their daily emotional experiences. One participant said,

"Sometimes, by just knowing that I can meet and hang out with my close friends after school, I feel like I can go through all those hard essay assignments." (P3)

Another participant also said,

"I don't immediately tell my friends about what I have been to at school today. I know that I'm going to meet them, and I prefer to talk with them while having dinner together." (P4)

We can also see similar experience on another participant,

"My friend would ask me out to have a meal together, or just hanging out, when they know I feel down, or I have a problem." (P7)

Even before the actual experience sharing take place, the act of anticipating a moment, or recalling past shared experience, can help someone to regulate their emotion that they have experienced. When the actual conversation happens, stress and anxiety associated with negative emotions can be decreased, while reliving positive emotional experiences in conversation can enhance positive affect. One of the participants recalled her experience,

"Nothing can beat sharing good food with good friends after school. I could even forget about my failed exams" (P2)

These responses have shown us that a shared experience with others has a significant effect as an attempt for interpersonal emotion regulation.

3.4.2.3. Constituents: Caring/Cheering Gestures

All participants talked about exchanging caring/cheering gestures with their close ones as a constituent of interpersonal emotion regulation. Experiences on being reached out by a friend or

a family member were mentioned 12 times, while experiences on reaching out to others were mentioned 14 times. These results are shown in Appendix 4. As also mentioned in Chapter 2, research on social sharing in offline communication by Christophe and Rime has shown that social sharing induced strong feeling not only to the person who shares but also to the listeners or recipients. One of our participants mentioned,

"Called my best friend just to ask about her day. I find it calming when I just listen to what my friends are up to right now." (P8)

In their study, it is also shown that in social sharing, listeners or recipients often respond with empathy and hugs (Christophe and Rime 1997). There are many different ways of how people are showing caring and cheering gestures to each other. One of the participants recalled his experience of how much his grandfather cares about him, where he felt that the more intimate a relationship is, the more this gesture can only be meaningfully understood.

"A lot of times I call my grandfather when I'm feeling down, and only by hearing his voice I feel comforted. He will then cheer me to keep doing my best in my work and give me life advice in general, without me having to tell what exactly my problem is. (P1)"

Another participant also found that in exchanging this gesture, the sender does not necessarily need to understand the full contextual story of the current state of the receiver, as he stated

"A simple and short text, saying that everything will be fine, is enough to make my day. (P2)"

In Online Social Media, people often show their caring gestures as responses in many ways like liking status updates, sending comments in public channel, or private messages. These are good media for interpersonal emotion regulation. The person who shares emotional experience can reach both broad and targeted audiences depending on his/her needs, where the viewers can show how much they care about him/her through the interactions mentioned above. One of the participants addressed one example of this,

"When my close friend posts something unusual on Facebook, I will know that she's not alright, but I don't think anybody else does. It's like an implicit sign that only her close people know. I will then text or call her, asking if everything is OK." (P5)

These responses are perceived as a form of caring gestures. We respond when any of our family, friend, or partner, experienced either positive or negative emotion, to show how much we care about that person. Cheering gestures are sent specifically when we want to comfort others, to increase their positive affect or to reduce their negative affect.

3.4.2.4. Constituents: Notion of Gift

5 out of 8 participants talked about gift giving experience with their close ones as a constituent of interpersonal emotion regulation. Exchanging physical gift were mentioned 5 times, while exchanging digital gifts were mentioned 11 times. These results are shown in Appendix 5. We learned in Chapter 2 that researchers had been attracted to implement aspects of gift giving into communication technology because of its pervasiveness and the pleasure it causes. In a study of minimal intimate objects where people can click a button that lights up a partner's button to provide a feeling of connection, Kaye and his team found that the notion of 'gifts' is useful in understanding the experience of the interface and suggested that each click of the system functioned as a gift (Kaye et al. 2005). They suggested that the cycle of giving and receiving gifts has the effect on the feeling of intimacy and can act as a token of commitment in the relationship. In a more traditional manner, giving support has been cultivated and encouraged through the means of feasts, gifts, and the enhanced connection that gift-giving gestures induced (Ben-Amos 2008). Gift giving is one expression to show appreciation or support from the sender to the receiver. According to literature by Otnes and Beltramini, Gift giving refers to the voluntary transfer of a good without expecting compensation (Otnes and Beltramini 1996). Belk and Coon define gift-giving as an "agapic love model", and emphasise the spontaneous and expressive nature of gifts. A gift can refer to a product or a service, and can also include the idea, the activity, and the time spent on choosing the gift itself, which voluntarily given to another person (Belk and Coon 1993). In gift-giving, the giver has to think mindfully about what the receiver desire, which requires intimate

knowledge of the receiver. A thoughtfully selected gift is a sign of the importance of the relationship, and it involves the effort to find or even making one.

One participant explained about how a ring from her grandmother plays an important role when she feels down.

"Sometimes I found myself staring at this ring from my grandma. Somehow I feel as if she's here with me, calming me with her words, just like when I was a kid." (P5)

The exchange of gifts conveys a variety of messages from the giver to the receiver. Several studies revealed that the most basic psychological function of gift-giving is a symbolic communication with explicit and implicit meanings of love, and it is crucial in creating, maintaining, and enhancing relationships (Cheal 1987, Mick and Demoss 1990). In the appropriate frequency, gifts can also reduce the risk of relationship termination. On the other hand, if it is used too often, it can increase the risk (Huang and Yu 2000). On traditional gift giving, a participant said

"I still feel that a traditional greeting card has that warm and comforting feeling that any digital media still could not recreate. It is the tangibility, the handwriting; it is a gift, it shows how they really care about you. It's these little things that matter." (P8)

Back to the notion of gift in the digital context, in a study, Skågeby has shown another type of 'gift-giving' interaction. He stated that giving and receiving "likes" resembles gift exchange as "liking" can also be perceived as a type of online gifting behaviour. He concluded that there are three concepts of digital gifting behaviour: (1) Realizing social bond value, (2) Acting out other-orientation by the end-user, and (3) Manifesting reciprocal rules and patterns. Specifically, social metadata, which refers to data information that exists in every intersection between people and media objects online, is similar to an actual gift in the aspect of helping strengthen social bonds (Skågeby, 2010). Another study of teenagers' use of mobile phones also revealed some gift-giving-related practices, where messages act as gifts rather than explicit communication (A. S. Taylor & Harper, 2002). The real challenge lies in the creation of a mediated gift-giving experience without losing its significance and value.

On associating digital object with the notion of gift, one participant said:

"My boyfriend sent me his e-ticket of him visiting me next weekend. Suddenly all the assignments I was working on that week feels easier to manage." (P3)

On this response, we can see that it also relates to the anticipation of sharing moments together that we discussed earlier in the previous theme. Gift giving often features a moment of surprise, both to the giver and the receiver, when the actual gift is unveiled.

There are many other forms of digital gift giving, including the exchange of gift, in its traditional context, but in digital form. One of the participant said,

"My friend sometimes would just randomly bought me digital stickers as a present. You know, those cute little character animations that you can exchange via messaging app. I know it is virtual but it still makes me happy and it shows how he cares about me" (P7)

These responses have shown us that perceiving the feedback and support as a gift has a significant effect and can help in the process of interpersonal emotion regulation.

3.4.2.5. Constituents: Picture Sharing

3 out of 8 participants talked about picture sharing as a constituent to interpersonal emotion regulation. P These results are shown in Appendix 6. hotographs often capture a user's special memories and moments. Photographs are also a great medium for sharing emotion with others. When a family sees a photo of a child riding a bike in a garden, it may trigger a memory for their private thoughts or emotional feeling at the time, even though the details may not be shown in the picture (Park et al., 2013). Looking at a photograph is also an indirect way of saying, "I'm thinking of you". As also mentioned in Chapter 2, people tend to touch pictures of their relatives when they are lonely, and it is one way to reconnect with their family members and treasured memories (Beacker et al., 2014). This gesture has a strong connection with the act of interpersonal emotion regulation and can also be seen in our cultural probe study. One of the participants said,

"The other day I found myself staring at the photo of my dad playing tennis. I miss him so much and I wish both of my parents to be happy and healthy. It gave me the motivation to do my study well." (P2)

Another participant, P3, also stated a selfie from her mom has boosted her positive mood.

One interesting finding here is that the content of the photograph that has affected participants' emotion was not necessarily connected in context with the current life events of the participants. The photographs that were shared evoked long shared memories, and thus can be associated with the presence of the loved ones when they are not sharing the same physical space.

3.4.2.6. Yields

The support we receive in an interpersonal emotion regulation act can help us cope with our daily ups and downs. Companionship, compassion, and acceptance that we receive from our family, friend, or partner, produces positive psychological states that have many benefits like improving our immune system and buffer stress (Cohen, 2004). Social sharing interactions can also strengthen social bonds that enhance social integration. As sharing targets are often intimates, the sharing process can be effective for reviving and strengthening intimacy. All participants talked about the yields of interpersonal emotion regulation. Feeling grateful were mentioned 21 times across all the data, while increase in positive affect were mentioned 18 times, and decrease in negative affect were mentioned 8 times. These results are shown in Appendix 7.

On positive experience, we learned in Chapter 2 how capitalisation occurs when sharing positive emotion by proposing several mechanisms (M Choi & Toma, 2014). Those mechanisms are:

- Expressing personal thoughts and feelings maximises the salience, memorability, and significance of the events (Langston, 1994).
- Discussing these events enables sharers to construct and rearrange their memory, which enhanced their understanding of the event and their ability to find meaning in it (Feldman, Joormann, & Johnson, 2008).

- Enthusiastic feedback from others has been shown to amplify the meaningfulness of the event and improve sharers' positive affect (Reis et al., 2010). Inline with this mechanism, one participant recalled, "I always love it when people acknowledge my hard work. I play guitar in a band, and one time an event organiser thanked and praised me that I played very well and would like to have me again." (P2)

- The sharing process involves deeper social interaction, which can lead to improved social relationships with the recipients, and therefore enhances positive affect (Rimé et al., 1998). One of our participant recalled his experience on this phenomenon, "A lot of times I call my grandfather when I'm feeling down, and only by hearing his voice I feel comforted. He will then cheer me to keep doing my best in my work and give me life advice in general, without me having to tell what exactly my problem is. (P1)"

In contrast, when we experience negative emotion, by reliving positive emotional experiences in conversation, interpersonal emotion regulation in social sharing can decrease stress and anxiety associated with negative emotions (Bazarova et al., 2015). As mentioned by one participant,

"I am happy today that my old friend from uni called me, and we talked a lot about an anime that we used to watch together back then. I almost forgot that I had a bad day on campus today". (P7)

For a negative episode, responses received by the person who shares the emotion can be a reminder that he/she is not alone (Zaki & Williams, 2013). One participant stated,

"Knowing that my friend is also going through the same pain keeps me pushing myself to not giving up on my tasks." (P3)

Another participant said,

"It lightens a bit when you know that you can share your stress, of the upcoming exam for example, with someone. I feel grateful when I realised I have such friends around me." (P7)

By providing social support, attention, and empathy, listeners' replies can also buffer the negative feelings reactivated when sharing a negative experience (Rimé, 2009).

3.4.2.7. Other: Immediacy of Feedback

By looking at how people send and receive gestures of empathy, validation, and support in interpersonal emotion with the support of technology, we understand that technology helps in a way that it is immediately accessible for a quick support and feedback. However, we also found that participants were also looking forward to a further and later conversations to express and share their emotional experience, especially when it is complicated. All participants reported their experience about the immediacy of feedback. Demanding an immediate feedback were mentioned 7 times, while anticipating later feedback were mentioned 13 times. These results are shown in Appendix 8. For examples:

"One time I won a competition, and I immediately call my sister, I wanted her to know, and it feels just nice when she appreciated what I had just achieved." (P1)

"Sometimes, by just knowing that I can meet and hang out with my close friends after school, I feel like I can go through all those hard essay assignments." (P3)

3.5. Discussions: Immediacy of Feedback and Common Patterns

In chapter 2, we learned that experiencing emotions is a fundamental aspect of human life, and we have a basic need for social sharing. We also learned that expressing emotions and receiving feedback can serve someone's emotional regulation needs, and has been proven to have significant effects on emotional well-being because their initial emotional response has been amplified (M Choi and Toma 2014). On experiencing positive emotions, we learned that it could improve our well-being in two ways: (1) by the increase of the level of positive affect that they cause and (2) by the positive feedback that a successful experience brings to the knowledge base and the self (Rimé 2009). People share positive emotions with others to amplify the joy. On the other hand, on negative emotions, we learned that letting out frustrations can help us cope. However, as Bond and

Anderson stated in their research, most of us also hesitate when it comes to sharing negative emotions (Bond and Anderson 1987). Contrast to the positive event, we hesitate to share negative events because we do not want people around us to judge negatively. We may keep the news to ourself for a while until a close friend or family member is available to talk. Rime et al. (2009) have also demonstrated in their research, hearing someone sharing a negative experience evokes negative emotions in the listener.

We can summarise our findings of this study in Figure 18.

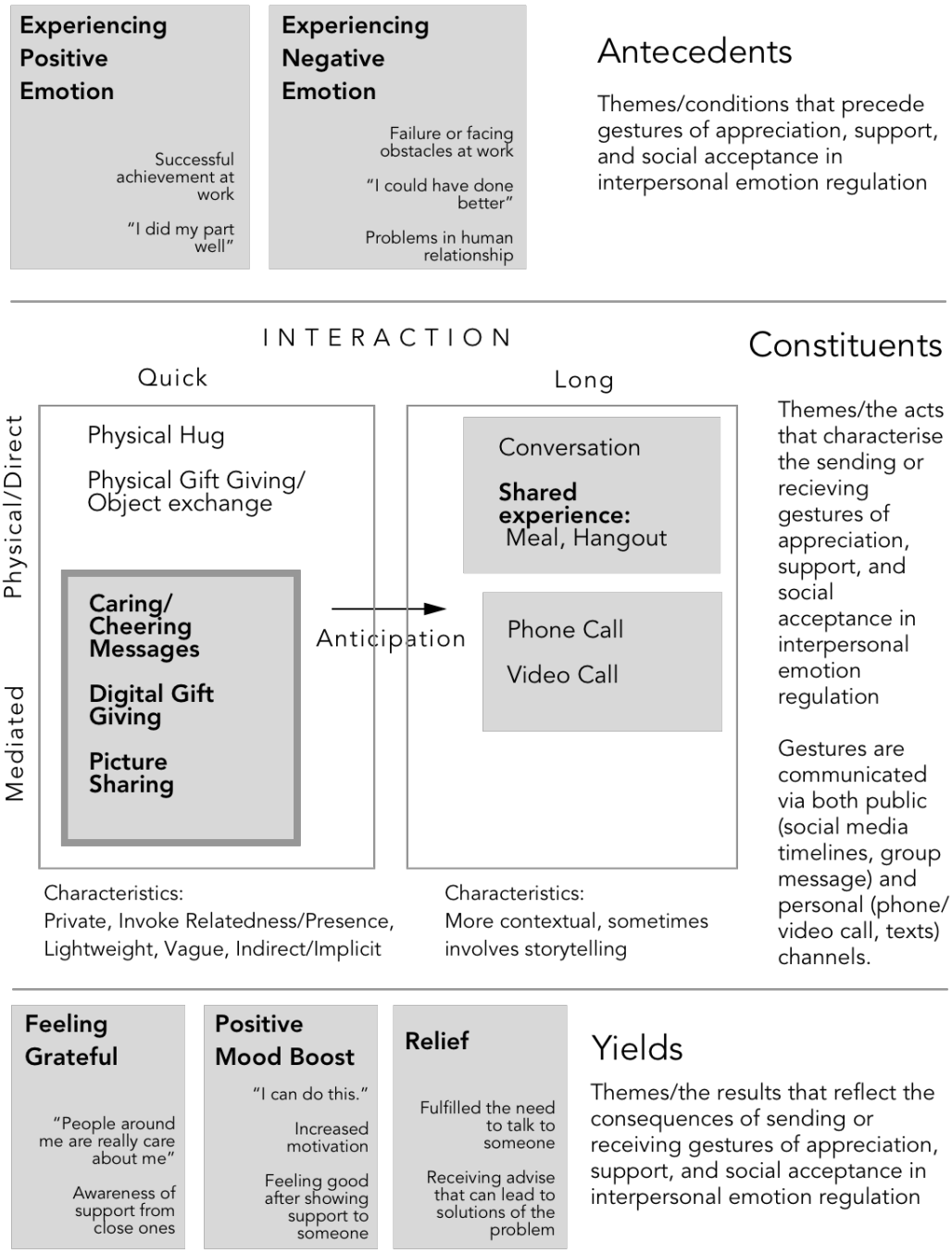


Figure 18 Schematic View of The Primary Themes Distilled from The Qualitative Data

By looking at how people send and receive gestures of empathy, validation, and support in interpersonal emotion with the support of technology, we understand that technology helps in a way that it is immediately accessible for a quick support and feedback. However, we also found that participants were also looking forward to a further and later conversations to express and share their emotional experience, especially when it is complicated. Here, we see how technology provides lightweight exchange, which can act as a bridge that establishes the possibility for further

conversation, as we have discussed in Chapter 2. In our results, we see many examples of phatic as a dominant communicative mode in technologies that do not necessarily require a large amount of data to convey significance and meaning (Gibbs et al. 2005). Specifically, we can also see that negative emotions often requires a more meaningful conversation to regulate, which most of the time does not happen inside the interaction mediated by technology. However, we found that the anticipation of having the conversation itself helps as an immediate support and feedback, and can be seen as one act of interpersonal emotion regulation. Figure 19 shows the relation between the immediacy of feedback/support and the cost/effort needed by the support giver.

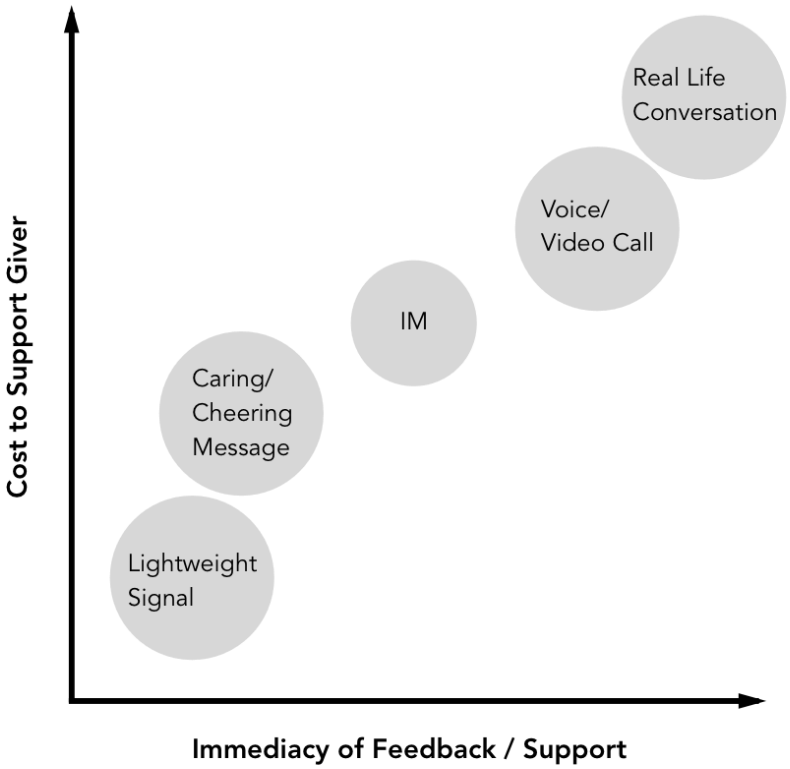


Figure 19 Immediacy of Feedback/Support and The Cost/Effort Needed by The Support Giver

To summarise, our first study gave us insight into how we can design our technology as a media to help with this process, which can be seen as a common pattern in our observational study. The summary of this study result can be seen in Figure 20.

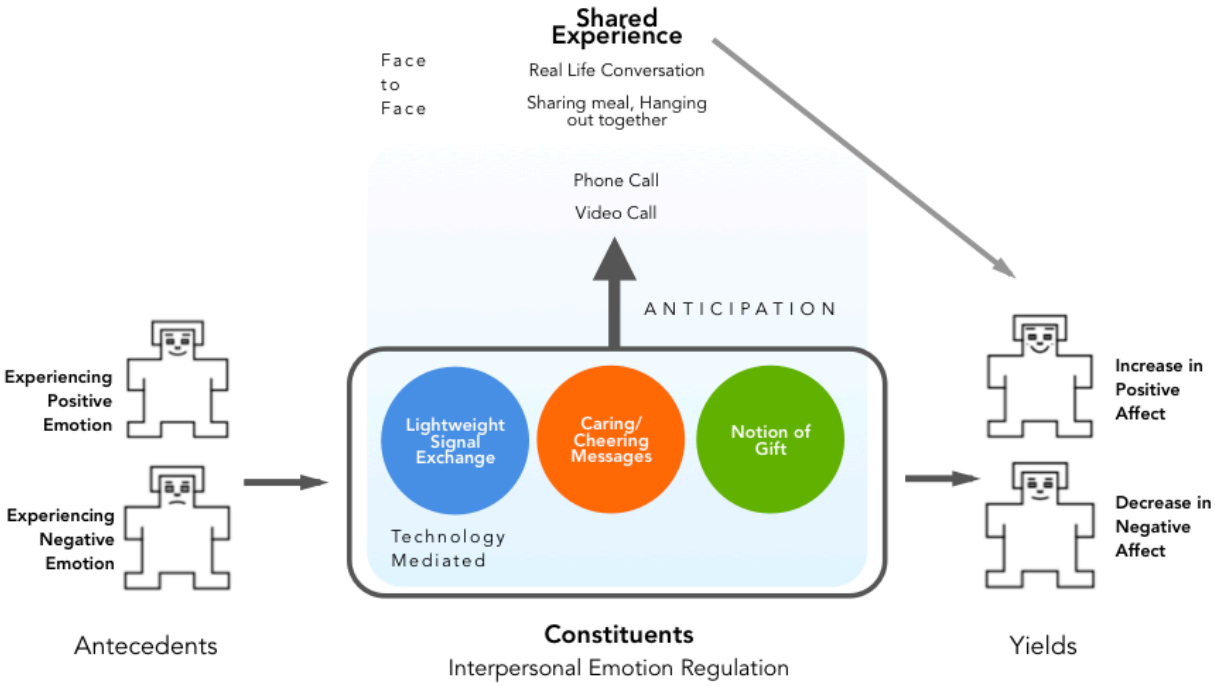


Figure 20 Interpersonal Emotion Regulation Process Seen in Observation Study

From Figure 20, we understand that technology plays an important role in the interpersonal emotion process. On the constituents part, we can see that there are two types of interaction, which is Face-to-Face and Technology-Mediated. Both can result in yields, where the support seeker can experience increase in positive affect or decrease in negative affect. Technology-mediated interactions with its phatic and lightweight characteristics have shown as an effective way to evoke an anticipation and establish the possibility for further conversation, that can also be technology mediated (but with high cost/effort like Phone call or Video call) or face-to-face interaction. Figure 20 emphasises the function of technology to establish the possibility for further conversation in facilitating interpersonal emotion regulation. The result from our study also gave us insight and inspiration on the characteristics that have to be provided by our next design for an app to support emotion regulation: Lightweight signal exchange, caring/Cheering message, and the notion of gift. Based on this finding, I argue that our design should have the following requirements **:**

1. Perform lightweight interaction and signal exchange. The technology should enable users to interact with each other throughout the day via low-fidelity communication channels. Meaningful interactions through minimal communication ("Little things" that matter),

as introduced by Hollan and Stornetta in “Beyond Being There”, argued that a better way to solve the telecommunication is "not to focus on the "tele-" part, but the communication part". Here, we need to make the most of the dominant phatic mode of communication in technology. We learned in the analysis of our study result that most of the times participants were getting support when the actual context of their story was not even communicated. In interpersonal emotion regulation, people seek to manage emotions by interacting with other people. We also learned through many examples of indirect strategies that also mentioned in Chapter 2 that it is the limitation of the exchanged signal that allows us to create the narrative that helps us to regulate our emotion. We need to impart this concept in our future design.

2. Show caring/cheering gestures from the trusted intimate circle. We learned from prior research and also from our results that technology provides the possibility to feel the presence and support of our close ones, even when they are not physically present. From participants' responses, we can also learn that they can still experience the presence of their supporters even when they are not sharing the same physical space, by interacting with objects that have emotional meaning, for example, ring, photograph, or traditional greeting card. The new technology should invoke this feeling to support interact-ing with people in the trusted circle for an effective interpersonal emotion regulation. We also learned about the preference of a trusted intimate circle, where our participants revealed that they are willing to express their emotion to someone intimate, compared to displaying it to a wider audience. This aligns well with the empirical research stating that by restricting the connection in a small group of trusted and intimate people, the emotions shared on their proposed system can be seen as more truthful or accurate (Willis and Jones, 2012)

3. Encompass 'gift-giving' experience. We learned in the analysis of our study that notion of gift is one of the important constituents acts. Several studies revealed that the most basic psychological function of gift-giving is a symbolic communication with explicit and implicit meanings of love, and it is crucial in creating, maintaining, and enhancing relationships. Many researchers have been attracted to implement aspects of gift-giving into communication technology because of its pervasiveness and the pleasure it causes. Encouraging 'gift-giving'

experience, by associating the response and feedback with the notion of gift inside our technology is hoped to help effectively supporting interpersonal emotion regulation.

4. A Bridge to establish the possibility for further conversation. Here, we focus on "We'll talk later" patterns that were seen in many interpersonal emotion regulation attempts in our results. We learned that anticipating a shared experience with their family, friend, or partner, can help them cope with their daily ups and downs. The new technology will only act as a tool, a bridge, or a trigger that leads to interpersonal emotional regulation process through actual conversation. It will excite and evoke anticipation that the user will have a conversation with people from their trusted circle, either via phone, video call or by meeting them in the same shared physical space. We also understand that the anticipation itself can help to regulate the emotion.

Based on these design implications, I propose a design idea that will be described in the next chapter.

3.6. Conclusions

In this chapter, I described our observation study: the cultural probes as an adopted method, study set-up, our results, and its analysis. We aimed to investigate how people send and receive gestures of empathy, validation, and support in interpersonal emotion regulation through social sharing in a daily basis, and what are the aspects that matter when supporting this with technologies as the media to send and receive these gestures. In our results, the timestamp data that were recorded clarify whether or not participants are experiencing both positive and negative emotion during the day, and their need of regulating the emotion by sharing it with their close ones. This data, combined with virtual postcards responses, taken photographs, and interview, helped us to confirm and support to make the response of each participant clearer as an integrated story of their daily ups and downs and their need of interpersonal emotion regulation. I analysed the results by visualising the collected probe data as a schematic view of themes induced from qualitative data and identifying affinities and patterns between those data help to communicate all the information of our study result. I categorised the themes into three categories: Antecedents, Constituents, and Yield. These results and its analysis are used as inspirations for deciding design implications and design ideas that we will use in the next stage of the system development. The key

findings from our study were concluded and summarised in Figure 20. Finally, I presented design implications that reflected the literature investigation and our findings in the observation study.

4. System Design and Implementation

In Chapter 3, the result from our study gave us insight and inspiration on the characteristics that have to be provided by our next design. The key findings from our study were concluded and summarised in Figure 20. Based on these findings, I established 4 design implications that need to be implemented in our design: Perform lightweight interaction and signal exchange, Show caring/cheering gestures from the trusted intimate circle, Encompass 'gift-giving' experience, and A Bridge to establish the possibility for further conversation. In this chapter, I propose a concept of *Empatchi*: Human *Tamagotchi* as a design idea, which will implement all the design implications presented at the end of Chapter 3. This chapter describe Objective O7 to demonstrate that the design implications can be implemented as a mobile app that provides phatic interactions to support emotion regulation.

4.1. *Empatchi*: Human *Tamagotchi*

Our findings in study 1 and our design implications involves lightweight interactions as one of the key to support interpersonal emotion regulation. As a design inspiration, I looked at examples of lightweight interactions that have been implemented to a technology, and one of them is *Tamagotchi*. *Tamagotchi* is a virtual pet simulation game introduced in 1996 by the Japanese toy manufacturer, Bandai Co. Players need to take care of virtual pets inside a keychain-sized object by feeding, playing together, or giving an injection. The characters/pets inside the game are simplistically designed creatures based on animals, objects, or people.



Figure 21 Various models of Tamagotchi, virtual pet simulation game introduced in Japan in 1996

The concept of *Tamagotchi* appeals to the basic psychological need of relatedness (Deci & Ryan, 2000) and the associated interest in nurturing and care, and could also be framed as a solution to relieve loneliness (Desmet & Hassenzahl, 2012). *Tamagotchi* shows a new way to craft technology to create a meaningful, fulfilling experience. How we interact with *Tamagotchi* really fits our design need: To have a lightweight interaction which does not distract our interaction with the real-life environment. What if we combine the concept of "Taking Care of Virtual Pet" on *Tamagotchi* and associate it with our real-life connection? The main concept of this idea is, instead of 'feeding' a virtual pet, we emotionally 'feed' people in our trusted circle with cheer or support. We can implement basic design concept and interaction of *Tamagotchi* to a new technology, which allows us to take care/support of our close ones (family, friends, or partner), associate it with their presence and could trigger an interpersonal emotion regulation process through actual conversation.



Figure 22 User Interface Prototypes of Empatchi: Human Tamagotchi Design Idea. The system were implemented to off-the-shelf system like smartphone for ease of access, as well as quick and light interaction.

This idea can be implemented to an off-the-shelf mobile app that many people already familiar to use in a daily basis like a smartphone to allow a quick and light interaction, one of the main appeals of *Tamagotchi*. The reason behind choosing an off-technology is as suggested by a study, using off-the-shelf technologies can solve the problems of examining and evaluating on-the-

wild/daily usage of experimental technology prototypes (N. Taylor, Wright, Olivier, & Cheverst, 2013). Smartphones are now widely available. Compared to the bespoke research prototypes, these technologies are more robust and require less maintenance (Balestrini, Bird, Marshall, Zaro, & Rogers, 2014), which helps for our purpose to study the usage of this system on a day-to-day basis, so we can focus on the interactions between the participants, which will be explained in the next chapter about our future studies. Moreover, a mobile device was chosen as a form factor because of its ubiquitous nature, which appeared to have an influence on the preference for using this type of system for sharing personal data, like emotion. One of the participants of Willis and Jones' study explained that a mobile device is preferable, compared to a desktop system, for this purpose because it is a lot more personal, you know that nobody else can see it, and the fact that it is your very own device (Willis & Jones, 2012). The system was implemented as a smartphone application. The functionality of the system will be described by linking to the established design implications that have been described at the end of Chapter 3.

4.1.1. Communicating Emotions with Lightweight Signals

Users can self-report their emotion on the emotion log screen, using the SAM (Self-Assessment Manikin) that has been widely used in research (Figure 23). Participants report their emotional state by selecting the valence and arousal level on a five-point scale. After sharing emotion, user will see confirmation banner indicating that the emotional state has been successfully recorded. When this happens, the app will notify everyone in their group so that they can then send appropriate support.

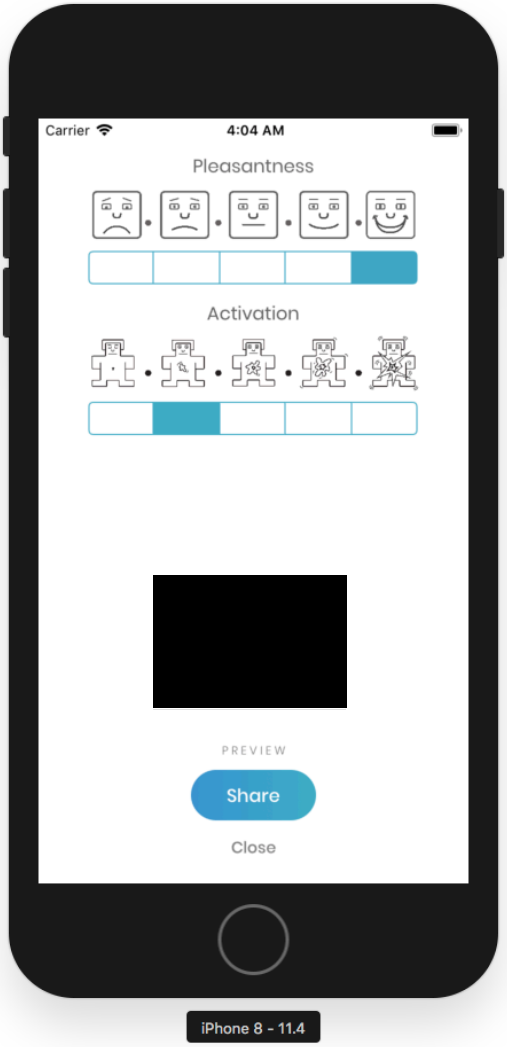


Figure 23 Sharing Emotion Screen

Users can quickly understand the affective state of people in their intimate circle by viewing the main screen of the app (See Figure 24: left image). The opacity of each avatar shows how recently they logged an emotion, as it fades out as time passes. The colour around the circle represents the valence of the last recorded emotional state of that person, visualised in a gradient ranging from red for negative emotions to green for positive emotions. The size of the circle represents the arousal of the last recorded emotional state of that person. The bigger the size of the circle, the higher their arousal. When users tap on an avatar, a dialogue will pop up, and users will have options interact with that person by sending them emotional support to help them regulate their emotion and see the support exchanges (See Figure 24: right image).

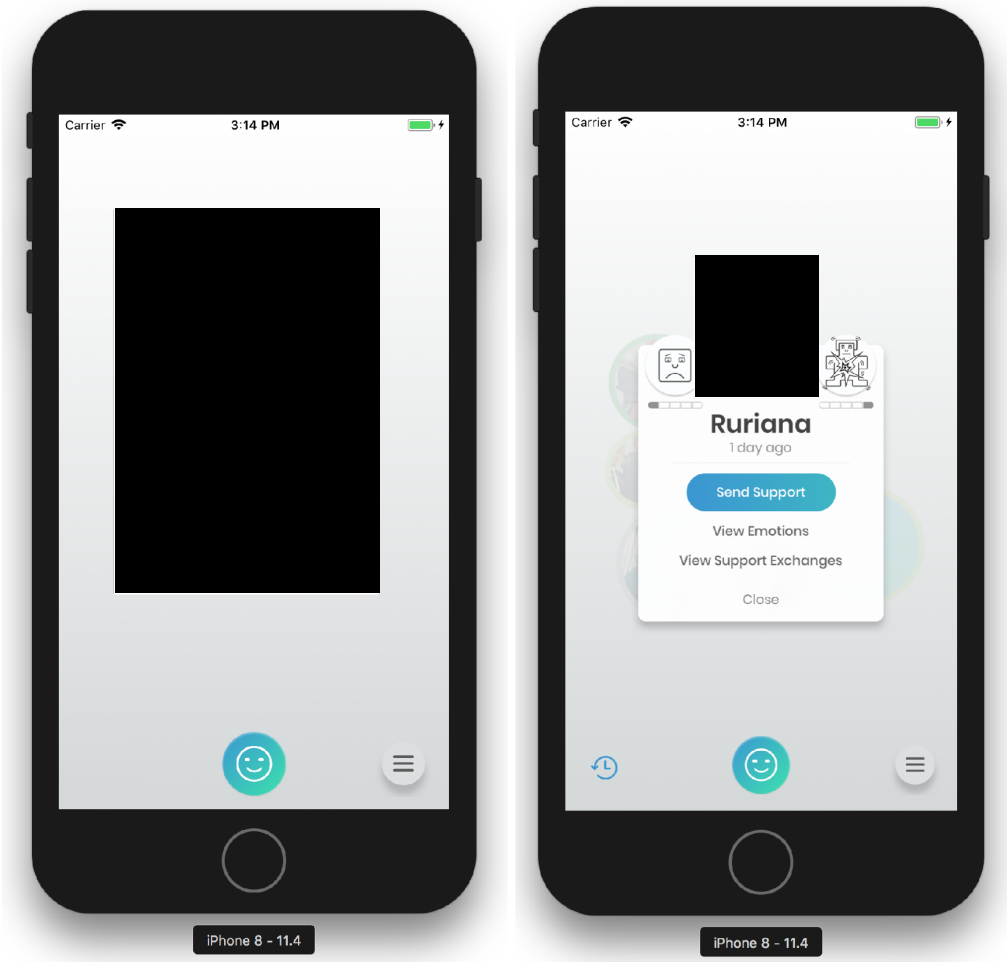


Figure 24 Trusted Circle Screen

4.1.2. Caring/ Cheering Messages

Participants can send supportive caring/cheering messages by selecting from the pre-defined list of short support message or setting up their own message inside the app. Users also have options to include message to let the recipient know that they are available to talk further (for example: through a phone call or face-to-face meeting) (See Figure 25). This feature is designed to lead the lightweight interaction inside the app to further face to face/real time interaction.

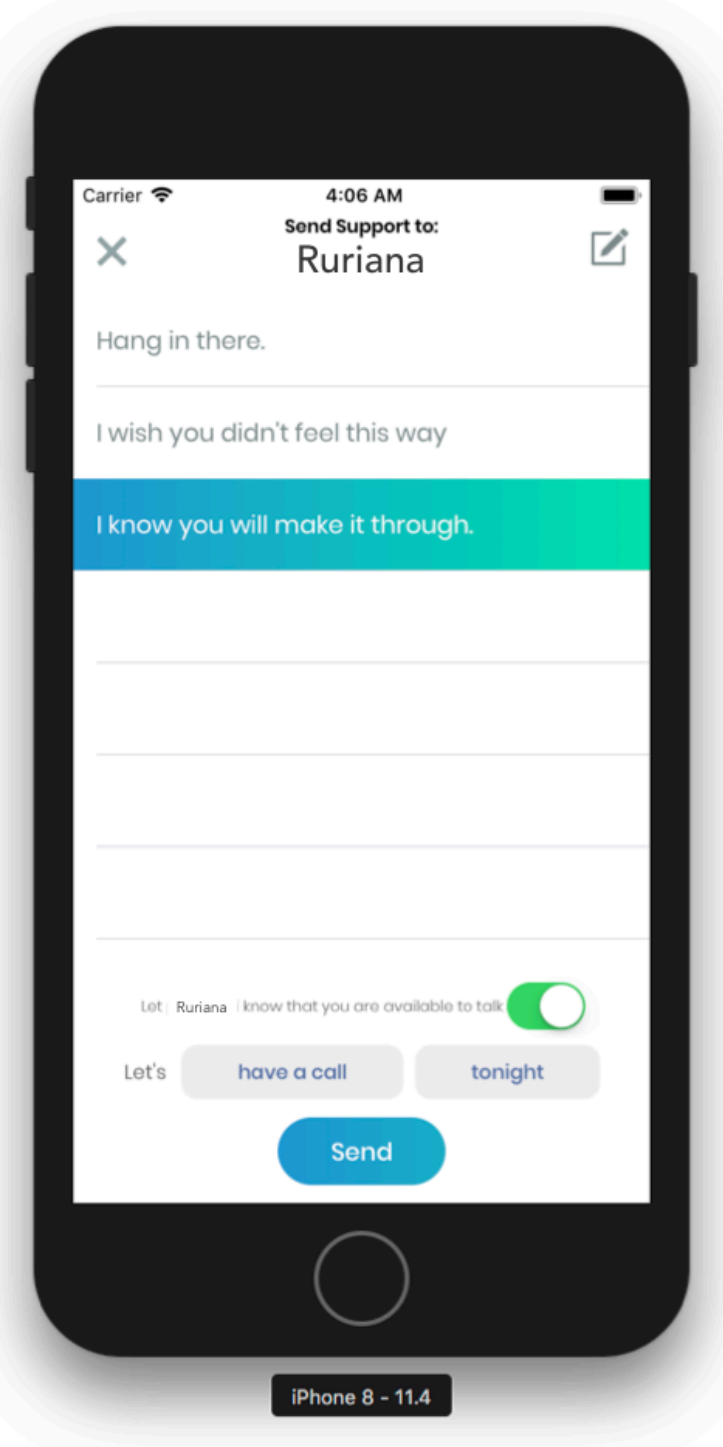


Figure 25 Sending Caring/Cheering Message Screen

4.1.3. Notion of Gift by Exchanging Support Messages

The support received will be shown as a 'support notes', which is provided to bring the conception of 'gift-giving' in exchanging support messages (Figure 26). We want to see how using the app leads to interpersonal emotional regulation process through actual conversation and

shared experience, either by having a conversation within the same physical space or via telephone or video call. This will be measured by analysing qualitative data that will be acquired from a short daily questionnaire and follow-up interview. In these scenarios, the gift sender is 'gifting' his/her time, as a gesture of care and support for the receiver.

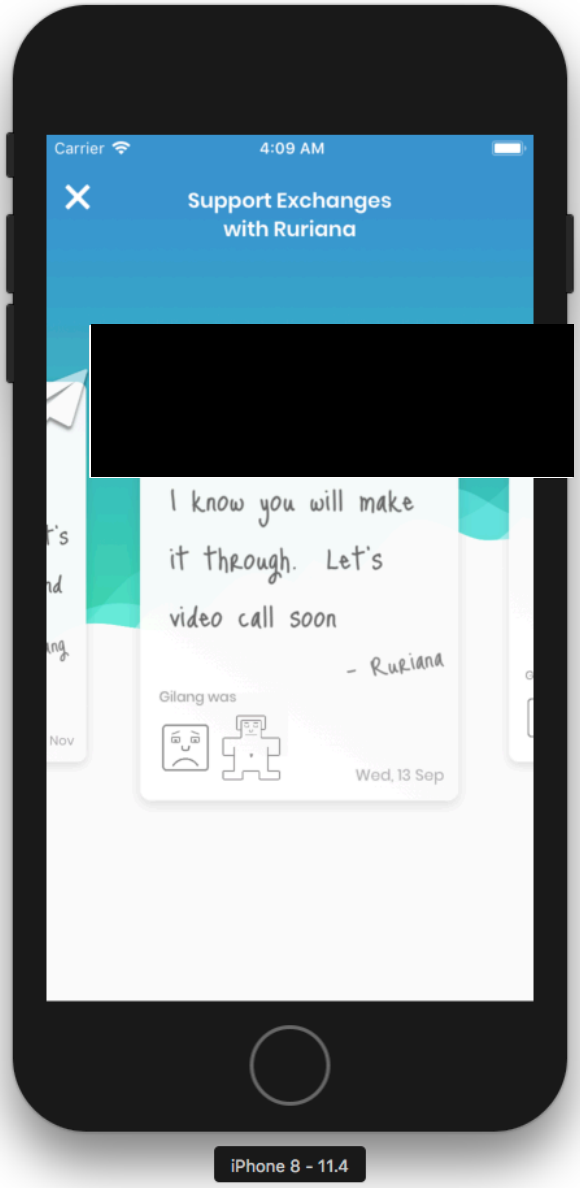


Figure 26 Support Exchanges Screen

With these three characteristics implemented in the system, it is hoped that this system can elicit an anticipation which leads to interpersonal emotional regulation process through actual

conversation and shared experience, either by having a conversation within the same physical space, or via telephone or video call.

This idea focuses as an approach in implementing a system on a relatively familiar device that many people already use, so it will be easier to introduce for daily use, compared to developing an entirely new hardware. It will also be easier to develop and iterate while experimenting on the interaction and allow us to see how it is used in the daily life scenario, which matches with our research objective to support interpersonal emotion regulation in daily ups and downs.

Figure 27 shows how the interactions provided in this system design fits our design implications.

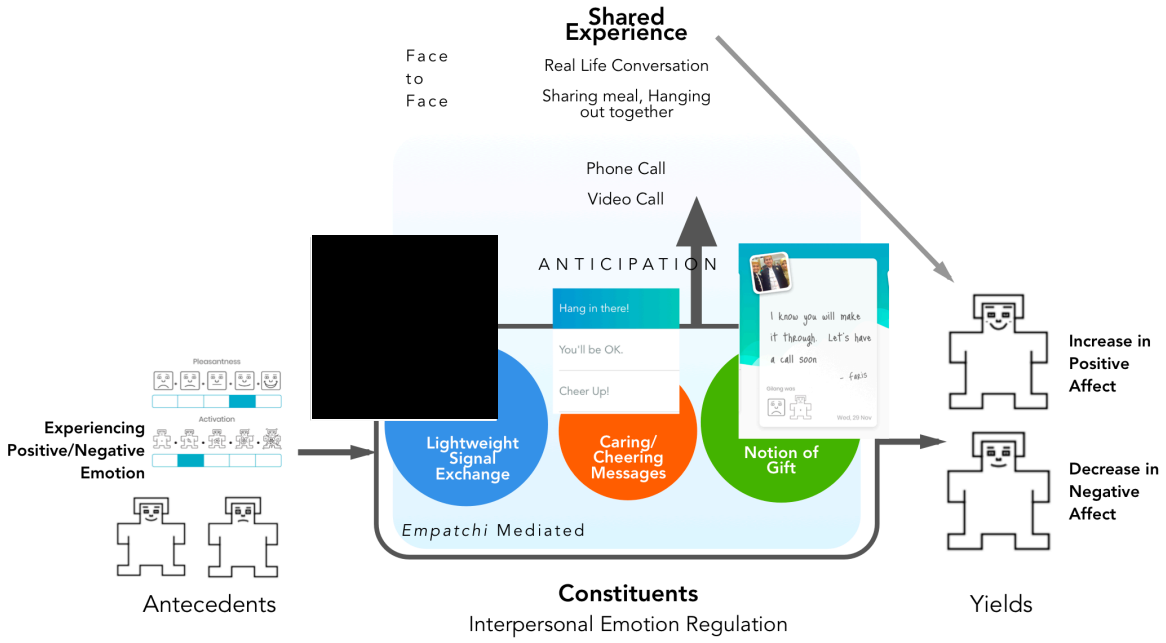


Figure 27 Empatchi: Human Tamagotchi as a technology to support interpersonal emotion regulation

As shown on the figure above, we can conclude that this design idea implements the 4 design implications that have been established: Perform lightweight interaction and signal exchange, show caring/cheering gestures from a trusted intimate circle, encompass 'gift-giving' experience, and a Bridge to establish the possibility for further conversation. Therefore, I decided to continue to progress to development and implementation of this idea to progress my PhD research.

4.2. System Implementation

The *Empatchi* system was implemented in an object-oriented programming language called Swift as an iOS Application using the XCode IDE (Integrated Development Environment), as shown in Figure 28. I also contributed the whole development of this system to this PhD research.

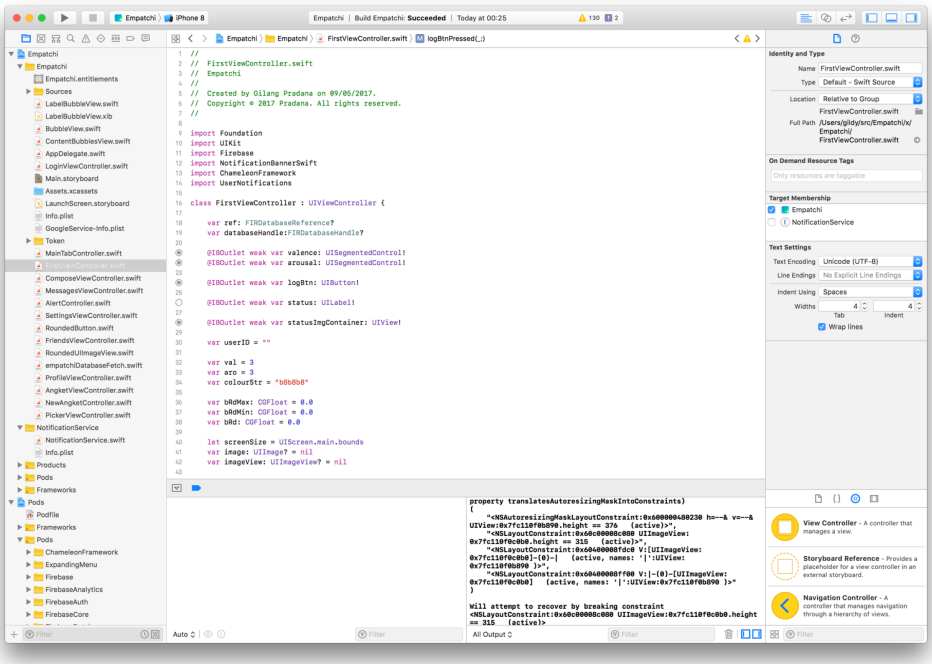


Figure 28 XCode Integrated Development Environment for Developing iOS App using Swift Object Oriented Programming Language

In the following sub-sections, I explain the implementation of *Empatchi* by describing the flow of the app itself. The flow of the app is shown in a diagram in Figure 29. This diagram will be divided into three sub-diagrams A (Figure 30),B (Figure 31), and C (Figure 32) while being explained for each screen.

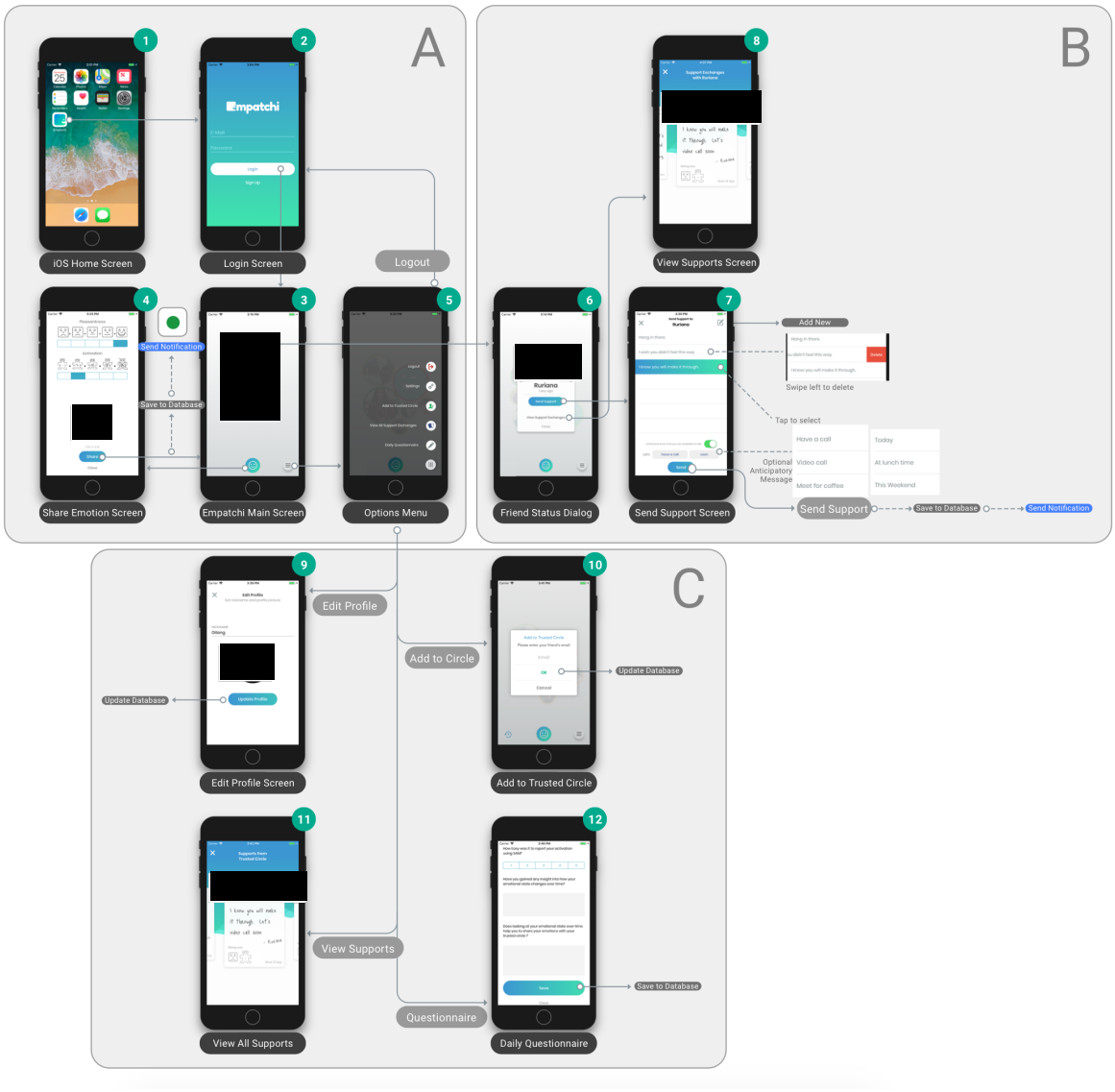


Figure 29 Empatchi App Flow Diagram



Figure 30 Empatchi Flow Diagram Screen 1,2,3,4, and 5

1. iOS Home Screen

Empatchi app has been officially approved by Apple and is publicly available for download from this link: https://itunes.apple.com/app/*Empatchi*/id1252331650

Screen 1 shows the home screen of the iOS device with *Empatchi* installed on it. The user needs to tap on the App Icon to start running the application. On its first run, the app will ask the

user's permission to allow notification for receiving updates from his/her trusted circle and for daily reminders.

2. Login Screen

Screen 2 shows the login screen of *Empatchi*. For our study purpose, the sign-in ID and password have been prepared so participants did not need to sign up. Participants only need to sign in with the provided login credentials. When the login information is typed and the login button is pressed, the app will authenticate with the online database whether the provided login ID (in this case e-mail) exist on the database and whether the ID and password match. When login succeeds, the user will be able to access the app main screen where he/she can interact with the trusted circle. The source code for this login screen is provided in Appendix 9 <LoginViewController.swift>

3. *Empatchi* Main Screen

As mentioned in the previous section, this screen shows the latest emotion shared by each member of the trusted circle. The colour of the avatar border represents the valence, the size of the avatar represents the arousal, and the opacity represents how long have the emotion shared. This view is implemented by drawing a canvas on top of iOS native view. Each avatar bubble is implemented as an object <BubbleView.swift>. A collection of avatar bubbles will be drawn on top of a canvas called <ContentBubblesView.swift>. If the app successfully authenticates a user's credential, it will communicate with the database to load the list of users that are registered on his/her trusted circle. After the app successfully collect those data, it will populate <ContentBubblesView.swift> with avatar bubbles for each member of the trusted circle with each member's avatar photo and latest shared emotion information (valence, arousal, and time shared) and show all those data as color, size, and opacity in <BubbleView.swift>. <ContentBubblesView.swift> also responsible to determine the behaviour of the avatar bubbles when the user interacts with them. When an avatar bubble is tapped, a friend status dialog will be

shown which will allow the user to send support or view support exchanges with that person. This will be explained in Screen 6.

On the bottom of Screen 3, we can see 2 buttons. The button on the middle is the share emotion button. When the user taps on this button, Share Emotion Screen (Screen 4) will show up and it will allow users to share his/her emotion. The second button is the options button which will show the options menu as shown in Screen 5. The source code for Screen 3 is provided in Appendix 10 <FriendsViewController.swift>

4. Share Emotion Screen

This screen allows the user to share his/her emotion by selecting from 5 point scale SAM. The term Pleasantness and Activation were used instead of Valence and Arousal since they are more familiar with general audiences. The user can also see the preview of how the emotion will look like on their trusted circle's main screen (Screen 3) when the emotion is shared. This serves a purpose of helping the user to get used to the colour and size representation of the emotion. When the share button is pressed, the app will communicate with the database to store the emotion information and send a notification to each member of the user's trusted circle. The notification will also show the shared emotion in colour and size representation as well. The source code for Screen 4 is provided in Appendix 11 <ShareViewController.swift>

5. Options Menu

By tapping on the bottom-right button from the main screen, the user will be able to access 5 different menus: Logout, Settings, Add to Trusted Circle, View All Support Exchanges, and Daily Questionnaire. Tapping on the logout button will let the user to log out from the system and will be brought back to the login screen. The other 4 options will be explained in Screen 9,10,11 and 12. The source code for Screen 4 is provided as a part of the main function in Appendix 10 <FriendsViewController.swift>

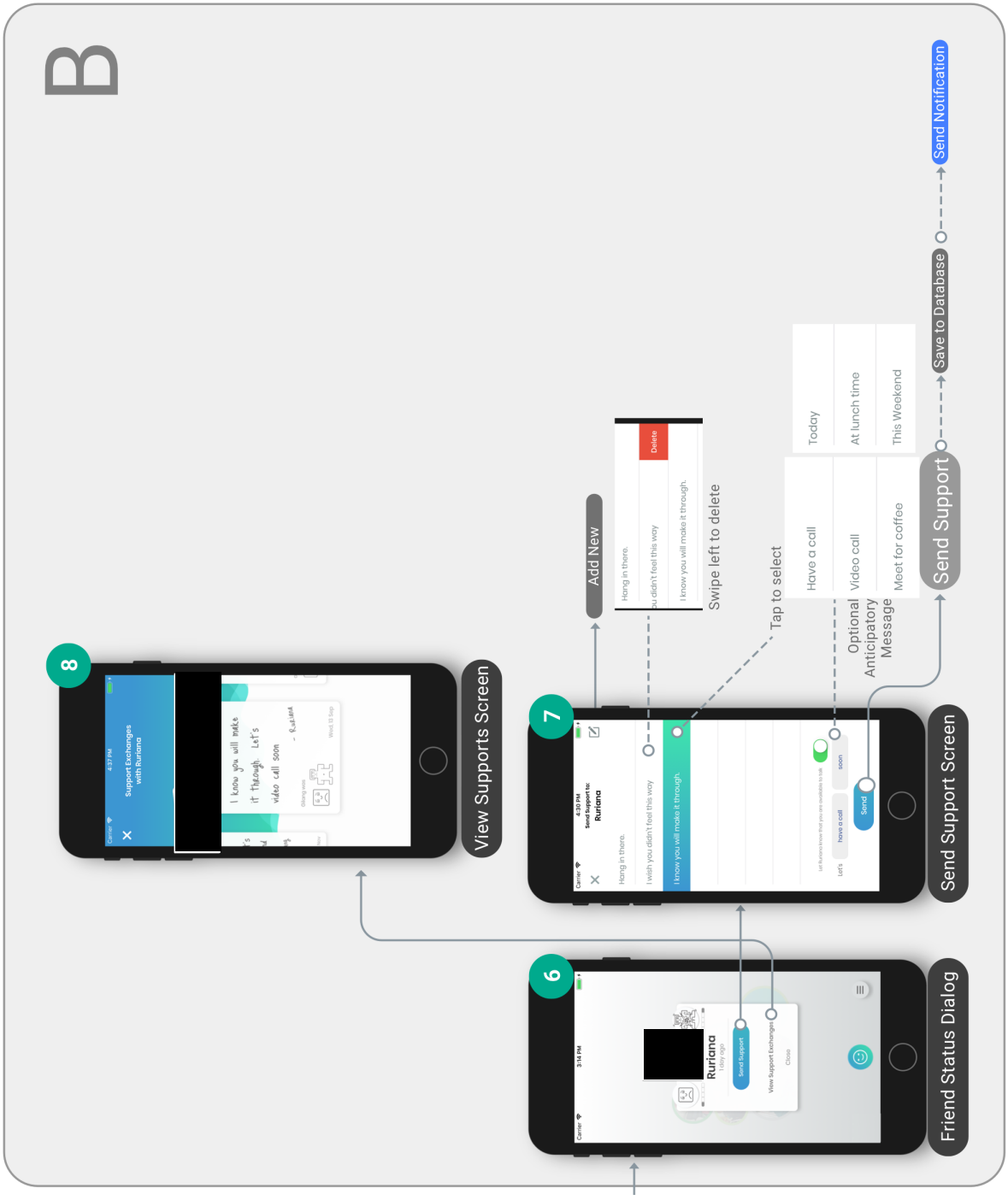


Figure 31 Empatchi Flow Diagram Screen 6,7, and 8

6. Friend Status Dialog

When an avatar bubble is tapped in Screen 3, a friend status dialog will be shown which will allow the user to send support or view support exchanges with that person. The dialog shows the information of latest emotion shared by that person, with the valence and arousal icon from

SAM scale. 5 point scale indicators are also shown below both valence and arousal icons to help the user identify the emotion. The dialog also shows the avatar photo, the name of the person, and the time of the latest shared emotion. There are three action buttons: Send Support, View Support Exchanges, and Close, which will bring the user to Screen 7, Screen 8, and Screen 3 respectively. The dialog in Screen 6 is a subview of Screen 3, and its source code is also provided in Appendix 10 <FriendsViewController.swift>

7. Send Support Screen

Screen 7 provides the user with options to select one of the predefined support messages to be sent to one of his/her trusted circle. The top right button of this screen also allows the user to create his/her own support message. The list of the predefined support messages will be shown based on the valence and arousal of the latest shared emotion.

- (Valence < 0, Arousal < 0):
    - You'll be fine.
    - Stay strong!
    - I know you will make it through.
- (Valence < 0, Arousal ≥ 0):
    - Hang in there.
    - I wish you didn't feel this way
    - I know you will make it through.
- (Valence ≥ 0, Arousal < 0):
    - Keep it up.
    - Glad you feel this way.
    - Well done.
- (Valence ≥ 0, Arousal ≥ 0):

- Great, well done!
- So proud of you!
- Let's celebrate!

The user also has the option to swipe left on each Support Message option to delete it. The user will need to tap on the desired support message to select it before sending it to one of his/her trusted circle. On the bottom part of the screen, the user also has the option to include an anticipatory message where he/she can select or create both action (e.g. Have a call, meet for coffee, have dinner) and time (e.g. Today, at lunchtime, tonight, this weekend). This serves a purpose of sending the caring thoughts of the sender's willingness to make time to interact, talk, or listen to the recipient. After the support message and the optional anticipatory message are selected, the user is now ready to send the support message by tapping on the send button. The app will then communicate with the database to store the information, and it will also send a notification to the recipient. The source code for Screen 7 is provided in Appendix 12 <MessagesViewController.swift>

8. View Supports Screen

Screen 8 provides the user with the support message exchanges with the selected person. When this screen loaded, the app will communicate with the database and look for the information of support messages between the user and the selected person from his/her trusted circle. The app will then populate the screen with the information as a collection of cards defined in objects called <CollectionViewCell.swift>. The card consists of the information of the sender's avatar photo, sender's name, support message, the valence and the arousal of the recipient's emotion, and the date of the emotion. The user can scroll horizontally on the screen to see all the support message exchanges. The source code for Screen 8 is provided in Appendix 13 <TokenViewController.swift>

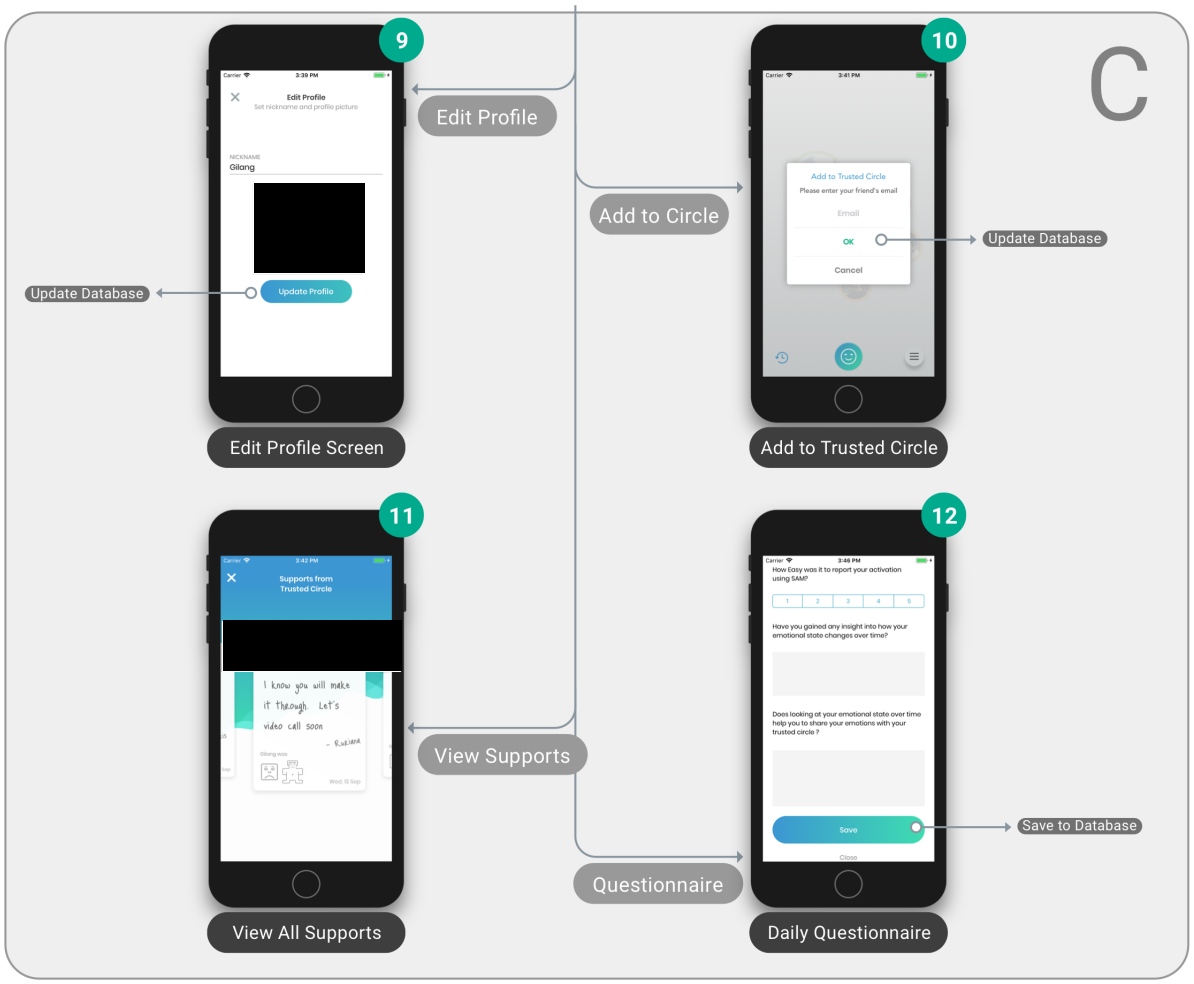


Figure 32 Empatchi Flow Diagram 9,10,11, and 12

9. Edit Profile Screen

Screen 9 allows the user to update his/her Nickname and Avatar Photo that will be seen to their trusted circle. When the user presses the Update Profile button, the app will update the database with the new nickname and avatar photo and a confirmation banner will be shown if the profile is successfully updated.

10. Add To Circle Screen

Screen 10 allows the user to add other users by email as the member of his/her trusted circle.

11. View All Supports Screen

Screen 11 programmatically has the same backbone as Screen 8, but instead of showing exchanges with one particular member of the trusted circle, Screen 11 shows all received Supports from all members of the trusted circle.

12. Daily Questionnaire Screen

Screen 12 provides the daily questionnaire that participants need to answer at the end of the day for the study purpose. When the save button is pressed, the app will save the participant's responses to the database and a confirmation banner will be shown if the responses have been successfully recorded.

4.3. Conclusions

In this chapter, I proposed Human *Tamagotchi* design idea and focused in implementing a system that reflects our design implications on a relatively familiar off-the-shelf mobile app that many people already use, so it will be easier to introduce for daily use, compared to developing an entirely new hardware. It will also be easier to develop and iterate while experimenting on the interaction and allow us to see how it is used in the daily life scenario, which matches with our research objective to support interpersonal emotion regulation in daily ups and downs. I also described how this design idea fits our design implications that have been established, and how the idea has been implemented as a mobile app in this chapter.

5. Study 2: Evaluating Empatchi as a Technology to Support Interpersonal Emotion Regulation

5.1. Introduction

In this chapter, I describe the evaluation study of my novel approach to interactive systems in supporting interpersonal emotion regulation. Based on our findings in study 1, and empirical research about interpersonal emotion regulation, I established design implications for a system to support interpersonal emotion regulation: (1) Provide lightweight signal exchange, (2) Show caring/cheering gestures from a trusted intimate circle, (3) Provide 'gift-giving' experiences by associating the response and feedback received with the notion of a 'gift', (4) Function as a bridge to establish the possibility of further conversation. These implications are implemented into a smartphone app called "*Empatchi*" which was developed as a smartphone application and was evaluated in Study 2. This app enables users to share their emotional valence and arousal with their trusted circle and allow them to send support/positive reinforcement through lightweight interactions within the app. These interactions are designed to facilitate interpersonal emotion regulation. In particular, this study focuses on evaluating the app and see how it helps participants to cope daily emotional ups and downs, and will exclude the extreme case of stress or depression (for example when someone loses their job or when their loved one passes away). The contribution of this study is a demonstration how our proposed system can support participants in sharing emotions and exchanging supports from their trusted circles. I assume that this demonstration positively answers part of research question RQ2: How can phatic interactions in technology help in interpersonal emotion regulation process? (Study 2).

Study 2 will evaluate the *Empatchi* app as a technology to help people cope with daily ups and downs by sharing their emotions with their trusted circle (people with whom they have strong connections) and receiving feedback from them. I am interested in finding out how people use our app to share their emotions and to give and receive appreciation and support. We want to investigate if *Empatchi* can support the interpersonal emotion regulation process. The following research questions were established for this study:

RQ2-1. What kind of signals are exchanged when using "*Empatchi*" for interpersonal emotion regulation, and how are these signals exchanged?

RQ2-2. How can the 4 design implications (1. Provide lightweight interaction and signal exchange, 2. Show caring/cheering gestures from a trusted intimate circle, 3. Provide 'gift-giving' experiences, 4. Establish the possibility of further conversation) that are implemented in "*Empatchi*" help in regulating emotion?

RQ2-3. How does "*Empatchi*" lead to another face to face contact between members of the group of a trusted circle?

5.2. Study Setup

5.2.1. Participants

In total, 16 people (6 females, 10 males) participated in the experiment. Participants were recruited through posters displayed at City, University of London, Social Media Post (Tweet and Facebook Post), and convenience sampling through personal contacts. The inclusion criteria for study 2 participants are as follows:

- Above 18 years old with a regular routine of work or study across the week. The groups will have a minimum of 2 people and a maximum of 6 people.
- Participants were recruited as groups of people who have strong-tie connections (Howard et al. 2006, Huszti et al. 2013). In the literature, strong-tie connections are defined as family ties, (close) relatives, or intimate friends with frequent/daily contacts.
- All group members use smartphone (iOS) on a regular basis.
- Everyone in the group knows each other and is willing to share emotion data with each other.
- Do not live together / Work or study in different places if living together i.e. conduct their main daily activities in different places.

The exclusion criteria for study 2 participants are as follows:

- People categorised as vulnerable adults (because of their social, psychological or medical circumstances)
- People with depression, or any other mental health issues
- People with serious health issues or under serious medical treatment

5.2.2. Procedure

The participants were instructed to interact with the app on their smartphone and share their emotions with the group using the SAM (Self-Assessment Manikin) and to send support to other members. Every group member was notified when any of the members share an emotion. Participants were instructed to interact with the app over a two-week indirect observation period. They were also instructed to answer several short questions at the end of the day which will be explained in the later section. This indirect observation period was be followed by a follow-up interview, which gave participants opportunity to explain, clarify, and expand upon the responses they have collected.

For this study purpose, participants are not required to sign up to use the app. Participant group who already agreed to participate on the study will be registered on the database. Each of the participant will be assigned one unique email address from Empatchi server to be used as the login credential. Since they are already registered as participant group, each of the participant inside a group will be already connected to each other as a trusted circle/group so that they only need to login without having to add their friends to the trusted circle.

In normal use, when signing up on Empatchi for the first time, user will have empty screen without any trusted circle member. User can add other user to their trusted circle by tapping the option menu from the main screen, select add to trusted circle, and enter the email of other user to send a request. After the other user confirmed the request, they are officially connected as trusted circle in Empatchi. To understand about what happens when two or more users connected as a trusted circle in Empatchi, we can take example from the following scenario:

1. A, B, and C are new users of Empatchi
2. A adds B's email from the "Add to Trusted Cricle" option on Empatchi App.

3. B confirms A's request. A and B are now connected as trusted circle.
4. A adds C's email from the "Add to Trusted Circle" option on Empatchi App.
5. C confirms A's request. A and C are now connected as trusted circle.
6. A has two members in his trusted circle: B and C.

   Since B and C are not directly connected, they are not on each other's trusted circle.

   B has only one member in his trusted circle, which is: A

   C has only one member in his trusted circle, which is: A

In this scenario:

- When A shares emotion update, B and C gets notified.

  B and C can see emotions that A has shared.

  A can see all emotions that are shared by B and C

  A can send support messages to B and C.

  A can receive support messages from B and C

- When B shares emotion update, only A gets notified.

  Only A can see emotions that B has shared.

  B can only see emotions that are shared by A.

  B can only send support messages to A.

  B can only receive support messages from A.

- When C shares emotion update, only A gets notified.

  Only A can see emotions that C has shared.

  C can only see emotions that are shared by A.

  C can only send support messages to A.

  C can only receive support messages from A.

5.2.3. Materials

5.2.3.1. Empatchi App

Participants were instructed to download *Empatchi* App from Apple App Store during indirect observation period. The design and implementation of the app were described in Chapter 4. All the interactions within the app were recorded (timestamp, sender ID, receiver ID, and types of interaction (which feature of the app used, what kind of messages being exchanged)), and will be automatically sent to a secure database hosted using SSL (Secure Sockets Layer). The logged emotions will only be shared among a closed group of strong-tie connections, where they have all agreed to share their information with each other.

5.2.3.2. Daily Questionnaire

Users were prompted to answer few questions at the end of the day. A notification will be sent at 9 PM every day during the indirect observation period to remind participants to fill the questionnaire. This study adopts the Experience Sampling Method (ESM) as a longitudinal approach to gather participants' behaviour, thoughts, and feeling on a certain occasion over a period of time. ESM is an established method in research used to study what people do, how do they feel and think by asking questions at a certain occasion when they are conducting daily activities (Larson & Csikszentmihalyi, 2014). In this study, the questions will focus around their interactions with each other for interpersonal emotion regulation and will also investigate whether they reach out to each using communication technologies other than the app. This is related to types of social sharing and support in interpersonal emotion regulation (Beckes & Coan, 2011; Bowlby, 1990; Epstein, 1973; Rimé, 2009; Stroebe et al., 1996; Wortman & Lehman, 1985).

- [Listing all the received support during the day] Which of the following support messages helped you the most to cope with your daily ups and downs?
- Did you communicate with any member of your trusted circle using a technology other than the app? If yes, how?
- What kind of support outside the app helped you the most to cope with daily ups and downs?

5.2.3.3. Follow-up Interview

The data gathering of the study was conducted over a period of two weeks. After the data gathering period is finished, an individual follow-up interview with each participant was conducted, which gave the participant the opportunity to explain, clarify, and expand upon their responses. The session was audiotaped and lasted about 45 minutes. The interview is a reflective discussion based on the responses collected from the participants. Their responses during the observation period are the starting point for the conversation between the researcher and participants and were focused on their interactions with the app. Participants were also asked if they have any feedback on or suggestions about the app. The interview topic guide/ example questions are as follows:

- Tell me about your experience on sharing emotions with your strong tie connection group (with or without technology), prior to using the app
- Tell me about your experience of using the app. How did it change the way you communicate your emotions and receive feedback with your strong tie connection group?
- Tell me about the times when the app helped you the most to cope with your daily ups and downs
- Did you ever find the app confusing?
- Did the app ever hinder the way you communicate with each other
- Tell me about the times when you communicated with each other outside the app
- Tell me what you liked the most about the app
- Tell me what you liked the least about the app

5.2.4. Analysis Method

Gathered data, supported by daily questionnaires and follow-up interviews, were thematically analysed by coding the responses to major themes, ideas and concepts. The following coding themes were established based on the thematic analysis framework of Study 1: Themes that precede its experience (Antecedents), characterise the act itself (Constituents), and reflect the consequences of the act (Yields). We also want to understand about the challenge in using SAM

method in Empatchi and the use of other technology for emotion regulation during the study period, so I introduce new coding theme for those purposes. The coding definitions and example are shown on Table 1.

Table 1 - Coding List for Study 2

No	Code	Definition	Example
1	**Antecedents: Sharing Emotion**	**Statements describing the act of sharing emotion to others, including its motivation, need, hesitation, and how do they feel when they share**	
1a	Sharing Positive Emotion	The act of sharing emotion when experiencing positive emotion	I think it's also the reason when we feel happy and when there are so many things we wanna talk about. we don't use *Empatchi* to share that we are happy. we just share it, we have so many energy to share that this is da-da-da-da on the WhatsApp
1b	Sharing Negative Emotion	The act of sharing emotion when experiencing negative emotion	Um. Yeah. There're times sometimes it when I feel like I want to be passive aggressive in a way. I want to tell, that I'm feeling down, but I can't really express it directly through Whatsapp, because I'm not the kind of person who actually express my feeling when I feel disappointed or sad.
2	**Constituents: Using *Empatchi***	**Statements describing the act of using *Empatchi* for Interpersonal Emotion Regulation with trusted circle**	
2a	Sending lightweight signal for sharing emotion	The act of sharing emotion with lightweight signal using *Empatchi*	I try to share emotion that I didn't share before.. for example, before using this app I experienced some negative feelings and I think I didn't try to show or share it, but after I started to use this application, I tried to share these emotions, and so she's trying to support me and can give me some words using this app, and I become better.
2b	Receiving lightweight signal representing others' emotion	The act of receiving lightweight signal from trusted circle representing their emotion	Yeah when I saw it... it's, I know something happened to her. Sometimes it's hard to detect her emotions so compared to text it's easier to detect emotion from *Empatchi* because from text message every time we don't talk about our emotion so it's a bit hard to detect or emotion from the usual text.

2c	Exchanging Support Messages inside *Empatchi*	The act of exchanging support messages with trusted circle inside *Empatchi*	So all this feedback, the good thing is for me I think is about the recording.. because I can see like the history thing... So it's more like when I get the support from my friend today it might not feel like "Oh, thank you very much!", but when I go back and see it again, looking at the history, I feel like, it sounded like a lot of good things happen, a lot of good supports happened. For me I feel positive in that way.
2d	Sharing with Trusted Circle / Strong-tie Connections	Statements describing how the closed network of *Empatchi* affect them to share emotion	But I think it's good that you only have a few people that are really close to you and decide who are you going to share your emotion with not like any other social media. As an introvert I feel comfortable to share everything.
3	**Challenges in using Self-Assessment Manikin**	**Statements describing the challenges of using SAM for sharing Emotion**	But also again. Because there are only four levels and it's only you're happy neutral or sad. I think it could be more if you know what a Facebook's I'm feeling happy sad this one, yeah, that kind of thing, more variety, I think that would be more interesting because I kinda like, I wanna get something that actually express my current feeling but I couldn't really find the right one so it's like sad and probably I don't remember what (did I do), but I put it as sad though
4	**Yields**	**Statements about the effect of interpersonal emotion regulation**	
4a	Reasurrance and Relief	Statements describing the feeling of reassurrance, relief, or improvement in affect	I feel better inside, I feel good... I kinda know that they know what I'm feeling and that's what I needed. I just want them to know, I don't know ... I think it's good enough to know that someone really cares about you, even it's only through the app, and I think it's good enough for me.
4b	Improved Relationship	Statatments describing changes/ improvement in relationship with others	I really like the idea of, it's like having to see my boyfriend's feelings, and then I'll be like feeding him with good comments and that's really nice. I think that's something very positive in someone's life. In my opinion they have more value,

			and more truthful, and more honest. I think you also get to know more about the other person. It adds, in my opinion, another dimension in my relationship.
4c	Sparking Conversations	Statements describing the effect on creating opportunities for further conversations	so I think it's more to an openness, because they're reluctant to share their emotions. It triggers what we're going to say during our chat or are video calls or skype, and we're going to talk about it, and it's really good that... like for example because I'm really self-centered person, and I know that they're feeling something too... I can like ask what they are feeling or what they've been going through. So since we start using the app, we had more deeper conversations about that.
4d	Self Awareness in Emotion	Statements describing the effect on self awareness in emotion, including self reflection and other act of intrapersonal emotion regulation	The thing that I felt the most was that it was like somebody told me like okay, this is a safe place for you to like ,like really tell how you are. On *Empatchi*, it was like the moment where I really kind of like self analyse my emotions, which didn't happen when I try to express it with whatsapp or other messages. Maybe the app just made me think more and aware about like how I was feeling.
5	**Use of Other Technologies**	**Statements describing the use of other Technologies in supporting Interpersonal Emotion Regulation**	
5a	Direct Conversation	Including Face to Face Conversation, Phone Call, and Video call	I normally share my emotions offline. I am not the person who share anything online and express my emotions. I usually call my friends my girlfriend and my family... For me I'm the person who talk a lot and be honest about my emotions when I share with people around me.. For example when I feel sad, I will call my girlfriend tell her why what happened today, I just need someone to listen to me.
5b	Text based conversation	Including text messaging, chat application, or e-mail	I think I found it really interesting I can have compare it to I don't know let's say like WhatsApp or other things.... it's become a bit more superficial.

			So you say on the surface of like you know, like daily life.
5c	Social Media	Including social media usage like Facebook, Twitter, or Instagram	I think for example in instagram, I kind of want to know what other people going to say about my picture

5.2.5. Ethical Implications

This study has been approved by City, University of London Computer Science Research Ethics Committee. During the ethics application process, there are several ethical issues that need to be considered for this study. The first one is how to deal with the sensitive data of people's emotion that were logged within the system. I overcame this issue by ensuring that the system is a stand-alone application and does not have access to or interact with any other apps like participant's contacts. Other than the registered trusted circle, no one will be notified when participant shares emotion. I also ensure that the data are transferred securely. All data gathered were password protected and stored securely, where only the researchers have access to the data. I also make sure that participants have right to withdraw from the study at any time, and I will destroy all of their collected data when they decide to do so. Another issue is to ensure that the system will not make people feel worse by using it. However, unlike another system where people explicitly write on negative emotional experience which can affect other people's emotion, this system does not share and does not focus the content of the reason behind that experience. I also ensure that my study focuses on a daily situation, where people experience daily ups and downs and will exclude the extreme case of stress, depression, or any other mental health problems. The ethics approval form is provided in the appendix.

5.3. Study Results

5.3.1. Descriptive Statistics of Shared Emotions and Exchanged Supports

Based on the emotion log collected from participants, we can show all shared emotions in graphs and classify it based on its characteristics (valence and arousal), time of the day or week when it was shared, participants, and the responses (support messages) that were sent to each emotion. Bar charts with different bar colours are used in visualising the result of this study

because we want to look and try to understand the frequency/ the amount of emotion shared for each level of valence and each level of arousal. The x axis of the bar chart can show the numbers of emotions shared by different participants, different time of day, or different day of week. Colour of bars corresponds to the colour representation of valence inside the *Empatchi* app (also shown in the legend). Description of each figure is shown below each plot/ graph.

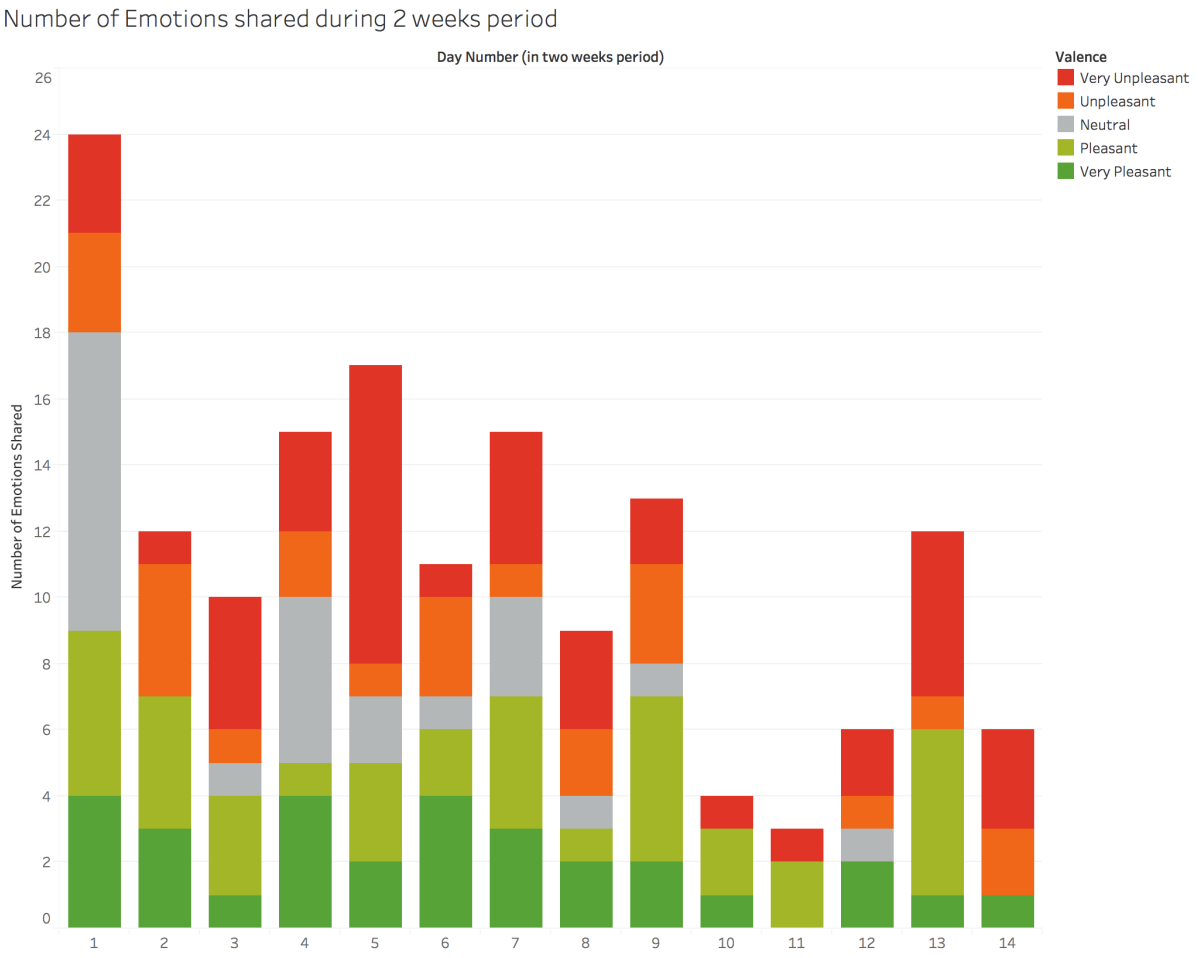


Figure 33 Number of Emotions Shared During 2 Weeks (14 Days) Period in Study 2

Figure 33 shows the number of emotions shared for each day number (in 2 weeks/ 14 days period). Colour shows details about valence, shown on the legend. Figure 1 shows higher number of emotions shared on the first week, with day 1 has a significantly high number of emotion shared. This shows that on day 1 participants might just trying to get use of the app by sharing emotions, so the emotions shared on day 1 is not relevant for later analysis. The following figures will exclude

the emotions shared on day 1, and focus on the rest of the days in 2-weeks period (Day 2 to Day 14).

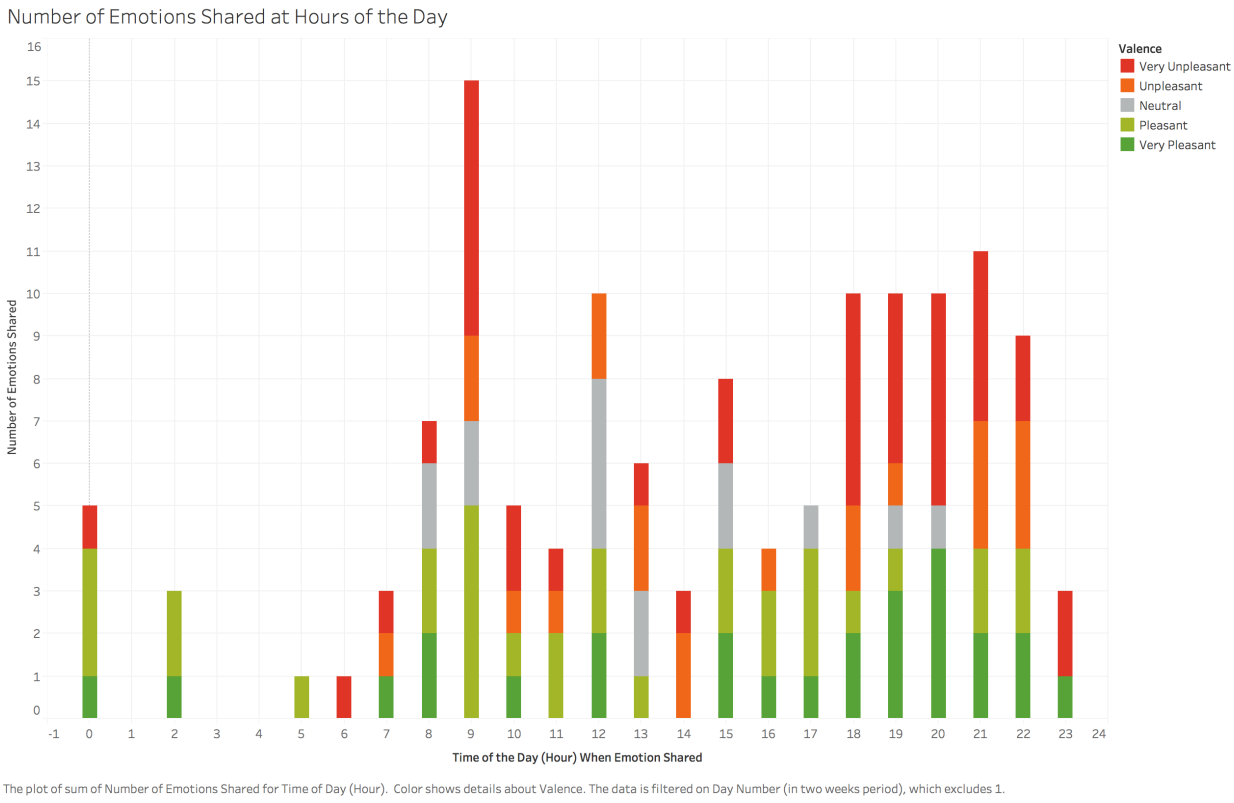


Figure 34 Number of Emotions Shared at Hours of Day in Study 2

Figure 34 shows the number of emotions shared for time of day (hours). Colour shows details about valence, shown on the legend. Figure 2 shows that most emotions were shared on 9 am, the same time when daily reminder to use the app for emotion sharing were sent to each participant. From this graph, we understand that a daily reminder for participants is useful to keep them engaged with the app, and to remind them to use the app as a tool to help them sharing their emotion.

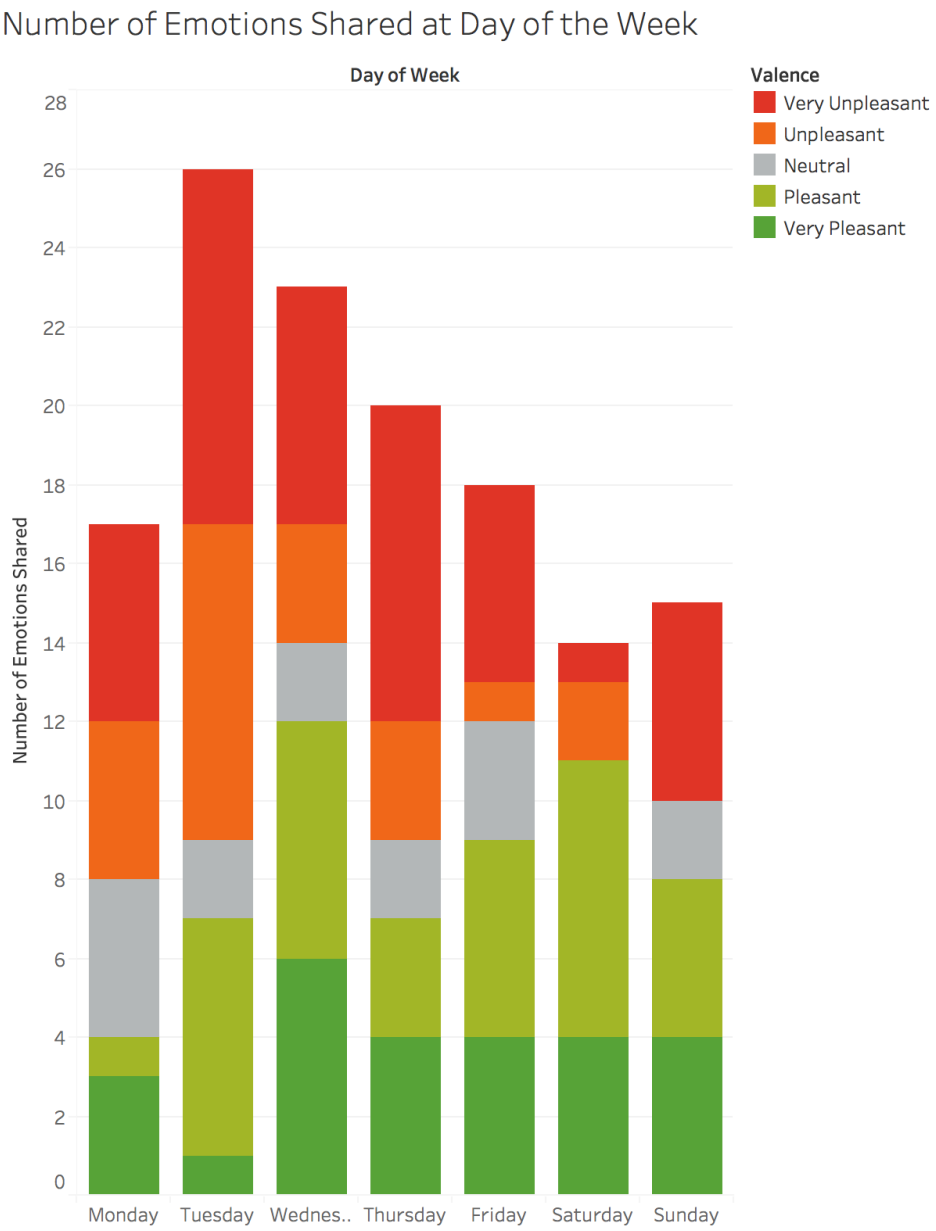


Figure 35 Number of Emotions Shared at Day of Week in Study 2

Figure 35 shows the number of emotions shared for each day of week. Colour shows details about valence, shown on the legend. Figure 35 shows that most emotions were shared on Tuesday, and in general emotions were shared more in the weekdays than in the weekend. This can be caused by two reasons. The first one is that most emotions are associated with events experienced during work or study period, and in the weekend, participants did not have as many emotional experiences compared to what they had during the weekdays. The second reason is that in the weekend, they have more chance to meet, talk, or engage in a direct conversation with the trusted circle to regulate their emotion, so they are able to use other tools that can facilitate this need rather than using lightweight signals that *Empatchi* provides. This showed us that *Empatchi* works best

as a tool to let each member of the trusted circle knows about how they are feeling when they don't have the opportunity to engage in further conversation. From the interview, some the participants stated:

#P5

I'm actually impressed with the concept of Empatchi as it simplifies everything. I live in a different timezone from him and to be able to summarise how I feel and to be able to explain everything in Whatsapp for instance will take some times and if I'm busy at certain times Empatchi can be a great help in just summarising everything off you in one day, and then just let him know how I feel .

#P7

I mean I've had some bad days. I think while using the app. So you know and my friend is quite a busy bloke. So you know he's working on quite a lot of project and all that... So for me I don't want to disturb any of these activities.. So through the app by setting my mood to red and then you know doing all that, it allows my friend to know that I'm feeling that way and then so he responds to that, and then I let him know that I kind of want to talk and then later on we can kind of just set a time where we where we are both available to talk to each other, and just talk about my feelings. I think that's quite helpful...

#P7

Well of course compared to an actual chatting platform like for example whatsapp or you know any other it's not as elaborate of course, but I think, that's that's where it works the best because the whole.. I feel like the premises you just let each other know how we doing but then we don't have to, you know, immediately get in contact. We can always contact later on when we're both available, so I think the short kind of responses allow us just to do that



Sum of Number of Emotions Shared for each Day Number (in two weeks period) broken down by Participant. Color shows details about Valence. The view is filtered on Day Number (in two weeks period), which excludes 1.

Figure 36 Emotion Sharing Daily Activity for Each Participant in Study 2

Figure 36 shows the number of emotions shared from day 2 to day 14 for each participant. Colour shows details about valence, shown on the legend. From this figure, we understand that each participant has his or her own tendency to share more positive valence or negative valence emotions. There are also participants with good balance of both positive and negative emotions shared. Based on this figure, the following figures will be analysed by categorising participants into three groups: Sharing more positive emotions, sharing mixed emotions, and sharing more negative emotions. The participants for each category are as follows:

Table 2 - Participant Categories based on the types of emotion shared

Participants	**Category**
P5, P7, P8, P9, P10, P11, P12, P13	C1 - Sharing more positive valence emotions
P3, P4, P14	C2 - Sharing mixed valence emotions
P1, P2, P6, P15, P16	C3 - Sharing more negative valence emotions

Based on these categories, the following figures (Figure 37, 38, 39) shows the number of emotions shared for each valence-arousal in Cartesian coordinate for each participant categories.

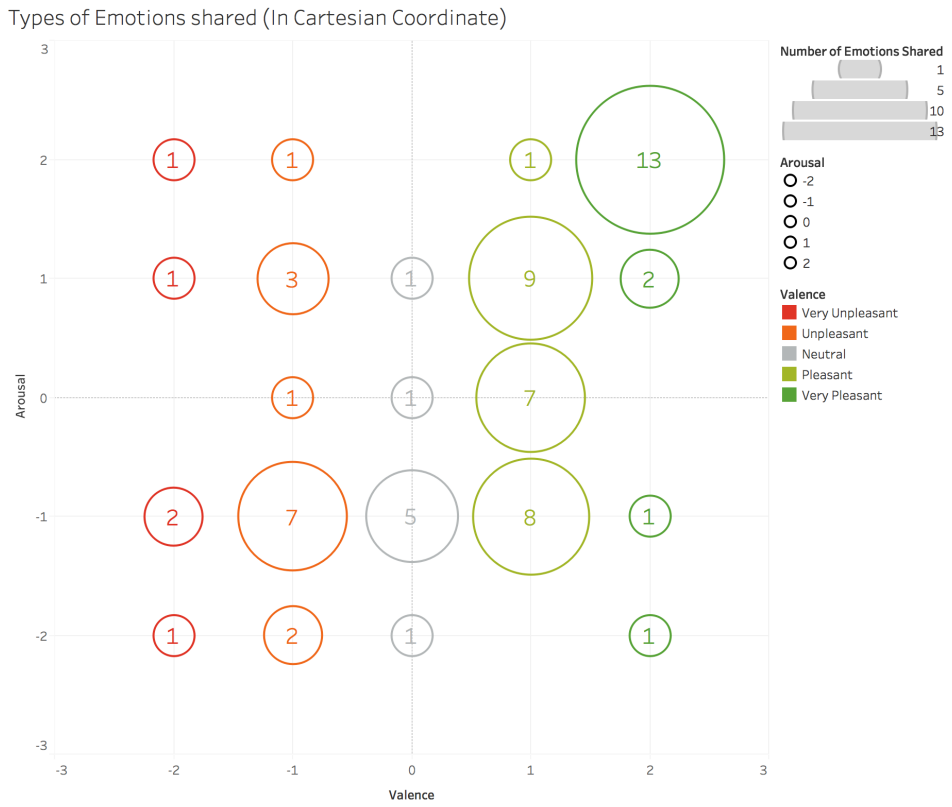


Figure 37 Number of Emotions Shared for C1 (In Cartesian Coordinate) in Study 2

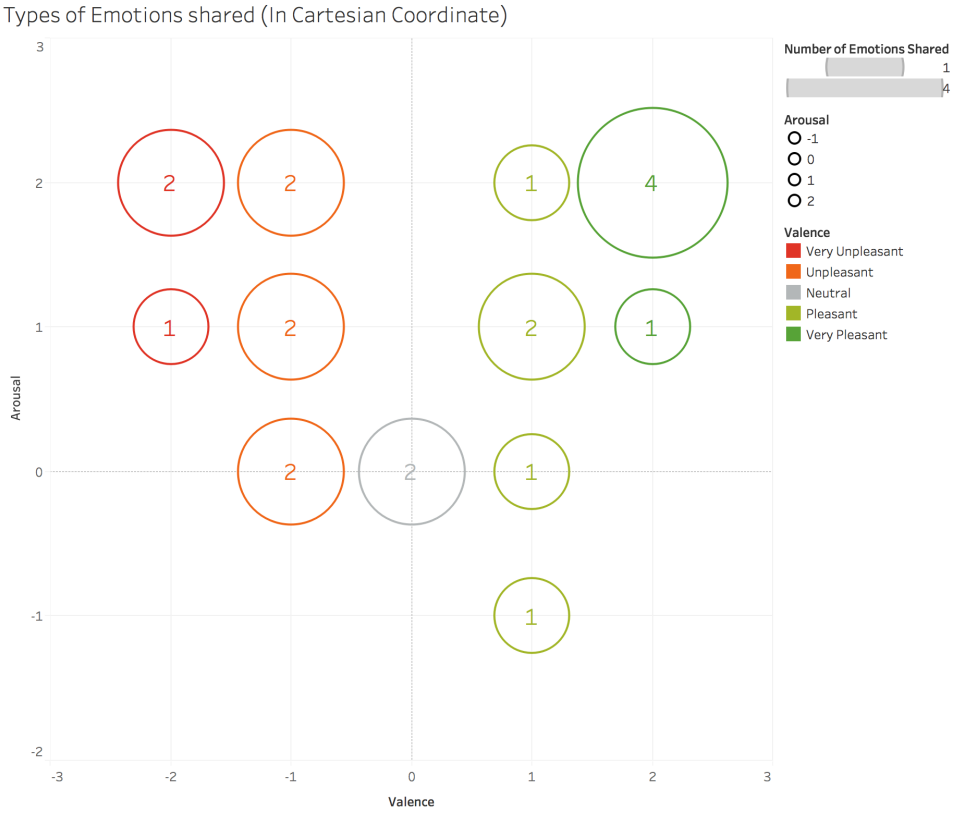


Figure 38 Number of Emotions Shared for C2 (In Cartesian Coordinate) in Study 2

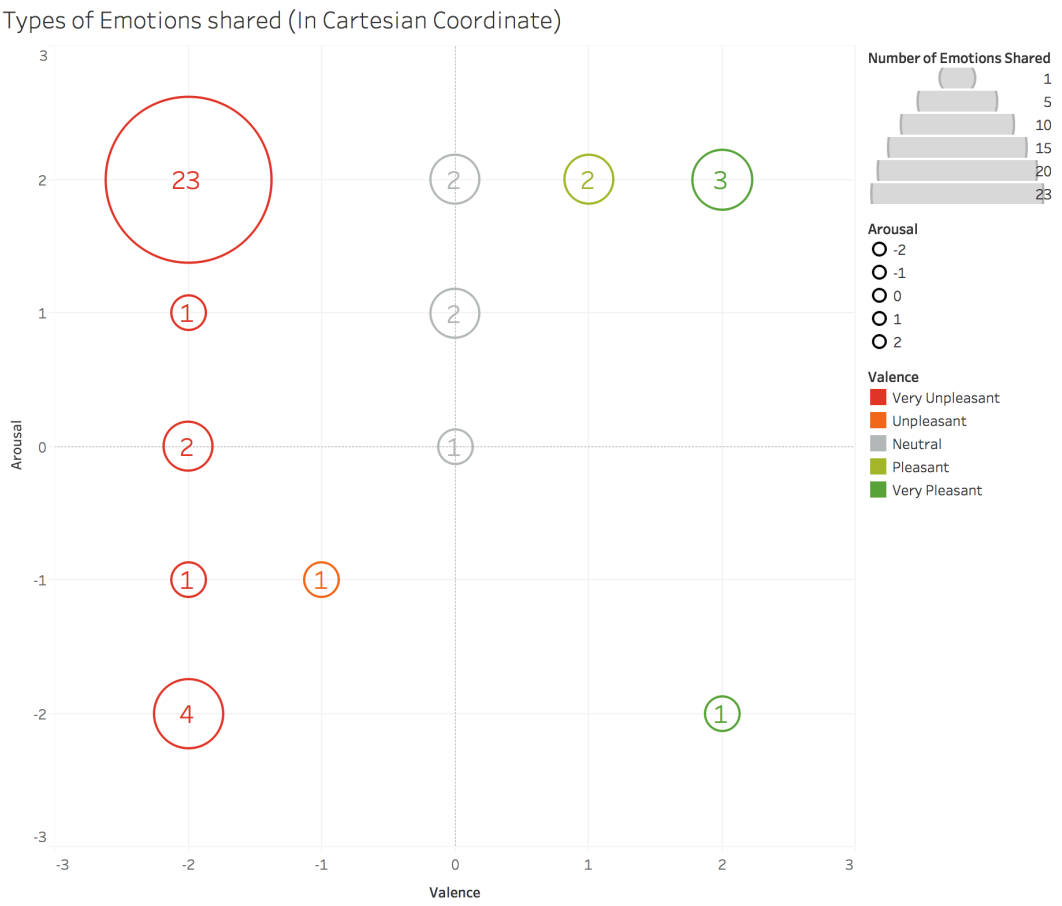


Figure 39 Number of Emotions Shared for C3 (In Cartesian Coordinate) in Study 2

Figure 37, 38, and 39 shows the number of emotions shared in Cartesian coordinate, with valence in x-axis and arousal in y-axis. Colour shows details about valence, shown on the legend. Size of circle shows number of emotions shared for each type of emotion. Each figure shows the trend of what type of emotions shared the most in each category: Positive emotions on Figure 37, a good balance of positive and negative emotions on Figure 38, and negative emotions on Figure 39. The similarity that we can find on all three figures are that emotions with higher arousal were shared more than emotions with lower arousal. The reason behind this is that participants might feel more need to share the emotion when the arousal level is higher.

Based on these figures, the following figures will focus on the valence of the emotion and analyse on how it affects the responses to the emotion. For this analysis, we are going to see participants in 7 groups of trusted circles, from group A to group G. Based on participants category, we can also categorise type of groups into the following:

Table 3 Group Categories based on the types of emotion shared

Groups	**Category**
D (P7, P8), E (P9, P10, P11), F (P12, P13, P14)	Cg1 - Sharing more positive valence emotions
B (P3, P4), C (P5, P6)	Cg2 - Sharing mixed valence emotions
A (P1, P2), G (P15, P16)	Cg3 - Sharing more negative valence emotions

Based on these categories, the following figures (Figure 40, 41, 42) shows the average response time (in hours) for each emotion type.

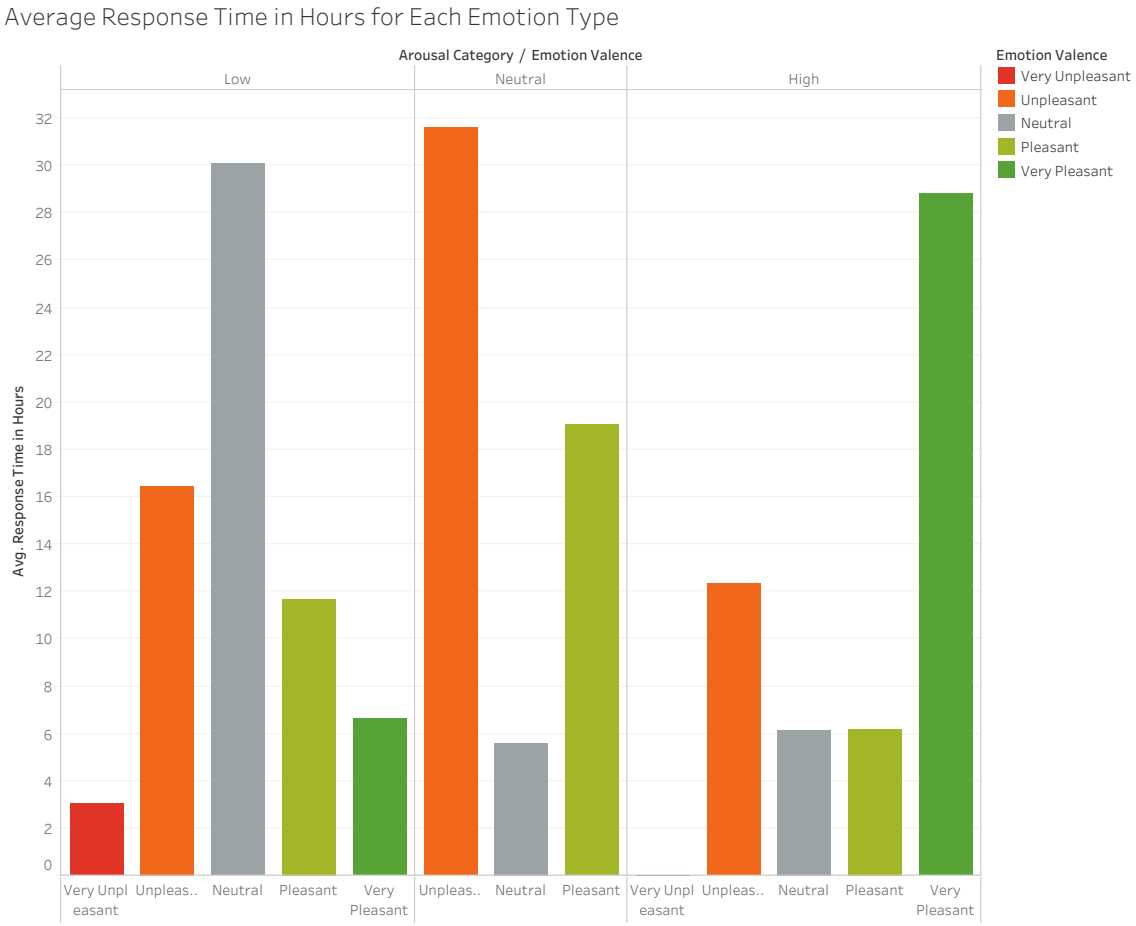


Figure 40 Average Response Time in Hours for Each Emotion Type in Cg1 in Study 2

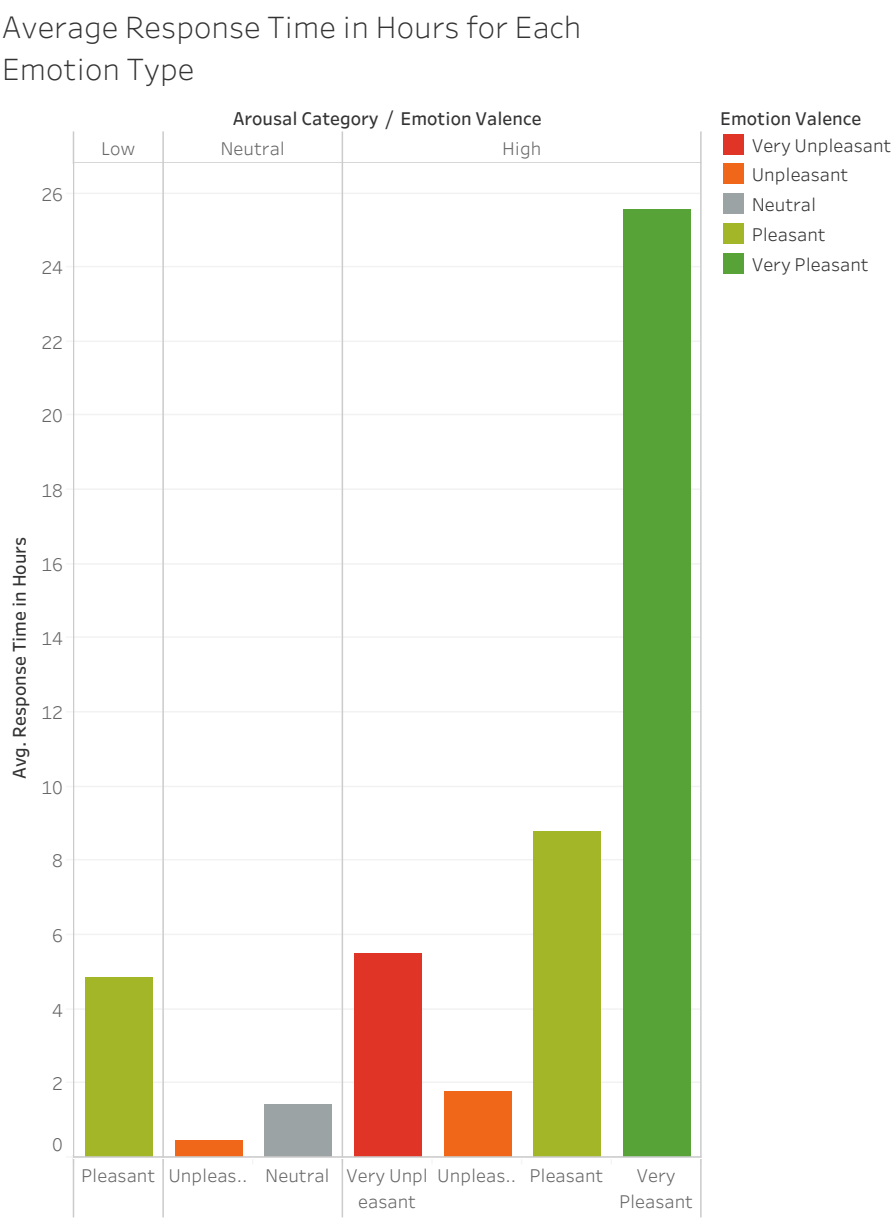


Figure 41 Average Response Time in Hours for Each Emotion Type in Cg2 in Study 2

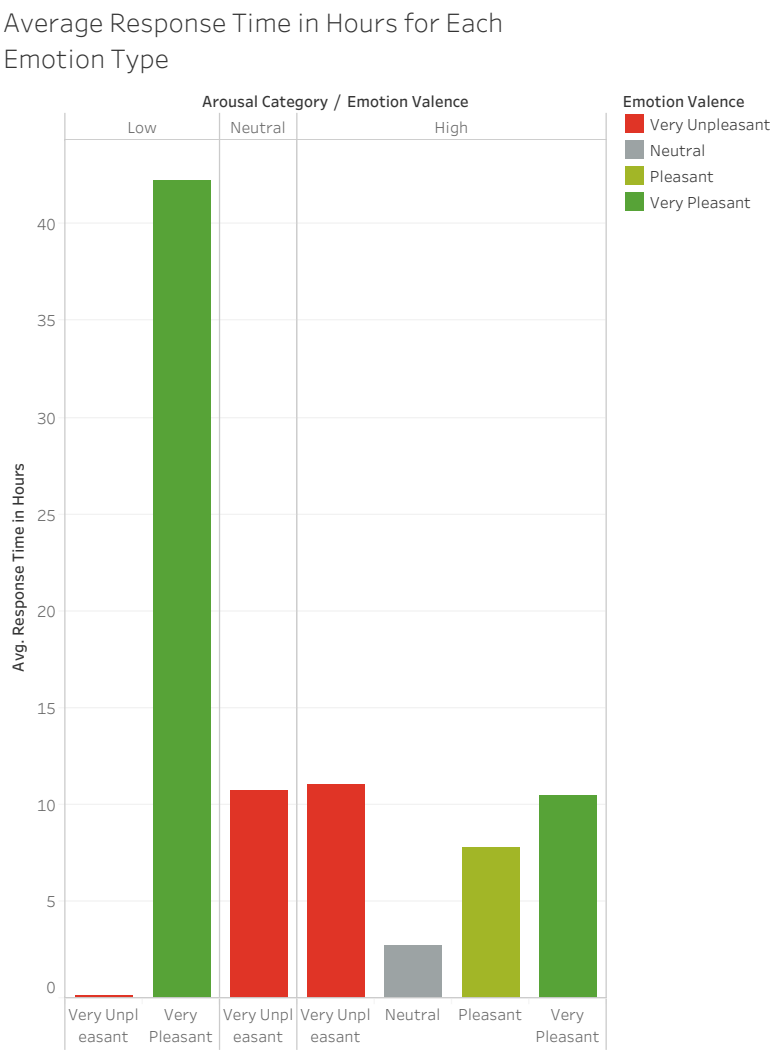


Figure 42 Average Response Time in Hours for Each Emotion Type in Cg3 in Study 2

Figure 40, 41, and 42 shows average response time (in hours) for each emotion type in Cg1, Cg2, and Cg3. Colour shows details about valence, shown on the legend. Figure 40, 41, and 42 shows that in every category, negative valence emotions has the shortest average response time, although the arousal level is different for each group category. This is caused by the worries and curiosity from the other member of trusted circle when someone shared negative emotion, they have more urgency to reach out to the emotion sharer. Some of the participants mentioned:

#P1

In fact actually I'm really curious what happened to her. That's what I did. Okay. What happened? I always send why, what happened to you, and then I try to give her support in Empatchi.

#P8

I personally have the tendency to whenever I'm on my phone, and I see the notification (from Empatchi), I reply to it directly. If I see it red, I will be, I'm kind of worried about what happened to him so I try to respond directly, because I know that he's in his in Japan and he is living alone, and he doesn't really have that much friend there.

#P9

When they show the extreme emotion, if they're really happy or very unpleasant, it really gets into my attention and I feel like hey, what's going on? or something like that, and I really mean it when I say okay, what happened? Let's have a call.

5.3.2. Thematic Analysis of Study 2 Result

Based on the established coding scheme that was described in the previous section, I conducted thematic analysis on our study 2 result. In the following sub-subsection, I describe the result for each coding theme.

5.3.2.1. Sharing Emotion

In study 2, 8 out of 16 participants talked about sharing their positive emotional experiences. while 5 out of 16 participants talked about sharing their negative emotional experiences. These results are shown in Appendix 14. As we have already observed from many studies in the literature review, people have less hesitation in sharing positive emotion. In this study, we understand that participants have more ability to articulate or verbally share positive emotions, and they tend to tell the story and the context of why do they feel happy. In this situation,

they did not use *Empatchi* because they feel limited in expressing the emotion inside the app. Instead, they tend to use direct conversation via phone or video call, and/or text messages. On the other hand, when experiencing negative emotion, most participants have difficulties in articulating the emotion/ expressing it verbally. In this situation, *Empatchi* simplifies how they can express the emotion and makes them easier to let others know how they feel. By looking at these examples, we understand that in positive emotion, participants have more ability to express verbally/ articulating the emotion and expecting implicit/ less verbal response/ support from their trusted circle. On the other hand, in negative emotion, participants have less ability to express verbally/ articulating the emotion and expecting explicit/ more verbal response/support from their trusted circle. Sharing emotion with *Empatchi* does not depend on what kind of emotion, but rather it is more on can they or do they want to articulate the emotion or to share it verbally. When they want to express more about their emotion, *Empatchi* feels limited, but when they hesitate or could not express it, *Empatchi* helps them and makes them easier to let others know about how they feel. I will explain more about this in the next theme.

5.3.2.2. Using Empatchi for Emotion Regulation

In Study 2, all participants reported the usage of Empatchi app to facilitate their emotion regulation process. The lightweight/phatic experience in sharing emotion was stated 63 times across all the data by all 16 participants. These results are shown in Appendix 15. For example:

"I guess when you share something you will raise the curiosity of your friends, and they will be like oh, why do you feel this way? And you can carry on a conversation. Before using this app, you may be bothering other people if you ask like, hey is it ok if we speak?" (P14)

"I try to share emotion that I didn't share before.. for example, before using this app I experienced some negative feelings and I think I didn't try to show or share it, but after I started to use this application, I tried to share these emotions, and so she's trying to support me and can give me some words using this app, and I become better." (P4)

"I think the whole idea of sharing it to Empatchi is you just need a media to tell how you feel right now, so in that sense, it sounds like your posting a tweet saying that I feel sad… you just want to express it, but you don't necessarily need an immediate response." (P5)

By looking at these responses, we understand how *Empatchi* affect participants sharing emotions and exchanging support messages with their trusted circle. The lightweight way of sharing emotion that *Empatchi* offers make it easier for participants to share emotions, especially at times when it is difficult to articulate the emotion or when they hesitate to share emotion. The way how they share emotion in *Empatchi* also provides the opportunity to comprehend their emotion, having to think of at what degree their emotion is. However, many of them are not familiar to use Self Assessment Manikin and they were struggling to use it for the first time. I explain more about this in sub-subsection 5.4.2.3. When sharing emotion, most of the participants do not mind of not getting immediate support or immediate conversation. Letting the emotions out/ venting it, and knowing that others know how they feel, is enough to regulate their emotion. They can have the conversation later when they have the opportunity. Although sometimes in extreme conditions when they feel that they need the support immediately, they also chose to directly text or call others asking for help.

In this study, the experience of getting lightweight updates from their trusted circle were mentioned 31 times across all the data by 14 out of 16 participants. For example:

"The strong point of this app is , I feel is the fact that I can just allows people, close friends to be straight with each other. They don't have to beat around the bush too much when they're talking in a when they're engaged in a conversation. They can just go straight into the matter at hand just solve the problem immediately because I think that's quite important . Often times there are people who have difficulties in expressing themselves, often times when they talk to even their closest friends, they would still talk but end up not talking what they want to talk about.. And this app prevents just that." (P7)

"Before I use the app me and [P7] has this tendency that we wait for each other whenever we want to talk about something. For example if I have something I want to share with [P7] especially, I just wait until he texted me. That's where I found Empatchi really helping me to just express myself and then he can ask me how I feel based on my emotion." (P8)

"But when we had an issue, for instance, then that's when Empatchi plays in role. He kinda, it kinda send me a signal that his, for example, his sadness is being amplified but he does not want to share it through WhatsApp." (P5)

When getting notified about their trusted circles' emotion updates, lightweight and straightforward emotional signals in *Empatchi* help them to understand how others are feeling. It was harder to understand how others are feeling from text messages or direct conversation. Most of the time they needed to guess others' affective state. When they receive straightforward emotional signals from others in *Empatchi*, they got curious about what happened to others, and try to engage in conversation by sending support and asking if the others are OK. A better understanding of how others are feeling also helps them to think about what they can do to help others, for example sending supportive messages. It also helps them to start talking about emotions when they have a conversation, something that they were not used to.

In Study 2, the experience exchanging support messages was stated 43 times across all the data by 13 out of 16 participants. For example:

"This app, it kind of helps just to jump straight into the matter.. We know how the other person is feeling so.. for example if my friend is showing a red on the app, which is sign for not very good mood I think? Yeah, well I can just ask them straight away, hey dude what's going on. Do you need some help or , or someone to talk to? Something like that. So, It's definitely helpful for both parties I think." (P7)

"I feel better inside, I feel good... I kinda know that they know what I'm feeling and that's what I needed. I just want them to know, I don't know ... I think it's good enough to know that someone really cares about you, even it's only through the app, and I think it's good enough for me." (P11)

"I think for me personally like I really... I really like it because like you don't need to read all those unnecessary text (like in chat history) and looking back at the history like what, what are the responses? I was like. Yeah, they do care, oh, they lift up the spirit, and like changed the emotions. It really helped to know that they got the notification, and I know that they know." (P12)

Before using *Empatchi*, emotions were not always shared/expressed verbally or explicitly even when they have a direct conversation. *Empatchi* helps to understand others better so that they know they also need to support others, before (by sending supportive messages) and when engaging in a conversation. The signals exchanged in *Empatchi* encourages participants to send cheering/caring messages by asking them, engaging in conversations, or by sending supportive messages because it is easier to understand how others are feeling. Cheering/caring messages that the participants received from others help in managing their emotion. Exchanging support messages also helps as reassurance and make them value how much they care to each other. Some of them were looking at the support messages they have received to make them feel better when they need it. The additional anticipatory message in the support messages were perceived as signals of others' willingness and thoughts of helping or supporting. The reassurance of having later conversation making them feel that they are not alone and thus help in regulating and managing their emotion.

The importance of having a trusted network to share emotion was stated 12 times across all the data by 10 out of 16 participants. For example:

"Unlike facebook, I feel more comfortable in sharing my emotion with my close friends in this app, because I know that they will see it and they will support me in a way. I feel more comfortable to ask them for dinner, to discuss about my feelings." (P11)

"Empatchi, for me, it became like a like a place in which we knew we were vulnerable, in a place, I don't know, for me... I could be like sensitive or I could share because it was like specifically for sharing emotions. So it became like a place,like nobody has a facade. In my opinion, I feel safe like, I can share everything and then it was like okay to be bad, like okay to be sad, and okay to be that and then because I knew that I will receive support, so it was like fine." (P3)

"I think I only share with people, who, even if I'm right or wrong they will support me. If I share online, some people might not agree." (P9)

By having to share it only with trusted circle/ people whom they care the most, most participants feel that *Empatchi* is a safe place to be vulnerable to share emotions, which also helps

them to share more emotion. In *Empatchi*, participants do not think of how their trusted circle will think when they share either positive or negative emotion. The hesitation of sharing emotion caused by the fear of being judged which happens in social media does not happen in *Empatchi*, because they trust that everyone in the trusted circle will always support them in any condition. In *Empatchi*, they can be more honest with themselves and their trusted circle about their emotions, which improved their emotional understanding, both to self and others. I explain about the yields/effect of interpersonal emotion regulation with *Empatchi* in sub-subsection 5.4.2.4.

5.3.2.3. Challenges in Using Self-Assessment Manikin

In Study 2, all participants reported the challenges in using the Self-Assesment Manikin scale to express their emotion. These challenges were mentioned 29 times across all the data. These results are shown in Appendix 16. For example:

"About the scale, if I'm not that unhappy, I rarely choose 1 or 5, I try to choose between 2,3, or 4.. you know what I mean.. I think it's another challenge to express.. I think if you come up with one keyword, for example if I'm very happy and very active, it can be, oh I feel very awesome today, I think I feel more connected that way. I think people need more example about what each scale means. I just feel like it's sometimes difficult for me to rate my emotion today. It's not like, a standard for everyone. We don't know why people rate 3 or 4, for my personality, I try to avoid selecting 1 or 5. When I don't see sample scenario, I have no benchmark. But if I rate yesterday, today would be easier to rate because I can compare with how I felt yesterday. Maybe if you can have some questions to lead or to help me rate, I can feel more connected to the app." (P9)

"It is a bit confusing at first, but I think as I use it for a while I get to understand. I also discussed it with my wife and we tried to figure out what does it mean." (P15)

"In the first few days I'm using this application, I felt like there must be a way where I can just share how I feel, just... Just to be more specific about what I feel. That's just what I was thinking back then but the more I use the app, the more I understand the whole purpose of the app, and I feel like it's more simple basically." (P8)

By looking at these responses, we understand that participants were facing difficulties in using SAM scale for the first time. The idea of expressing emotion in two scales: valence/pleasantness and arousal/activation, is new for them and they argue whether it is enough to express the emotion. Some of them think that it might be better to include an option to put a short text status message about their emotion. Other participants also mentioned about the icons of SAM scale that are often confusing and misleading. While the valence parameter is straightforward and easy to understand, many participants feel confused especially in the arousal parameter. We also understand that they get to understand the SAM scale as they use the app. Some of them also mentioned that having the benchmark of comparing the emotion with their past emotion or their trusted circle's emotion can help them in defining their emotion in SAM scale. In this version of the app, there was no dedicated menu for looking at the history of emotions. They can only see their past emotions by looking at support exchange history if the emotions were getting responses from the trusted circle. Supporting users to see and reflect on the past emotions by providing a dedicated function will be the new feature for the improvement of the app to support participants in sharing emotion in Study 3.

5.3.2.4. Yields

Yields reflects the consequences of the act of emotion regulation. In Study 2, the effects of using Empatchi app to facilitate their emotion regulation process were mentioned 52 times across all the data by all 16 participants. Based on the participants' responses, 4 sub-themes were distilled as the effect of their emotion regulation process. 9 out of 16 participants reported relief and reassurance after using Empatchi for emotion regulation. 7 out of 16 participants reported improved relationship with their trusted circle as the effect of using Empatchi. 11 out of 16 participants stated that the lightweight interaction in Empatchi sparks conversation between them and their trusted circle. Finally, 9 out of 16 participants reported increased self-awareness of emotion as they were using Empatchi to facilitate their emotion regulation process. These results are shown in Appendix 17. For example:

“I think it's good that you only have a few people that are really close to you and decide who are you going to share your emotion with not like any other social media. As an introvert I feel comfortable to share everything.” (P2)

“I really like the idea of, it's like having to see my boyfriend's feelings, and then I'll be like feeding him with good comments and that's really nice. I think that's something very positive in someone's life. In my opinion they have more value, and more truthful, and more honest. I think you also get to know more about the other person. It adds, in my opinion, another dimension in my relationship.” (P3)

“We don't know when to, you know, talk about feelings because it's kind of a touchy subject i guess? So, it's quite a difficult subject to approach, so we don't want to offend or make our friend uncomfortable. But, with this app, it's you know, we sort of already know what he's feeling. So you know in a way, we know that they want us to engage in a conversation.” (P7)

“It's nice to be able to notice like a little difference in, you know, all the negatives (emotions) like that, You didn't actually think it's a big enough to you to actually call up your friends and stuff like that, so it's a good way to discover more about emotion.” (P10)

5.3.2.5. Use of Other Media for Emotion Regulation

In Study 2, the use of other media for participants' emotion regulation need were mentioned 51 times across all the data by all 16 participants. Based on the participants' responses, 3 sub-themes were distilled as the effect of their emotion regulation process. 14 out of 16 participants reported about using direct conversation, 10 out of 16 participants reported using text-based messages, while 7 out of 16 participants described about their experience on using social media to facilitate their emotion regulation process. These results are shown in Appendix 18. For example:

"When I share my emotions especially bad emotion to Empatchi, most of the time I need a support immediately from her. But if she hasn't replied, I will, I will try to reach her by using a call. If she's not picking up, I will try to leave a text/message to her but not using Empatchi, but other whatsapp probably, to share." (P1)

"I think it's also the reason when we feel happy and when there are so many things we wanna talk about. We don't use Empatchi to share that we are happy. We just share it, we have so many energy to share that this is da-da-da-da on the WhatsApp" (P5)

"Well I think usually on social network, you tend to only share about positive stuff, so you're not looking forward to tell your concern or condition to your friend. That's what I feel prior to using Empatchi. For me social network is not so... isn't so intimate, because it has bigger crowd... So you usually only curate the positive contents, thinking it might bother other people and you don't feel good when you share all the negatives. I'm more like sharing good experience, so it's kind of like you doing it because you want to sort of remember and at the same time be able to let people know what you're up to, but I guess for the negative part isn't really considered because you only want to portray only like to know the OK side of your life." (P10)

Direct conversation with phone calls, video calls, or even text-based message was used when they want to express more about the emotion verbally. Many participants feel that most of the time, the conversations happen on the surface and it was hard to talk about a sensitive subject like feelings or emotion. They also struggle to figure out others' emotion by catching implicit cues during the conversation. Direct conversations also require a time commitment from everyone

involved, so it is challenging especially for participants in a long-distance relationship with their partner, friends, or family. *Empatchi* helps them to solve these issues by providing a lightweight and straightforward emotional signal exchanges with their trusted circle and the ability to send caring and thoughtful supportive messages without having to be committed in an immediate direct conversation. However, most of them still use messaging app like WhatsApp when they feel expressing emotion with *Empatchi* is not enough and they want to engage in more verbal and explicit conversation with their trusted circle. Some of the participants also feel that they are still not getting used to *Empatchi* as their to-go app when they need to share emotion with their trusted circle. Regarding the use of social media, some of them find it difficult to express through these media, especially when they are experiencing negative emotion. In particular, social media were used mainly to share positive emotions, when it is not something private. Participants afraid of being judged when sharing negative emotions through social media.

5.4. Design Implications

The findings in this study demonstrate the key features where *Empatchi* is useful to support interpersonal emotion regulation:

- Venting emotion: Being true and honest to oneself, being vulnerable to others
- Alert/Signaling system: Letting others know can help in regulating emotion
- Better understanding in self emotion and how others feel
- Encouragement to support others
- Yields: Reassurance and Relief, Improved Relationship, and Sparking Conversations

We also understand that some participants have challenge in rating their own emotion, while some others feel that the app increased their self-understanding of their own emotion after reflecting on what kinds of emotion have they shared to others. Based on these findings, to improve our proposed system and to help the self-reflection process of emotion regulation, we need to give people insight into their emotional state over time, which can hopefully increase their emotional literacy. By looking at what emotions they have shared (not just what support they provide or

received), they know how their emotions change over time, which can hopefully help them to rate and express their emotion with the SAM scale.

One of the important thing in improving the system is to keep it lightweight and focused into our core objectives, not to provide invasive and unnecessary features that can possibly harmful by the distraction it may cause. The app is designed to fill in the gap, to facilitate and to complement, not to substitute text-messaging app or social media.

6. Study 3: Investigating Self-Reflection Process in *Empatchi* 2.0 for Supporting Interpersonal Emotion Regulation

6.1. Introduction

Study 2 evaluated the *Empatchi* system as a technology to support people to cope with daily ups and downs by sharing their emotions with their trusted circle (strong-tie connections). We investigated how people use our system to share emotions, as well as giving and receiving feedback of appreciation and support.

The results of the study have shown that *Empatchi* was used as a medium to vent emotion, to signal others and to let them know about users' current emotional states, especially when they could not or did not want to articulate the emotion. The lightweight signals that were exchanged in *Empatchi* also made participants more aware of the emotional states of the people they care about the most, as well as encouraging them to support each other. Other results from the study have also shown that the system encouraged them to be more self-aware about their own emotional states, a process of self-reflection which is a part of intrapersonal emotion regulation. However, many of them struggled to use the SAM (Self-Assessment Manikin) as a method of reporting their own emotions.

In this chapter, I describe Study 3, which focused on investigating the process of self-reflection, how it solves the challenge in using the SAM method that they were facing in the previous study, and study its role in helping individuals to understand, manage or regulate their own emotions. I provided an additional feature in *Empatchi* to allow users to self-reflect on their emotion to help to increase their emotional literacy which can support the interpersonal emotion regulation process.

The contribution of the study presented in this chapter is a demonstration that an interactive system can be designed to support self-reflection, sharing emotion, and exchanging

support: the integrated cycle of intrapersonal and interpersonal emotion regulation. I assume that this demonstration positively answers part of research question RQ2.

6.2. Research Questions

The following research questions were established for this study:

RQ3-1. Does giving people insight into their emotional states over time in *Empatchi* increase their emotional literacy and change how they interact with their trusted circle?

RQ3-2. How does improved emotional literacy make people understand the SAM (Self-Assessment Manikin) method better?

RQ3-3. How does the self-reflection process help in the Interpersonal Emotion Regulation process?

6.3. Study Setup

6.3.1. Participants

In total, 19 people (15 females, 4 males) participated in the experiment. Participants were recruited through posters displayed at City, University of London, Social Media Post (Tweet and Facebook Post), and convenience sampling through personal contacts. The inclusion criteria for study 2 participants are as follows:

- Above 18 years old with a regular routine of work or study across the week. The groups will have a minimum of 2 people and a maximum of 6 people.
- Participants were recruited as groups of people who have strong-tie connections (Howard et al. 2006, Huszti et al. 2013). In the literature, strong-tie connections are defined as family ties, (close) relatives, or intimate friends with frequent/daily contacts.
- All group members use smartphone (iOS) on a regular basis.
- Everyone in the group knows each other and is willing to share emotion data with each other.

- Do not live together / Work or study in different places if living together i.e. conduct their main daily activities in different places.

The exclusion criteria for study 2 participants are as follows:

- People categorised as vulnerable adults (because of their social, psychological or medical circumstances)
- People with depression, or any other mental health issues
- People with serious health issues or under serious medical treatment

6.3.2. Procedure

The participants were instructed to interact with the app on their smartphone and share their emotions with the group using the SAM (Self-Assessment Manikin) and to send support to other members. Every group member was notified when any of the members share an emotion. Participants were instructed to interact with the app over a two-week indirect observation period. They were also instructed to answer several short questions at the end of the day which will be explained in the later section. This indirect observation period was followed by a follow-up interview, which gave participants opportunity to explain, clarify, and expand upon the responses they have collected.

For this study purpose, participants are not required to sign up to use the app. Participant group who already agreed to participate on the study will be registered on the database. Each of the participant will be assigned one unique email address from Empatchi server to be used as the login credential. Since they are already registered as participant group, each of the participant inside a group will be already connected to each other as a trusted circle/group so that they only need to login without having to add their friends to the trusted circle.

6.3.3. Materials

6.3.3.1. Empatchi App

Participants were instructed to download *Empatchi* App from Apple App Store during indirect observation period. The design and implementation of the app were described in Chapter

4. All the interactions within the app were recorded (timestamp, sender ID, receiver ID, and types of interaction (which feature of the app used, what kind of messages being exchanged)), and will be automatically sent to a secure database hosted using SSL (Secure Sockets Layer). The logged emotions will only be shared among a closed group of strong-tie connections, where they have all agreed to share their information with each other.

In Study 3, participants were provided an additional feature in *Empatchi* to see how their emotional state changes over time. This feature is intended to support the self-reflection process, our main focus for this study, and also to solve the challenge in using SAM to report emotions. In addition, participants can also see the emotion history of each member of their trusted circle. The information will be shown in cards, showing the valence, arousal, and the time when the emotion shared. This additional feature is shown in Figure 43.

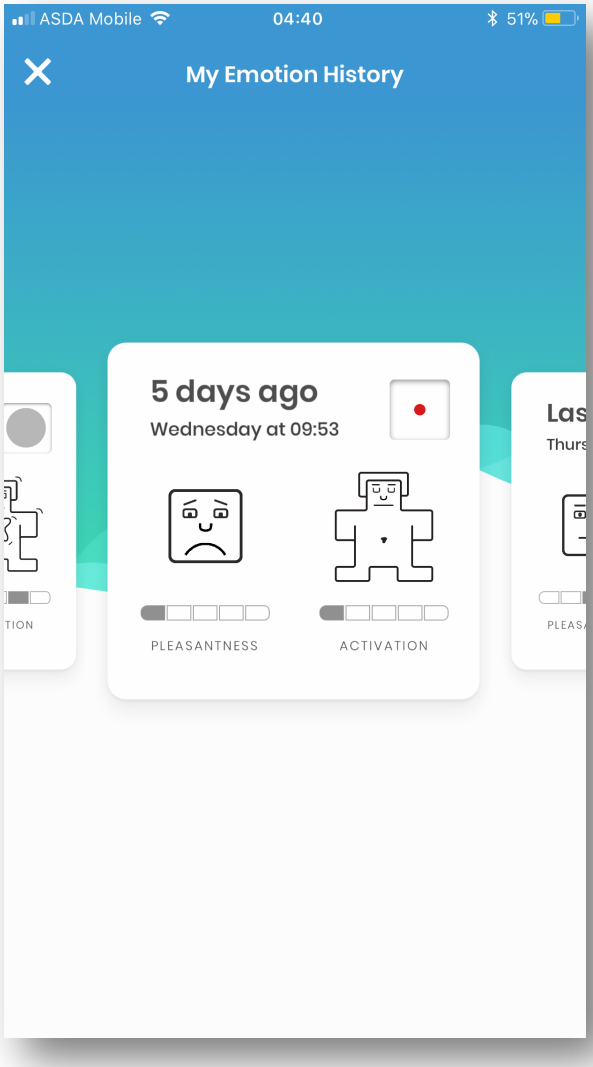


Figure 43 Self-Reflection Screen on Empatchi

6.3.3.2. Daily Questionnaire

Users were prompted to answer few questions at the end of the day. A notification will be sent at 9 PM every day during the indirect observation period to remind participants to fill the questionnaire. This study adopts the experience sampling method as a longitudinal approach to gather participants' behaviour, thoughts, and feeling on a certain occasion over a period of time. The questions were focused around their interactions with each other for interpersonal emotion regulation and investigated whether they reach out to each using communication technologies other than the app.

- How easy was it to use the SAM to report your emotional state today? (in likert scale)
- How easy was it to record the valence using the SAM method? (in likert scale)
- How easy was it to record the arousal using the SAM method? (in likert scale)
- Have you gained any insight into how your emotional state changes over time?
- Does looking at your emotional state over time help you to share your emotions with your trusted circle?

6.3.3.3. Follow-up Interview

The data gathering of the study was conducted over a period of two weeks. After the data gathering period was finished, an individual follow-up interview with each participant was conducted, which gave the participant the opportunity to explain, clarify, and expand upon their responses. The session was audiotaped and lasted not more than 45 minutes. The interview was a reflective discussion based on the responses collected from the participants. Their responses during the observation period were the starting point for the conversation between the researcher and participants and were focused on their interactions with the app. Participants were also asked if they have any feedback on or suggestions about the app. The interview topic guide/ example questions are as follows:

- Tell me about your experience of using the app. How did it change the way you communicate your emotions and receive feedback with your strong tie connection group?
- Tell me about the times when the app helped you the most to cope with your daily ups and downs
- How do you feel about the SAM method to record emotional states?
- Did your view of using the SAM method to record emotional states change over the study period?
- Do you think reflecting on how your emotional states changed over time helped you in sharing your emotions with others?
- Did you ever find the app confusing?

- Did the app influence the way you communicate with other people in your trusted circle?
- Tell me about the times when you communicated with each other outside the app
- Tell me what you liked the most about the app
- Tell me what you liked the least about the app

6.3.4. Analysis Method

Gathered data, supported by daily questionnaires and follow-up interviews, were thematically analysed by coding the responses to major themes, ideas and concepts. The following coding themes were established based on the thematic analysis framework of Study 2: Themes that characterise the act itself (Constituents), reflect the consequences of the act (Yields), Challenge in using SAM method in Empatchi, and Use of other technology for emotion regulation during the study period. We also want to understand how the self-reflection feature are used in Empatchi 2.0, so I also introduce new coding sub-theme for that purpose. The coding definitions and example are shown on Table 4.

Table 4 Coding List for Study 3

No	Code	Definition	Example
1	**Constituents : Using *Empatchi***	**Statements describing the act of using *Empatchi* for Interpersonal Emotion Regulation with trusted circle**	
1a	Sending lightweight signal for sharing emotion	The act of sharing emotion with lightweight signal using *Empatchi*	"I think it's very important to let your friend knows when... you know, sometimes we don't want to tell anything about it.. We just want to show the feeling like: I'm sad, what's going on with my life.. I just want to tell them that I am sad and I would like to go out and and have fun.. I just want them to know that"
1b	Receiving lightweight signal representing others' emotion	The act of receiving lightweight signal from trusted circle representing their emotion	"Both of us are quite busy, we have to work so we don't actually have a lot of time to chat and having an intimate communication. This is very helpful because I can react quicker than I used to be. Before, I need to guess how she feels from the music that she listened or how she types in the chat. This app is more like a straightforward signal. I need to make sure that I am there when she needs me."
1c	Exchanging Support Messages	The act of exchanging support messages with trusted circle inside *Empatchi*	"I feel so curious. Okay. What is the reason? What is the cause of his feeling right now?

	inside *Empatchi*		So, the first thing I did when I saw the notification that he just updated his emotion, I send him a support and then I follow up using WhatsApp."
1d	Self-reflection	Statements describing the act of looking at how emotional state changes over time	"When I was looking back at my emotion history, because it was full of something unpleasant, I tried to talk to myself like well, uh, it seems like I tend to share my emotion to my inner circle if I feel something unpleasant, and it's really rare for me to share my feelings when I get very happy or joyful. Maybe I would say that it is not directly helping me to share, but I got to understand that I need a support particularly when I feel sad or I have something bad during the day, I tend to share my emotions to get support."
1e	Sharing with Trusted Circle / Strong-tie Connections	Statements describing how the closed network of *Empatchi* affect them to share emotion	I think it is the fact that we can only use this with a very limited people. But I imagine if I have like 11 people, I don't know how it will look like in the screen because right now it looks fool with only four people. Maybe we can divide to different groups of, let's say your really close friends and your colleagues. So I think uh, even like with your colleagues you have like the closest friend among them, so you can share something that is more related to work. For example if I have a really bad day because I am very overwhelmed with work today, I think we can relate to each other and discuss it.
3	**Challenges in using Self-Assessment Manikin**	**Statements describing the challenges of using SAM for sharing Emotion**	"I think it's it's actually good enough for me to actually express the complexity of the emotional state with this two parameter. For me, with the smaller activation I just want to keep it for myself very very deeply, so you need to approach me and ask me and make me tell the story."
4	**Yields**	**Statements about the effect of interpersonal emotion regulation**	
4a	Reasurrance and Relief	Statements describing the feeling of reassurrance, relief, or improvement in affect	"Okay, so the good part of my experience is that after I came home from the office, sometimes I just feel like , really really tired and then I can see from the app that, Oh, okay I'm not alone since my friends are also feeling the same thing. I feel that I'm not the only one, I feel connections with them. I can relate with their emotions."
4b	Improved Relationship	Statatments describing changes/ improvement in relationship with others	"I think our communication is currently becoming more intense more personal and also more frequent. Okay, especially when we talk about emotion. Before, it was only about like, something really really common, Like what do you think about this research, like a simple discussion about our life, or our common

			interest, or just commenting on his posts on Instagram. But after using this is this application I can say that our communication is becoming more intense.”
4c	Sparking Conversations	Statements describing the effect on creating opportunities for further conversations	“It's absolutely changed how we communicate, because uh, because emotion is something personal.. After I get his emotion update, I follow up to ask about the cause of his feeling and we, um, finally talk about something personal that may be bothering his mind. And of course the frequency is also increased.”
4d	Better Understanding in Emotion	Statements describing the effect on better understanding of own’s emotion and others’ emotion	“Before I know this app I was just like a guessing what is she feeling and then this app made me communicate with her better I think. Personally it helps me to understand others and others' emotion because I know empathy is an important thing and we need to communicate it better with people. Because I can, you know, show my empathy easily because I know what was the emotion that she is feeling, and so it helps me to support her better. Because to be honest, sometimes it's hard for me to, you know, to understand what others are feeling just by looking at them, but um, you know, by using this app at least I have the understanding about what they're feeling right now.”
5	**Use of Other Technologies**	**Statements describing the use of other Technologies in supporting Interpersonal Emotion Regulation**	“.. but in social media I think it is more real time, for example when I'm stuck in the traffic and then I really have a bad mood and then I can like snap a picture and then post it, so it has more details ”

6.3.5. Ethical Implications

This study has been approved by City, University of London Computer Science Research Ethics Committee. During the ethics application process, there are several ethical issues that need to be considered for this study. The first one is how to deal with the sensitive data of people's emotion that were logged within the system. I overcame this issue by ensuring that the system is a stand-alone application and does not have access to or interact with any other apps like participant's contacts. Other than the registered trusted circle, no one will be notified when participant shares emotion. I also ensure that the data are transferred securely. All data gathered were password protected and stored securely, where only the researchers have access to the data.

I also make sure that participants have right to withdraw from the study at any time, and I will destroy all of their collected data when they decide to do so. Another issue is to ensure that the system will not make people feel worse by using it. However, unlike another system where people explicitly write on negative emotional experience which can affect other people's emotion, this system does not share and does not focus the content of the reason behind that experience. I also ensure that my study focuses on a daily situation, where people experience daily ups and downs and will exclude the extreme case of stress, depression, or any other mental health problems. The ethics approval form is provided in the appendix.

6.4. Study Results

6.4.1. Descriptive Statistics of Shared Emotions and Exchanged Supports

Based on the emotion log collected from participants, we can show all shared emotions in graphs and classify it based on its characteristics (valence and arousal), time of the day or week when it was shared, participants, and the responses (support messages) that were sent to each emotion. Bar charts with different bar colours are used in visualising the result of this study because we want to look and try to understand the frequency/ the amount of emotion shared for each level of valence and each level of arousal. The x axis of the bar chart can show the numbers of emotions shared by different participants, different time of day, or different day of week. Colour of bars corresponds to the colour representation of valence inside the *Empatchi* app (also shown in the legend). Description of each figure is shown below each plot/ graph.

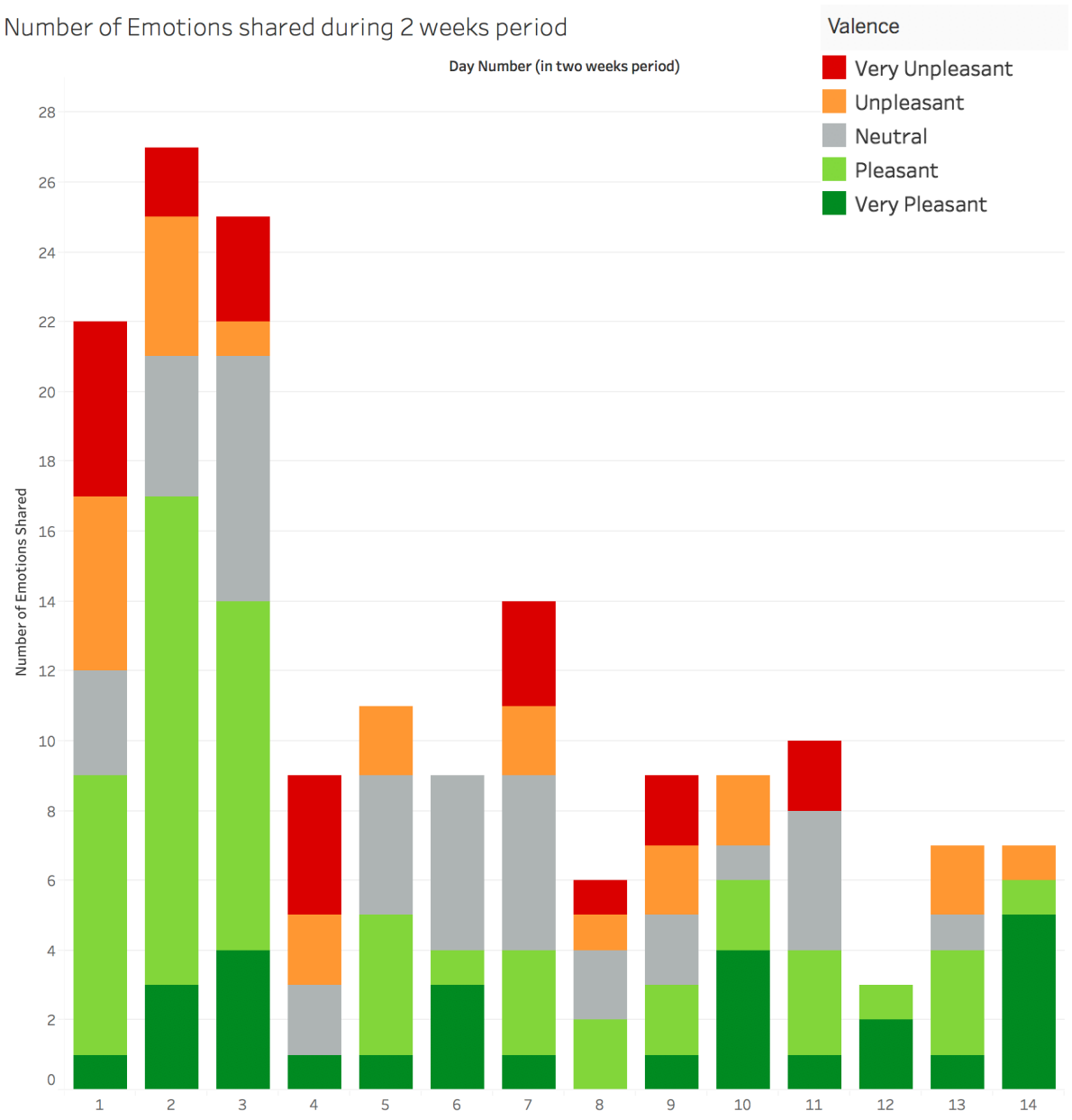


Figure 44 Number of Emotions Shared During 2 Weeks (14 Days) Period in Study 3

Figure 44 shows the number of emotions shared for each day number (in 2 weeks/ 14 days period). Colour shows details about valence, shown on the legend. Figure 44 shows higher number of emotions shared on the first week.

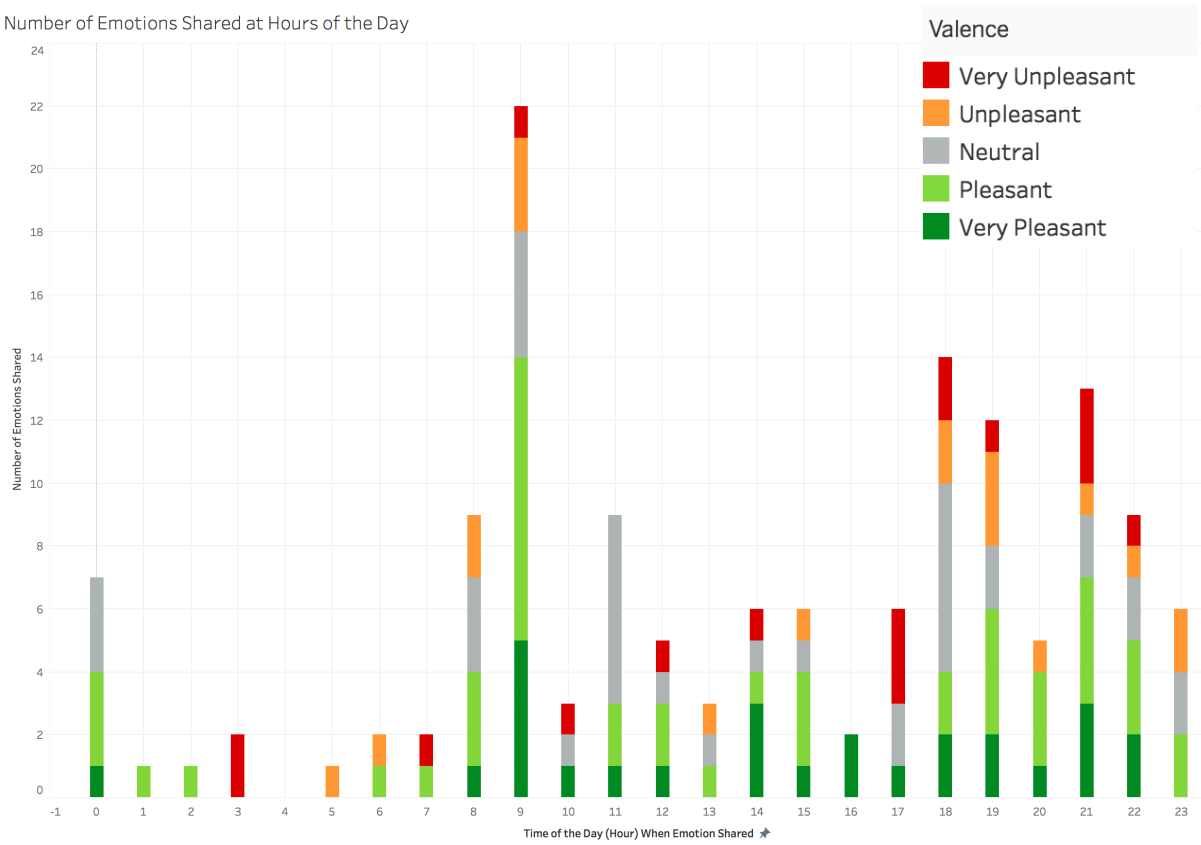


Figure 45 Number of Emotions Shared at Hours of Day in Study 3

Figure 45 shows the number of emotions shared for time of day (hours). Colour shows details about valence, shown on the legend. Figure 45 shows that most emotions were shared on 9 am, the same time when daily reminder to use the app for emotion sharing were sent to each participant. From this graph, we understand that a daily reminder for participants is useful to keep them engaged with the app, and to remind them to use the app as a tool to help them sharing their emotion.

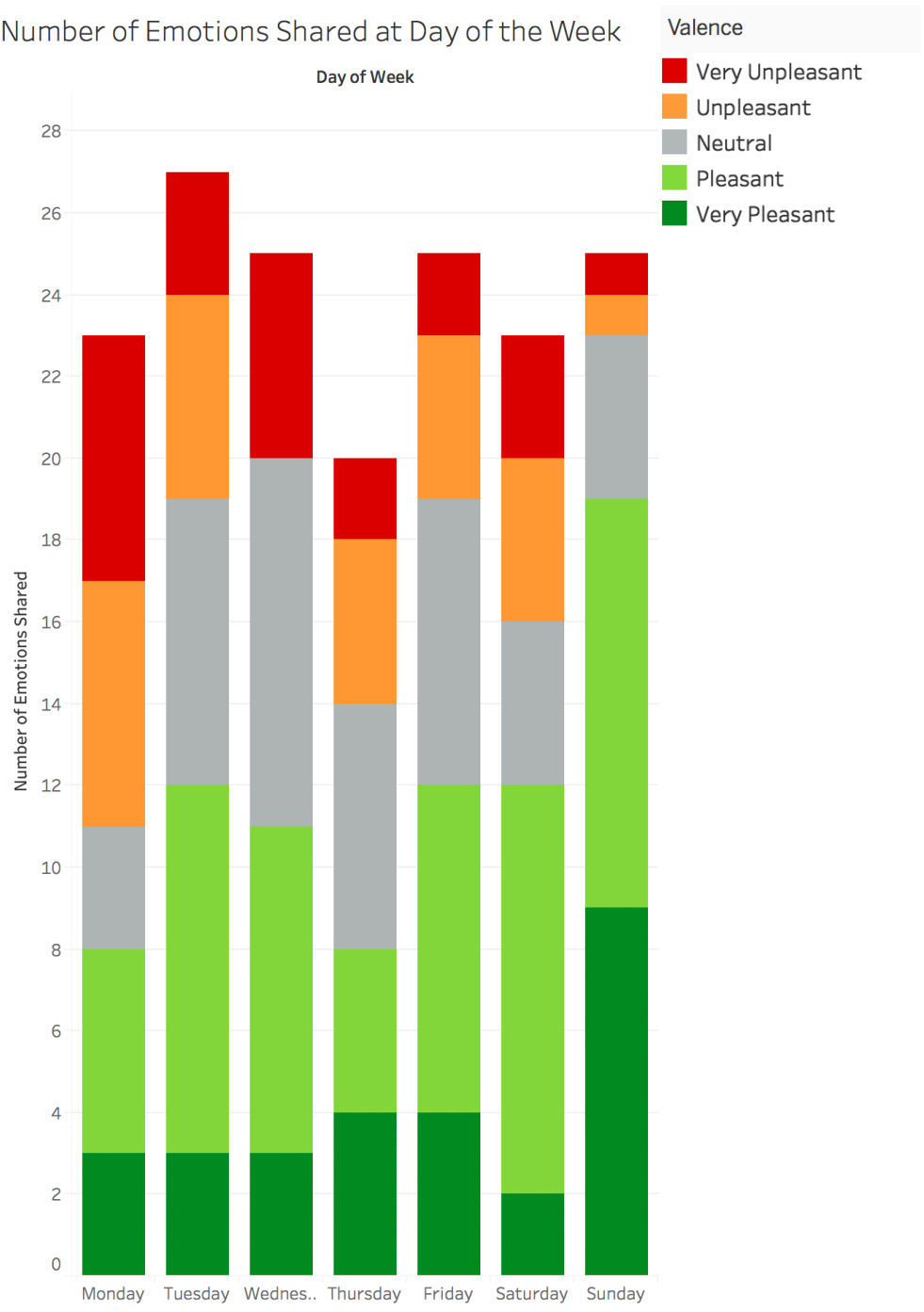
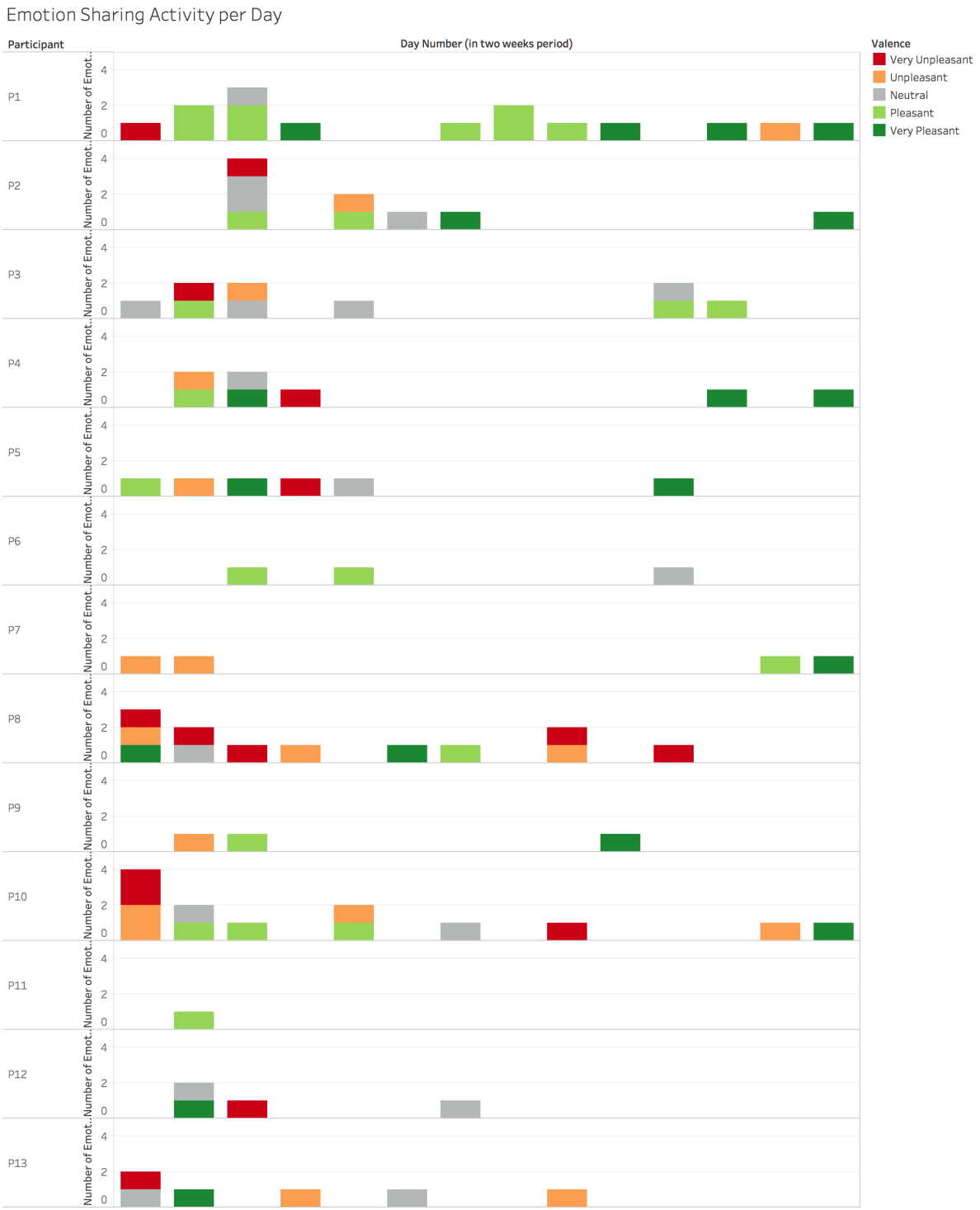


Figure 46 Number of Emotions Shared at Day of Week in Study 3

Figure 46 shows the number of emotions shared for each day of week. Colour shows details about valence, shown on the legend. Figure 46 shows that most emotions were shared on Tuesday. As shown on the graph, we understand that more positive emotions were shared during the weekend, and more negative emotions were shared during the weekdays. One of the reason is that most emotions are associated with events experienced during work or study period, and in the

weekend, participants did not have as many negative emotional experiences compared to what they had during the weekdays.



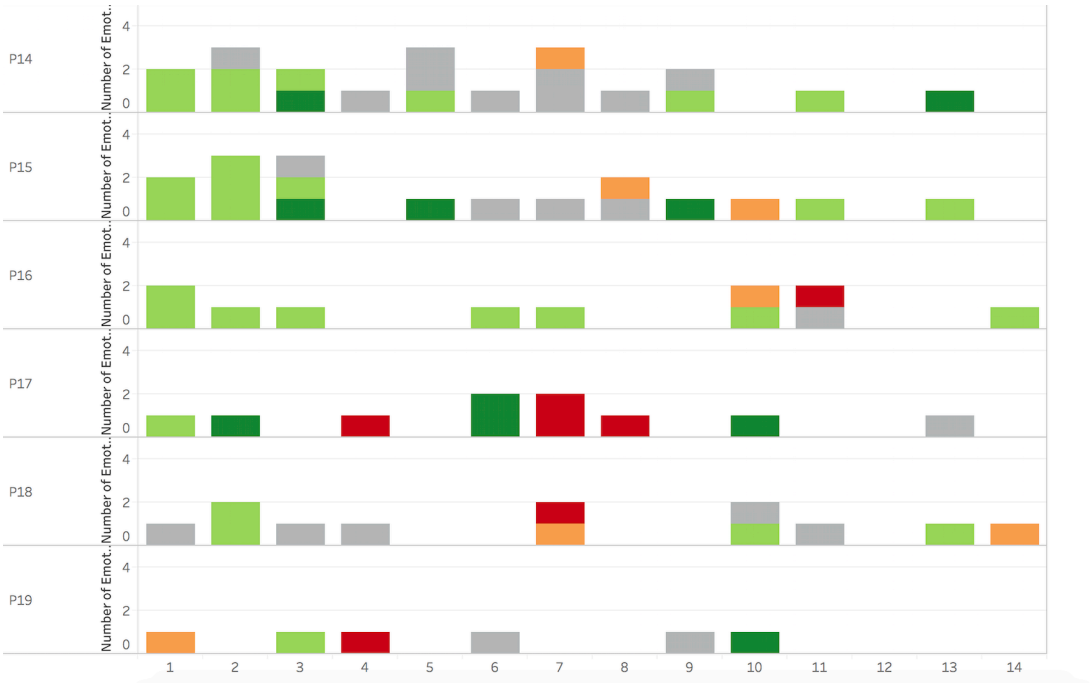


Figure 47 Emotion Sharing Daily Activity for Each Participant in Study 3

Figure 47 shows the number of emotions shared from day 1 to day 14 for each participant. Colour shows details about valence, shown on the legend. From this figure, we understand that each participant has his or her own tendency to share more positive valence or negative valence emotions. There are also participants with good balance of both positive and negative emotions shared. Based on this figure, the following figures will be analysed by categorising participants into three groups: Sharing more positive emotions (Number of positive emotions is more than the rest of emotions (negative & neutral emotions)), sharing more negative emotions (number of negative emotions is more than the rest of emotions (positive & neutral emotions)), and sharing mixed emotions. The participants for each category are as follows:

Table 5 Participant Categories based on the types of emotion shared

Participants	**Category**
P1, P4, P6, P9, P11, P14, P15, P16	C1 - Sharing more positive valence emotions
P2, P3, P5, P7, P12, P13, P17, P18, P19	C2 - Sharing mixed valence emotions
P8, P10	C3 - Sharing more negative valence emotions

Based on these categories, the following figures (Figure 48, 49, 50) shows the total weight of emotions shared for each valence-arousal in Cartesian coordinate for each participant categories.

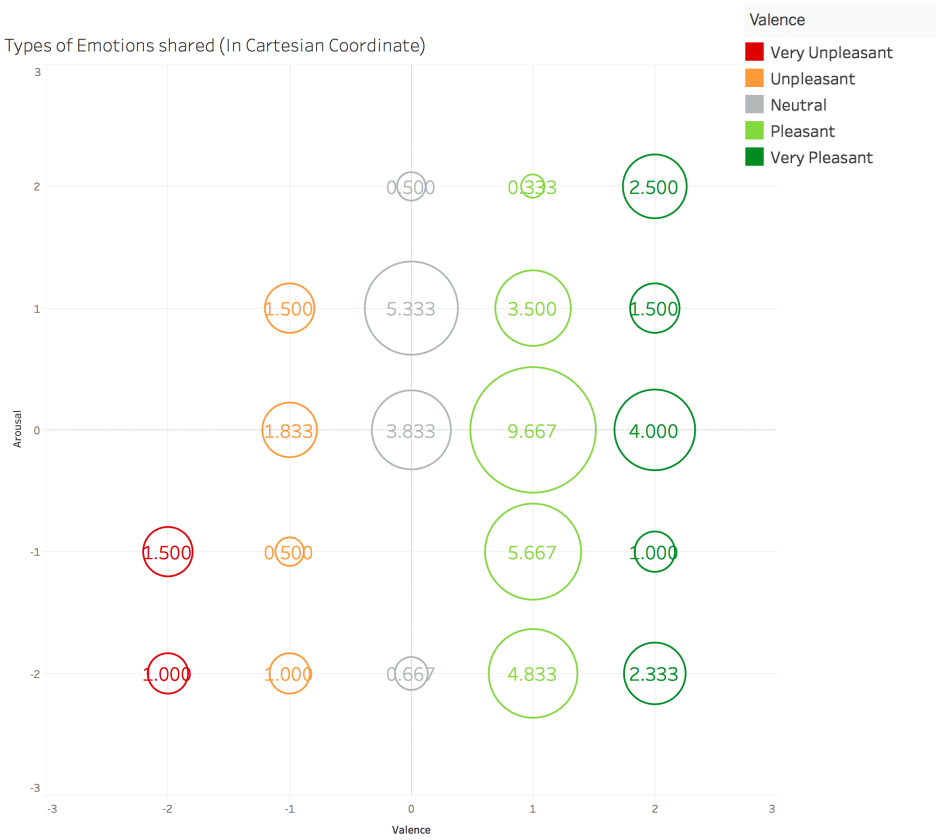


Figure 48 Total Weight of Emotions Shared for C1 (In Cartesian Coordinate) in Study 3

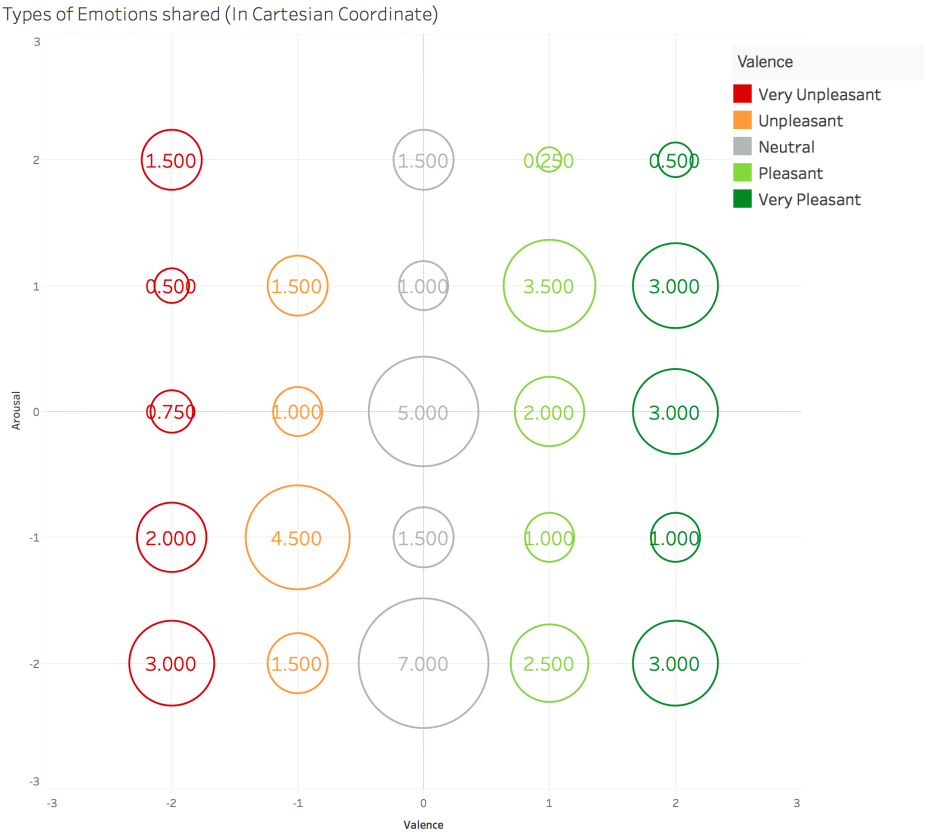


Figure 49 Total Weight of Emotions Shared for C2 (In Cartesian Coordinate) in Study 3

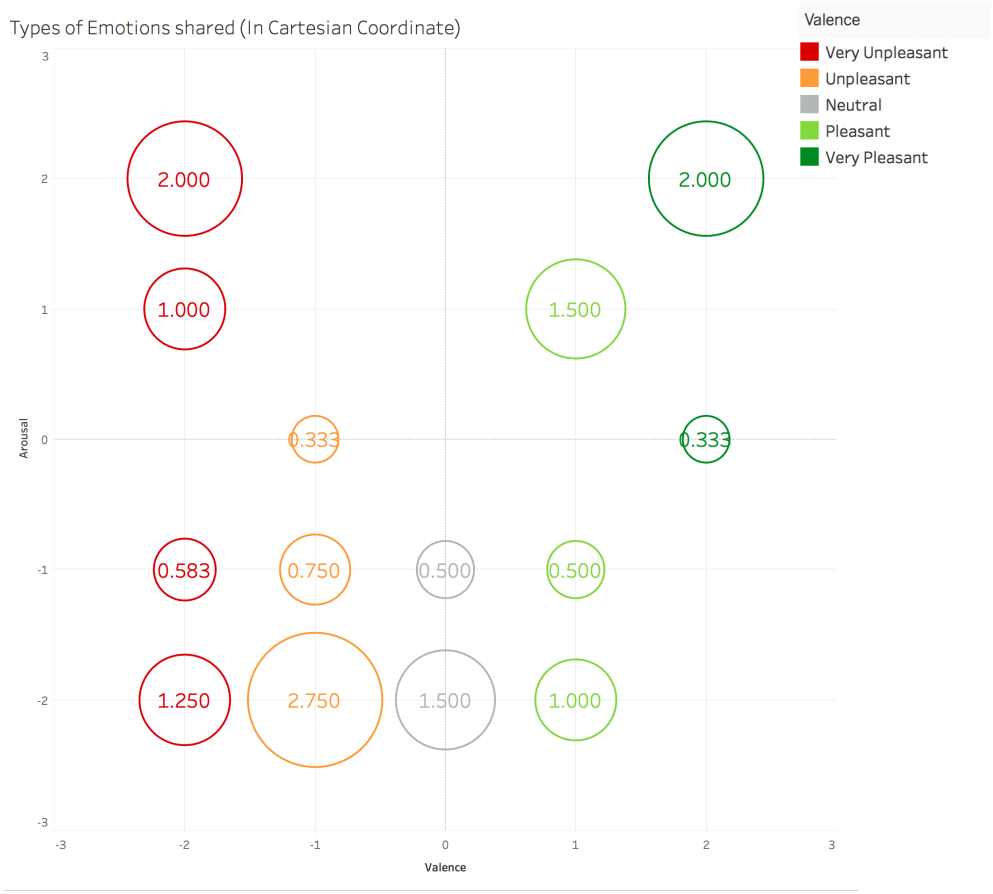


Figure 50 Total Weight of Emotions Shared for C3 (In Cartesian Coordinate) in Study 3

Figure 48, 49, and 50 shows the total weight of emotions shared in Cartesian coordinate, with valence in x-axis and arousal in y-axis. Colour shows details about valence, shown on the legend. Size of circle shows number of emotions shared for each type of emotion. Each figure shows the trend of what type of emotions shared the most in each category: Positive emotions on Figure 48, a good balance of positive and negative emotions on Figure 49, and negative emotions on Figure 50.

Based on these figures, the following figures will focus on the valence of the emotion and analyse on how it affects the responses to the emotion. For this analysis, we are going to see participants in 8 groups of trusted circles, from group A to group H. Based on participants category, we can also categorise type of groups into the following:

Table 6 Group Categories based on the types of emotion shared

Groups	Category
A (P1, P2), F (P14, P15), G (P16, P17)	Cg1 - Sharing more positive valence emotions
B (P3, P4), C (P5, P6), D (P7, P8, P9, P10, P11,), E (P12, P13), H (P18, P19)	Cg2 - Sharing mixed valence emotions

6.4.2. Thematic Analysis of Study 3 Result

6.4.2.1. Sharing Emotion

In Study 3, all participants reported the usage of Empatchi app to facilitate their emotion regulation process. The lightweight/phatic experience in sharing emotion was stated 41 times across all the data by all 19 participants. These results are shown in Appendix 19. Study 2 results have shown that sharing emotion with *Empatchi* does not depend on what kind of emotion, but rather it is more on can they or do they want to articulate the emotion or to share it verbally. When they want to express more about their emotion, *Empatchi* feels limited, but when they hesitate or could not express it, *Empatchi* helps them and makes them easier to let others know about how they feel. While Self-Assesment Method that is being used in *Empatchi* is not always the best way to express or to share emotion for everyone in every situation, Study 3 gave us understanding on the scenarios of emotion sharing that can be facilitated with *Empatchi*. If we look into how participants feel when sharing emotion with *Empatchi*, we can divide them into two categories. The first one consists of participants who feel that the SAM method works because it fits their need of simplicity in expressing emotion. They feel easier to share emotion because they don't have to think about the words to express the emotion, and in fact, they can be more expressive compared to having to articulate the emotion in words, something they weren't used to. This was stated by one of the participants:

"It makes me easier to share emotion because I don't have to think about how to express it in words. Sometimes it's hard to write or think about how to express it in details when we want to share it." (P9)

Other participant stated that this method is enabling him to express his emotion better compared to text message and emoji:

".. before I knew this app, I thought that um, You know, for example, whatsapp, could not facilitate (expressing) my emotion because... um, I don't know I couldn't find myself satisfied just by using whatsapp and the emoji.. but by using this app, I think I can be more expressive to express my my emotion." (P12)

One participant also said that he thinks that using verbal language to express emotion sometimes can be dangerous:

"I like how quick it is to signal my girlfriend. How I did that before is by posting a certain picture, change my tone on the phone, or using capital letters in chat. But as I said before, it's actually quite dangerous to type when you are actually affected with your emotion, right? I think there's a limit of what a verbal language can do. You know looking at Trump's tweet, you know, when he got angry he tweets like, very horrible stuff, you know. When you are angry with your girlfriend, you don't chat her. It's very dangerous because you tend to make rational justification of why you are angry, and you can get mad with her reply." (P1)

Participants in this category feel good and relieved just by venting out the emotion and letting others know. On the other hand, the second category consists of participants who have desire to express more about their emotion. Participants in this category feel that the emotion sharing method in *Empatchi* is limited. They feel that the emotion they want to share is more complex and could not be expressed only by rating at the pleasantness and activation dimensions. One participant stated :

" .. the first time I used it to share my emotion, I felt like, there is something missing because I can only share my emotion and receive support from my friend without being able to have further conversation inside the app. It's confusing sometimes for me because, uh, when my friend shared emotion and I send her support, without knowing the reason behind how can we say that we empathise with her properly?" (P4)

Participants in this category include people who are used to write diaries/ keep journals about their daily emotions, or people who often share the story of their emotional experience to others.

Although some participants said that they share more negative emotions on *Empatchi* since there are more challenges to articulate the negative emotions, Study 3 results have shown that there are more positive emotion shared compared to Study 2. The reason behind this can be the self-reflection process which led participants to try to be more positive in their daily life. As one of the participants said:

"Once I remember once I was in the office and I was very like demotivated, and few days after I was like looking back to it and I think it was like so so emotional and I felt like I don't want to feel that way again, I don't want to have that kind of demotivated state again." (P8)

Another factor can be the difference in the types of relationship in participants for Study 2 and Study 3, where in Study 2 we have more participants with more intimate relationship (e.g. married couples).

6.4.2.2. Getting Emotion Updates from Others

In this study, the experience of getting lightweight updates from their trusted circle were mentioned 33 times across all the data by all 19 participants. These results are shown in Appendix 19. Lightweight and straightforward emotional signals in *Empatchi* help them to understand how others are feeling and encourage them to support others, as also show in the result of Study 2. When receiving emotional signals from others, they got curious about what happened to others, and try to engage in conversation by sending support and asking if the others are OK. As one of the participants stated:

".. If it's in the group chat someone can some common thing like: "Oh I hate this traffic!" while she actually meant that she's really having a bad day and wanted someone to approach her, I couldn't tell. But beacuse we already know that this is the place to share our emotion, I can be more aware that there might be something good or bad happened to her today." (P11)

In fact, some participants perceive *Empatchi* as an "Emergency Sad Button", indicating that someone in their trusted circle need support. *Empatchi* helps to understand others better so that they know they also need to support others, before (by sending supportive messages) and when engaging in a conversation. As one of the participants stated:

"This app is more like a straightforward signal. I need to make sure that I am there when she needs me. If she's really really sad, I need to be there. I must be there." (P6)

Other participants also stated:

"Yeah, it changed the way I communicate with her.. Before I know this app I was just like a guessing what is she feeling and then this app made me communicate with her better I think. Personally it helps me to understand others and others' emotion because I know empathy is an important thing and we need to communicate it better with people. Because I can, you know, show my empathy easily because I know what was the emotion that she is feeling, and so it helps me to support her better. Because to be honest, sometimes it's hard for me to, you know, to understand what others are feeling just by looking at them, but um, you know, by using this app at least I have the understanding about what they're feeling right now." (P12)

Some partipants also said that *Empatchi* affirms non-verbal emotional cues of their loved ones that participants always struggle to interpret before the app:

"I think one of the things that helped me the most is actually making sure that my hunch is correct about my girlfriend. Okay, so sometimes when you have a long distance relationship, sometimes you need to guess whether she's sad or happy.." (P1)

6.4.2.3. Exchanging Support Messages

In Study 3, the experience exchanging support messages was stated 22 times across all the data by 12 out of 19 participants. These results are shown in Appendix 19. From Study 2, we understand that *Empatchi* encourages participants to send cheering/caring messages by asking them, engaging in conversations, or by sending supportive messages because it is easier to understand how others are feeling. Study 3 shows similar result, that cheering/caring messages that the participants received from others help in managing their emotion. Exchanging support

messages also helps as a reassurance and make them value how much they care to each other, as well as giving opportunities for a further conversation. One participant compared how she used to communicate with her trusted circle using WhatsApp, and how *Empatchi* helped her to send better support for her friend who is in need:

"The good thing is, I feel like uh, I don't know, this past few weeks when I have a lot of work. I can't really keep up with our group chat, I can't even like keep up one by one. And, I feel like I can't reply to the chat because of my work. I don't know if someone need my support two or three hours ago . But this one is more direct, and personal, to the certain types of emotion. After using it, maybe it doesn't really change how I communicate with them but I think what I like about this app is like I can actually respond to that certain types of emotion. For example, when my friends are tired or just like having too much work like I do, I can relate to their emotion even when we're not together, so it's easier to give an appropriate support or start a conversation about what happened yesterday.." (P7)

Other participant also mentioned how she found it easier to send support in *Empatchi* :

"I think it doesn't affect the direct communication, but it makes it easier for us to send support because the effort is very small, you only need a few clicks to send support and you already have the messages like "hang in there" so it's like by two, three clicks, you can send support and show your attention and show that you care about your friend. It will then lead to following up in text messages or WhatsApp, and not necessarily through meeting" (P10)

Some of them were looking at the support messages they have received to make them feel better when they need it. However, many participants feel knowing that the support message that they received was a pre-defined templates of support messages that were provided in the app reduce the value of the support and the sincerity of the support sender.

".. when I was feeling down and lonely I tried to share my emotion with the app and I really expected that my friend will contact me rather than only give me support because I think that uh, if he just give me that support, especially the default one, I feel that he didn't really care. So yeah, sometimes I hope that I... I need a bigger support.." (P13)

Not knowing about the context of the emotional experience also makes it hard to create an appropriate and suitable support for their trusted circle, as one of the participants stated:

"the first time I used it to share my emotion, I felt like, there is something missing because I can only share my emotion and receive support from my friend without being able to have further conversation inside the app. It's confusing sometimes for me because, uh, when my friend shared emotion and I send her support, without knowing the reason behind how can we say that we empathise with her properly?" (P4)

Other participant also mentioned:

".. because I don't know what's going on with them, I have switch to another app to ask.. It's kinda, not difficult, but it would be more practical if we can have it in one place. We do have the section to write support and you provided some examples, but yeah, I just.. I don't know what's good to support them.." (P8)

6.4.2.4. Self-Reflection, Self-Assessment of Emotion, and Challenges in Using SAM Scale

Study 3 focuses on investigating the process of self-reflection, how it solves the challenge in using the SAM method that participants were facing in the previous study, and study its role in helping individuals to understand, manage or regulate their own emotions. While many participants agreed that they got to understand better about the self-assessment method after many uses over the study period, there are only limited evidences that show how looking at their past emotions directly affect their understanding in the SAM method. Other factors that helped them to understand about the method better are discussing and making agreements with their trusted circle, and also looking at other people's emotion history. Knowing that other people not hesitating in sharing the negative emotion and knowing the relief after sharing it helped participants in managing their emotion, especially by sharing emotions with others. Self-reflecting on the past emotions also influenced participants to try to be more positive.

In Study 3, all 19 participants reported the challenges in using the Self-Assesment Manikin scale to express their emotion. These results are shown in Appendix 20. These challenges were

mentioned 22 times across all the data. Many participants think that the idea of sharing emotion by rating your own emotion in levels is very new and seeing them visualised is interesting. Many participants like the convenience, ease of use, and simple interactions that *Empatchi* provides. Regarding this method to express the emotion, some participants said:

"I think it's it's actually good enough for me to actually express the complexity of the emotional state with this two parameter. For me, with the smaller activation I just want to keep it for myself very very deeply, so you need to approach me and ask me and make me tell the story." (P1)

"What I perceive from the activation part is like how tired you are, because the first icon is like calm the last icon is like exploding, which happens to my life every day. I think it's nice to have this dimension other than just happy or sad, and it is interesting to think about how activated I am in the workplace." (P7)

".. yeah, um, I was a bit confused but with these two parameters because I thought, okay, emotion just probably like, I am feeling bad or I'm feeling happy. But in this app I have to express it this way, and then it could be somehow confusing because I have to think that, okay, I'm feeling sad but uh on the other side, I am feeling energized.. For me, it's a to be honest, it's a bit confusing. But um, well so far I got used to it." (P12)

Some participants mentioned that they understand SAM better as they use the app. Looking at the emotion history helped them to understand the parameters used in SAM:

"Yeah, I kind of understand it over time so I know the difference between like, level 1 and level four, and then I can um, give value to my emotion and divide it into levels." (P10)

Some other participants mentioned that they deal with their difficulties in using SAM by making discussion and agreements with their trusted circle:

"It's not difficult. But it takes time. Actually in the first two days, we were discussing about our interpretation of the icons and colours and we kind of decide how we want to proceed with that.. What's the meaning of that? How do I react with that? There's still no agreement of that. We're actually creating rules for it. I also talked with her about my expectation." (P1)

"I think for the first time I did not know what activation means, but I thought it's like... I don't know I have no idea about this activation .. But it was mentioned in our group chat and we were discussing about it, and it was fine.. That's one, but the other one is the valence right? that one is very obvious." (P8)

6.4.2.5. Yields

Yields reflects the consequences of the act. In Study 3, the effects of using Empatchi app to facilitate their emotion regulation process were mentioned 42 times across all the data by all 19 participants. Based on the participants' responses, 4 sub-themes were distilled as the effect of their emotion regulation process. 6 out of 19 participants reported relief and reassurance after using Empatchi for emotion regulation. 7 out of 19 participants reported improved relationship with their trusted circle as the effect of using Empatchi. 7 out of 19 participants stated that the lightweight interaction in Empatchi sparks deeper conversation between them and their trusted circle. Finally, 18 out of 19 participants reported increased understanding of self and others' emotion as they were using Empatchi to facilitate their emotion regulation process. These results are shown in Appendix 21.

- Reassurance and relief. Knowing that others may also be in the same struggle. The feeling of "I'm not alone and there are people who are always supporting me". Relief that people I care the most are doing fine, and if they are not, I can be there when they really need it. One of the participant mentioned:
  "Okay, so the good part of my experience is that after I came home from the office, sometimes I just feel like , really really tired and then I can see from the app that, Oh, okay I'm not alone since my friends are also feeling the same thing. I feel that I'm not the only one, I feel connections with them. I can relate with their emotions." (P7)
- Improved relationship, more emotional connection with people in trusted circle. One participant explained his experience using *Empatchi* with his girlfriend:
  "In long distance relationship, emotional connection is something that is hard to do, you know? I wonder how do you actually facilitate those emotional connection? We are far far away. That's what I think is the benefit of Empatchi: I don't need to guess

anymore. Before, how do I know that she's actually sad? because they were no direct, you know, straightforward signals from her before you must guess from how she behave. It is, in my opinion, a very good way to actually start the conversation that can fill the gap in our emotional connection." (P1)

- Sparking deeper, more personal conversations about emotion with others. As one of participant said:
  "It's absolutely changed how we communicate, because uh, because emotion is something personal.. After I get his emotion update, I follow up to ask about the cause of his feeling and we, um, finally talk about something personal that may be bothering his mind. And of course the frequency is also increased. Yeah. Uh, I think our communication is currently becoming more intense more personal and also more frequent. Okay, especially when we talk about emotion. Before, it was only about like, something really really common, Like what do you think about this research, like a simple discussion about our life, or our common interest, or just commenting on his posts on Instagram. But after using this is this application I can say that our communication is becoming more intense.." (P13)
- Better understanding in self and others' emotion. As one of the participant stated:
  "I think from her emotion updates I know that my friend, you know, I know better about her, I mean like her habit or something that she doesn't like or something that can make her feeling down in the end.. Yeah, it changed the way I communicate with her.. Before I know this app I was just like a guessing what is she feeling and then this app made me communicate with her better I think. Personally it helps me to understand others and others' emotion because I know empathy is an important thing and we need to communicate it better with people. Because I can, you know, show my empathy easily because I know what was the emotion that she is feeling, and so it helps me to support her better. Because to be honest, sometimes it's hard for me to, you know, to understand what other feelings just by looking at them, but um, you know, by using this app at least I have the understanding about what they're feeling right now." (P12)

6.4.2.6. Use of Other Media for Emotion Regulation

In Study 3, the use of other media for participants' emotion regulation need were mentioned 23 times across all the data by 15 out of 19 participants. Based on the participants' responses, 3 sub-themes were distilled as the effect of their emotion regulation process. 4 out of 19 participants reported about using direct conversation, 11 out of 19 participants reported using text-based messages, while 6 out of 19 participants described about their experience on using social media to facilitate their emotion regulation process. These results are shown in Appendix 22. As we understand from Study 2 result, direct conversation with phone calls, video calls, or even text-based message was used when they want to express more about the emotion verbally. Some of them find it difficult to express through these media, especially when they are experiencing negative emotion. In particular, social media were used mainly to share positive emotions, when it is not something private. Participants afraid of being judged when sharing negative emotions through social media. One of the participant mentioned:

"I don't really want to post something negative, or constant negative things in social media. Like for example, I use instagram stories everyday, but I don't want it to be like negative stories like complaining about traffic all the time because I feel like I'm becoming a negative person for the followers.. So I think it's more comfortable to share that to empatchi instead of to other social media. Because you only share it to your inner circle, and you are comfortable to share it and to show it when you have a really bad day and then you are feeling very very unpleasant and you can't use your social media." (P11)

Other participant also mentioned:

"Sometimes I just need to be around people when I am really really vulnerable and. When I'm really down, I actually need this kind of simple way to signal someone.. because if I post something on Facebook, I can actually talk really crazy, I can post crazy picture in instagram, when I am angry, I can get angrier in the chat, I might use harsh languages... but instead I can use this and tell my inner circle that I actually need someone, and that's without telling why and it's actually really helpful for me. Yeah, I think that my experience so far is actually good .. it's a good app to signal someone." (P1)

6.5. Discussions and Conclusions

The findings of this study demonstrate how self-reflection process help participants in interpersonal emotion regulation process. We understand that giving an insight of how participants' emotion changes over time can contribute to improving their understanding of their emotion. While some of participants mentioned about its effect in understanding how the Self-Assesment Method works in particular, we can see a broader impact of the self-reflection process in understanding the dynamic of their emotion, how they cope with it, and in what specific time do they need to lean on their trusted circle the most. We can also see that it is crucial to support people to express their emotion, which is called emotional labelling. While SAM method is perceived as a new method for most participants, we understand how it helps to capture the complex expression of emotion while preserving the simplicity and convenience. Some participants experienced the benefit of the SAM method compared to other methods like text-message, posts on social media, or other verbal methods, where some of them mentioned about the difficulties in articulating the emotion and the harm that it may cause. However, some participants said about how it feels limited to them, which was experienced by participants who were used to, and have no problem with, articulating and expressing emotion verbally (e.g. via phone call, or self-journaling in a diary). Some of the participants also mentioned about how the icon is sometimes confusing and outdated, which opens an opportunity of future research in improving it as one of lightweight emotional expression method, especially while using technology as media. Some participants also mentioned about improvement in understanding SAM after discussing and making agreements with their trusted circle about what it means when they select a certain level of valence or arousal, how do they react to that, and what do they expect from their trusted circle when they express a specific emotion. This demonstrates that the challenge that they are facing in emotion labelling created opportunities for them to have conversations about emotion. Finally, after conducting this study, we understand that one of the most crucial factors in the emotion regulation process is to help people to label or express their emotion. This aligns with studies that revealed how the interpersonal emotion regulation process starts with the emotion labelling process (Rime 1991), while some of the research actually demonstrated that the labelling process also facilitate coping (Kircanski et al. 2012, Lieberman et al. 2011). We can see from the findings that participants

improved their emotion labelling process by self-reflecting at their past emotions, or discussing it and making agreements with their trusted circle.

7. Discussions, Conclusions, and Future Work

In this final chapter, I conclude my PhD Thesis by reviewing all the Research Questions of this PhD Research and provide the answers that have been described in the previous chapters. I also provide a summary of clear contributions of this research and its scope and limitation, as well as opening up the opportunities for future research.

This thesis began by introducing how humans experience emotion and how do they make sense of it. This is a fundamental aspect of human life which starts an internal private process in our own self, which can lead us to share our emotion with others. This act of social sharing of emotion has developed since the very early stage of our life, where we signal discomfort to our parents, giving them the opportunity to appease us by comforting us or by their mere presence. The first chapter brought us a brief overview of the background of this PhD research. We learned about the interpersonal emotion regulation process as one's attempt to manage and regulate emotion. Chapter 1 also introduced us the opportunity to support interpersonal emotion regulation with technology by providing support for phatic interaction.

7.1. Review of Findings

In this section, I review all the research questions for this PhD research to conclude this thesis.

RQ1: How do people currently share emotions and exchange gestures of empathy to facilitate interpersonal emotion regulation through social sharing?

From the literature review that was presented in Chapter 2, we understand the concept of interpersonal emotion regulation through social sharing. The process starts with emotional experience, which was described by its correlation with goal-reaching activities that have always been a part of our daily life. Many studies have shown that when experiencing emotional experience, people try to cope with situations by choosing not to go through it alone, but instead seeking help and social contact from others in understanding and managing our emotions (Zaki and Williams 2013, Schachter and Stanley 1959), which happens regardless of the valence of the emotions involved (Rime 2009) and occurs independently of age, gender (Rime et al. 1992, 1998),

and culture (Mesquita 1993, Yogo and Onoe 1998, Rime et al, 1996, Singh-Manoux and Finkenauer 2001). We also understand that sharing emotion can capitalise on positive events, and reducing distress on negative events.

We see many examples on how people share emotions: Direct face-to-face conversations, Showing the emotions in our behaviour or non-verbal cues like voice tones or using technology to mediate the emotional communication (telephone, text message, or social media). The targets of social sharing of emotion are often the strong-tie connections or the trusted circle of the emotion sharer (Partner/ Family/ Friends), who is generally willing to listen. They usually respond to the emotion sharer by showing empathic and prosocial behaviours, that can be shown by a mere presence, social validation, verbal support, body gestures, or material help.

We also further explored the interpersonal emotion regulation process in Chapter 3 (Study 1). We see evidence of what motivates them to share emotion, which was experiencing positive or negative emotion. We see responses of how these experiences related strongly with their daily goal-reaching activities. We also see examples of the act of sharing emotion: by a direct face-to-face conversation, or mediated with technology. We also understand that the target of the social sharing of emotions responds by showing empathic behaviours in various ways: Physical hug, Sending supportive messages or Giving presents. This aligns with many other examples from the previous studies. Study 1 also gives us an understanding of the effect of interpersonal emotion regulation, which is to increase the positive affect of our emotion.

The literature review gives us the overview of the opportunity of providing phatic interaction through technology can help to support interpersonal emotion regulation. In Chapter 3 (Study 1), we explore further by looking at how people send and receive gestures of empathy, validation, and support in interpersonal emotion with the support of technology. We understand that technology helps in a way that it is immediately accessible for a quick support and feedback. However, we also found that participants were also looking forward to a further and later conversations to express and share their emotional experience, especially when it is complicated. Here, we see how technology provides lightweight exchange, which can act as a bridge that establishes the possibility for further conversation, as we have discussed in Chapter 2. In our

results, we see many examples of phatic as a dominant communicative mode in technologies that do not necessarily require a large amount of data to convey significance and meaning (Gibbs et al. 2005). Specifically, we can also see that negative emotions often requires a more meaningful conversation to regulate, which most of the time does not happen inside the interaction mediated by technology. However, we found that the anticipation of having the conversation itself helps as an immediate support and feedback and can be seen as one act of interpersonal emotion regulation. Technology-mediated interactions with its phatic and lightweight characteristics have shown as an effective way to evoke an anticipation and establish the possibility for further conversation, that can also be technology mediated (but with high cost/effort like Phone call or Video call) or face-to-face interaction. From the first study, we understand that phatic interaction in technology helps both emotion sharer and support giver to engage in interpersonal emotion regulation process. Sharing emotion verbally, whether it's via text messages, phone call, or direct communication, takes a lot of effort from the emotion sharer. As discussed in Section 2.1, most of the sharing process develops immediately after the experience, where the sharer is generally not ready for a deep cognitive work like reframing the problem, trying to figure out the meaning of the experience, or expressing it verbally and share it to others. At the same time, people in his/her trusted circle, who act as support giver, are not always ready to listen to the story, due to their job or other activities. In this case, comfort and reassurance, that is more lightweight and takes less effort, that can be gained from socio-affective mode of social sharing via phatic interaction channel can be helpful for future cognitive thinking of the emotional experience when it is needed and to open possibilities for further conversations. Both emotion sharer and support giver can engage in verbal conversations when the emotion sharer ready to share the emotion verbally, and when the support giver ready to listen and get involved deeper in giving support for the sharer's emotion regulation process.

Our first study gave us insight into how we can design our technology as a media to help interpersonal emotion regulation process. Based on our findings, we conclude that the following aspects are important in supporting interpersonal emotion regulation process with technology, which we have presented as our Design Implications to design Empatchi:

1. Perform lightweight interaction and signal exchange. The technology should enable users to interact with each other throughout the day via low-fidelity communication channels.
2. Show caring/cheering gestures from the trusted intimate circle.
3. Encompass 'gift-giving' experience, as a symbolic communication which is crucial in creating, maintaining, and enhancing relationships.
4. A Bridge to establish the possibility for further conversation. The technology should excite and evoke anticipation that the user will have a conversation with people from their trusted circle, either via phone, video call or by meeting them in the same shared physical space.

RQ2: How can phatic interactions in technology help in interpersonal emotion regulation process?

In Chapter 4, I proposed the system design of Empatchi: Human Tamagotchi and presented the technical implementation of it as a mobile app. In Chapter 5 (Study 2) I describe the evaluation study of my novel approach to interactive systems in supporting interpersonal emotion regulation. From the result of Study 2, we understand how Empatchi affect participants sharing emotions and exchanging support messages with their trusted circle. The support for phatic interaction for sharing emotion that Empatchi offers make it easier for participants to share emotions, especially at times when it is difficult to articulate the emotion or when they hesitate to share emotion. The way how they share emotion in Empatchi also provides the opportunity to comprehend their emotion, having to think of at what degree their emotion is. However, many of them were not familiar with Self-Assessment Manikin and they were struggling to use it for the first time. This is the challenge that I try to address by providing support for self-reflection of emotion, which was explored in Study 3.

When sharing emotion, most of the participants have no problems for not getting immediate support or immediate conversation. Letting the emotions out/ venting it, and knowing that others know how they feel, is enough to regulate their emotion. They can have the conversation later when they have the opportunity. Although sometimes in extreme conditions when they feel

that they need the support immediately, they also chose to directly text or call others asking for help.

When getting notified about their trusted circles' emotion updates, lightweight and straightforward emotional signals in Empatchi help them to understand how others are feeling. It was harder to understand how others are feeling from text messages or direct conversation. Most of the time they needed to guess others' affective state. When they receive straightforward emotional signals from others in Empatchi, they got curious about what happened to others, and try to engage in conversation by sending support and asking if the others are OK. A better understanding of how others are feeling also helps them to think about what they can do to help others, for example sending supportive messages. It also helps them to start talking about emotions when they have a conversation, something that they were not used to.

Before using Empatchi, emotions were not always shared/expressed verbally or explicitly even when they have a direct conversation. Empatchi helps to understand others better so that they know they also need to support others, before (by sending supportive messages) and when engaging in a conversation. The signals exchanged in Empatchi encourages participants to send cheering/caring messages by asking them, engaging in conversations, or by sending supportive messages because it is easier to understand how others are feeling. Cheering/caring messages that the participants received from others help in managing their emotion. Exchanging support messages also helps as reassurance and make them value how much they care to each other. Some of them were looking at the support messages they have received to make them feel better when they need it. The additional anticipatory message in the support messages were perceived as signals of others' willingness and thoughts of helping or supporting. The reassurance of having later conversation making them feel that they are not alone and thus help in regulating and managing their emotion.

RQ3: How does self-reflecting process of one's own emotion affect the interpersonal emotion regulation process?

In Chapter 6 (Study 3), We understand that giving an insight of how participants' emotion changes over time can contribute to improving their understanding of their emotion. While some

of participants mentioned about its effect in understanding how the Self-Assesment Method works in particular, we can see a broader impact of the self-reflection process in understanding the dynamic of their emotion, how they cope with it, and in what specific time do they need to lean on their trusted circle the most. We can also see that it is crucial to support people to express their emotion, which is called emotional labelling. While SAM method is perceived as a new method for most participants, we understand how it helps to capture the complex expression of emotion while preserving the simplicity and convenience. Some participants experienced the benefit of the SAM method compared to other methods like text-message, posts on social media, or other verbal methods, where some of them mentioned about the difficulties in articulating the emotion and the harm that it may cause. However, some participants said about how it feels limited to them, which was experienced by participants who were used to, and have no problem with, articulating and expressing emotion verbally (e.g. via phone call, or self-journaling in a diary). Some of the participants also mentioned about how the icon is sometimes confusing and outdated, which opens an opportunity of future research in improving it as one of lightweight emotional expression method, especially while using technology as media. Some participants also mentioned about improvement in understanding SAM after discussing and making agreements with their trusted circle about what it means when they select a certain level of valence or arousal, how do they react to that, and what do they expect from their trusted circle when they express a specific emotion. This demonstrates that the challenge that they are facing in emotion labelling created opportunities for them to have conversations about emotion. Finally, after conducting this study, we understand that one of the most crucial factors in the emotion regulation process is to help people to label or express their emotion. This aligns with studies that revealed how the interpersonal emotion regulation process starts with the emotion labelling process (Rime 1991), while some of the research actually demonstrated that the labelling process also facilitate coping (Kircanski et al. 2012, Lieberman et al. 2011). We can see from the findings that participants improved their emotion labelling process by self-reflecting at their past emotions, or discussing it and making agreements with their trusted circle.

7.2. Contributions

In this section, I conclude that we need to add another essential factor to our design implications for designing technology to support interpersonal emotion regulation, which in fact happens in the early stage of emotion regulation process: Provide support for self-emotion labelling/ expression. I summarise our findings from Study 1, 2, and 3 by establishing four design implications for supporting emotion regulation with technology:

1. Provide Support for Self-Emotion Labelling/ Expression

2. Provide Lightweight Signal Exchange Support for Phatic Interaction

3. Show Caring/Cheering Gestures as Empathic and Social Behaviour

4. Can Act as A Bridge to Spark Further Conversations

The contribution of the research presented in this thesis are as follows:

1) **Developing a framework of knowledge for emotion regulation, and how technology can support it.**

   In Chapter 2, I presented research from psychology on emotion regulation, described problems in current communication technology, and argued how phatic interaction is seen as one suitable approach to tackle this problem. This was followed by a brief review of related studies of affective systems in HCI, including examples of interactive technologies that provide support for phatic interaction in communicating emotion. A framework of knowledge for emotion regulation and how technology can support it was developed throughout the thesis after conducting Study 1, 2, and 3.

2) **Establishing design implications for developing technologies with phatic interactions that support emotion regulation.**

   In Chapter 3, I described my investigation into emotion regulation through social sharing, for example, how people share emotions and exchange gestures of empathy as the feedback in interpersonal emotion regulation through social sharing. I explained about the methodology that was used in the user observation

study. I adopted cultural probes followed by contextual interviews to investigate how people share emotion and exchange gestures of empathy during their daily activities, and how interactive technologies are used as the media for this purpose. I started by introducing cultural probes as a user-centred design process for understanding current behaviour in sending and receiving support and validation, followed by our study setup, the result of our cultural probe study and its analysis. The responses gathered from the study were analysed and used to generate design ideas that I used in the next stage of the system development. From the analysis of this study, I established design implications for developing technologies with phatic interactions that support emotion regulation, which was improved and finalised after conducting Study 2 and Study 3.

3) **Designing, developing, and validating a mobile app that supports emotion regulation.**

In Chapter 4, *Empatchi,* the mobile app design based on the literature investigation and our cultural probe study data was presented, including its implementation. This mobile app was validated in Study 2 and Study 3.

4) **Demonstrating that providing support for phatic interaction in technology can help in the interpersonal emotion regulation process.**

In Chapter 5, I described Study 2 which explores how phatic interactions in technology can facilitate the interpersonal emotion regulation process. In this chapter, I demonstrated that phatic interactions can help to support the interpersonal emotion regulation process. The findings in study 2 demonstrated the key features where Empatchi is useful to support interpersonal emotion regulation:

- Venting emotion: Being true and honest to oneself, being vulnerable to others
- Alert/Signaling system: Letting others know can help in regulating emotion

- Better understanding in self emotion and how others feel
- Encouragement to support others
- Yields: Reassurance and Relief, Improved Relationship, and Sparking Conversations

We also understand that some participants have challenge in rating their own emotion, while some others feel that the app increased their self-understanding of their own emotion after reflecting on what kinds of emotion have they shared to others. In Chapter 5, I also described how the app can be improved to support both interpersonal and intrapersonal emotion regulation.

5) **Demonstrating that improving support for intrapersonal emotion regulation in a phatic technology can also support better interpersonal emotion regulation with the same technology.**

In Chapter 6, I described Study 3 which explores how reflecting on one's own emotion can facilitate the emotion regulation process. I started by describing how Empatchi was improved to better support in self-reflection. We understand that giving an insight of how participants' emotion changes over time can contribute to improving their understanding of their emotion. While some of participants mentioned about its effect in understanding how the Self-Assesment Method works in particular, we can see a broader impact of the self-reflection process in understanding the dynamic of their emotion, how they cope with it, and in what specific time do they need to lean on their trusted circle the most. We can also see that it is crucial to support people to express their emotion, which is called emotional labelling. While SAM method is perceived as a new method for most participants, we understand how it helps to capture the complex expression of emotion while preserving the simplicity and convenience. Some participants experienced the benefit of the SAM method compared to other methods like text-message, posts on social media, or other verbal methods, where some of them mentioned about the difficulties in articulating the emotion and the harm that it

may cause. However, some participants said about how it feels limited to them, which was experienced by participants who were used to, and have no problem with, articulating and expressing emotion verbally (e.g. via phone call, or self-journaling in a diary). After conducting Study 3, we understand that one of the most crucial factors in the emotion regulation process is to help people to label or express their emotion. We can see from the findings that participants improved their emotion labelling process by self-reflecting at their past emotions, or discussing it and making agreements with their trusted circle, which also helps them in interpersonal emotion regulation process..

Concluding my PhD research, after gaining the understanding of emotion regulation from Literature Review and three conducted studies, I propose the following Framework of Emotion Regulation to help us understand about the grand scheme of how the process of emotion regulation works, which was explained in the previous chapters and was reviewed through all of the research questions at the beginning of this final chapter. This framework is shown in Figure 51.

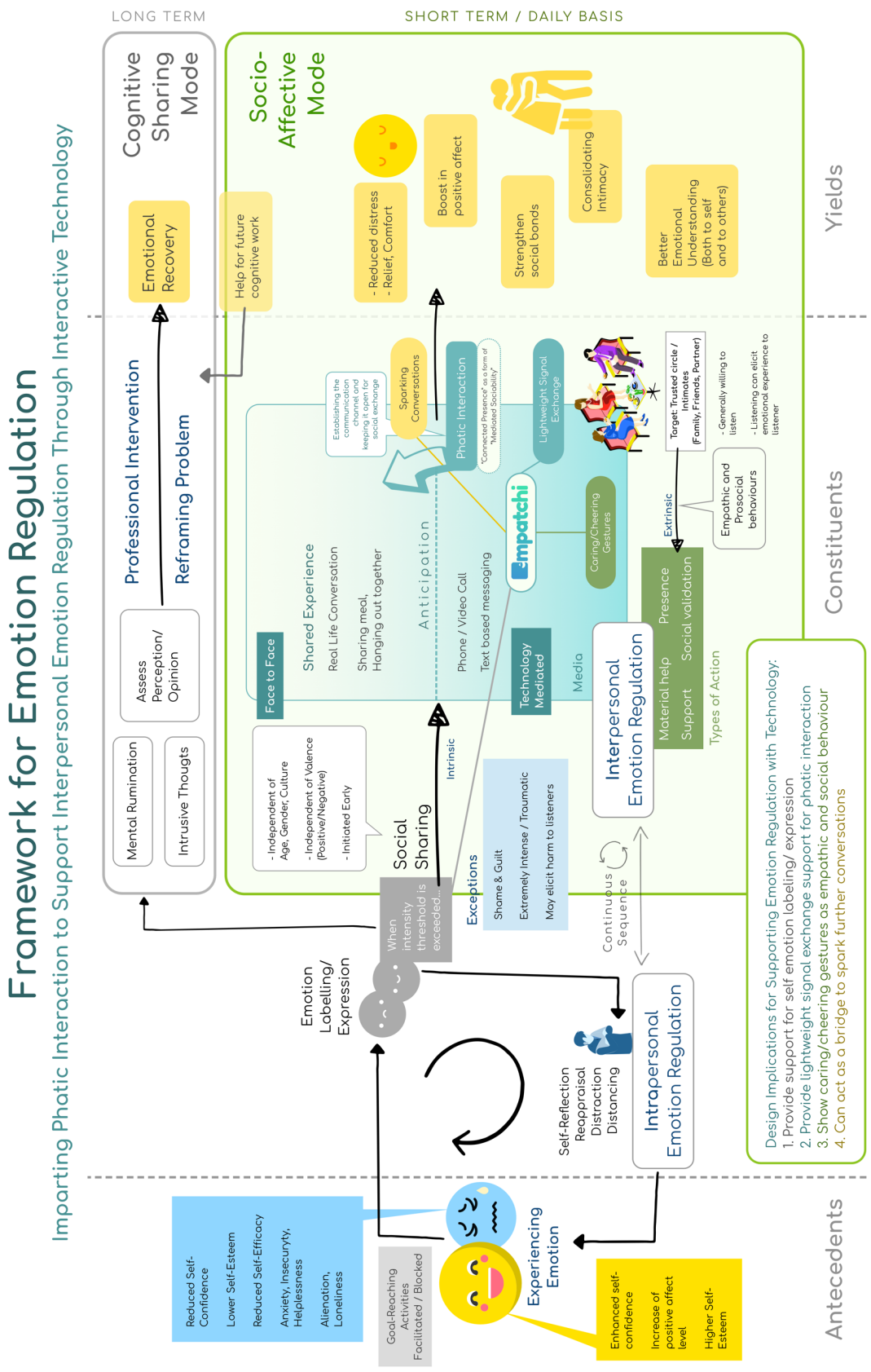


Figure 51 Framework for Emotion Regulation

I divided Figure 51 into 3 main categories that are structured according to the themes that precede its experience (Antecedents), characterise the act itself (Constituents), and reflect the consequences of the act (Yields).

- Experiencing emotion acts as **Antecedents**. We experience emotion when our goal-reaching activities are supported (positive emotions) or blocked (negative emotions).
- Experiencing emotion triggers an emotion regulation process as our attempt to manage and regulate emotions experienced in our daily life which helps us to move back into our emotional equilibrium: a regulated state where we can accept and allow our current affective state, which enables us to have more control of our responses. In emotion regulation, which in this figure acts as **Constituents**, we try to make sense of our emotional experience. The process starts as an internal process in our own self called intrapersonal emotion regulation (for example: self-reflection, reappraisal), which can lead us to share our emotion with others, which is called interpersonal emotion regulation (for example: sharing emotion to receive support).
- There are exceptions where we tend to hesitate to engage in sharing emotion: When the experience is related to shame and guilt, extremely intense/ traumatic, or may elicit harm to listeners
- Most of the emotion sharing process develops immediately after the experience, where the sharer is generally not ready for a deep cognitive work like reframing the problem or trying to figure out the meaning of the experience. In this case, the comfort and reassurance that can be gained from socio-affective mode of social sharing can be helpful for future cognitive thinking of the emotional experience when it is needed.
- When emotion is shared within a strong-tie relationship group, the target is generally willing to lend him/herself to listen, and often tries to help and manage sharer's emotion through empathic and prosocial behaviours. This can be seen in

the form of support and reassurance, material help and assistance, social recognition and validation, or mere presence of others.

- **Empatchi** fills in the gap as a mobile technology to support emotion regulation by providing support for self-emotion labelling/expression, providing lightweight signal exchange support for phatic interaction, showing caring/cheering gestures as empathic social behaviour, and acting as a bridge to spark further conversations.
- Expressing our feelings through social sharing helps us clarify and resolve the emotions we experienced in those events. As we can see in **Yields** category, It has many benefits like reducing the distress of an emotional experience, improving emotional well-being, stimulating social exchange and initiating communication, affirming connection, increasing intimacy by allowing others to provide empathy, validation, and support, and better emotional understanding both to self and to others.

7.3. Limitations and Opportunities for Future Research

Throughout the studies in this PhD research, I focused on the interpersonal process of emotion regulation through social sharing, and how can it be supported with technology. I focus on investigating this process and supporting it with technology in a daily situation, where people experience daily ups and downs. This research investigates how technology can support people to cope with daily emotional ups and downs. This research excludes the extreme case of stress, depression, or any other mental health problems.

As a direction for future research, there is an open opportunity to explore how providing phatic interaction through technology can help to support people with mental health issues. There is an opportunity to understand more important aspects in supporting emotion regulation by exploring in a longer period of time of studies. This research also has not explored on the targets of social sharing of emotion. Participants were set in a fixed group of trusted circles where everyone knows about each other. Future research can explore on giving options to the users to have more

than one type of trusted circle, where they may have different sets of emotion to be shared with different groups of people. There are also opportunities to tailor Empatchi to a more specific use case. For example, I would like to explore how can Empatchi be useful in supporting emotion regulation training for new employees in a company, or for new teachers at a university or school. Empatchi has the potential to introduce people that there are many ways that they can channel the fundamental need of sharing emotion, and sharing it lightweight using phatic approach, supported by technology, is one of them. It can help people with difficulties or hesitant in sharing emotion verbally to be more open and allow others to reach and help them in their emotion regulation process.

There are also many concerns regarding the effects and ethical implications on users for Empatchi use. Other than the security, privacy, and data protection issue of handling sensitive data of emotions, support messages, and people's connection, we need to also consider about how users interact with Empatchi. Although it has been designed to be non-intrusive and not distracting, it is still a mobile app which needs to be installed in a smartphone, and for some people it may not be helpful at all to support them fix the unhealthy behaviour of excessive smartphone use. We need to also consider about how people are connected to each other in Empatchi. In our study, all participants inside a group agreed to participate and consider each other as a trusted circle. However, in a real life scenario, it is possible that, for example, A considers B as one of his trusted friend, but B does not really want to share emotions with A all the time. With the current design of Empatchi, it may cause inconvenience for both A and B to find the better solutions to maintain their relationship and not hurting each other. Future research needs to address this challenge by exploring how a trusted circle should be formed inside Empatchi, and whether we should allow users to change the privacy of each emotion shared to different groups of people.

Finally, I would also like to suggest a future direction of the research of emotion labelling with self-report method. With all the challenges of the Self-Assessment Manikin (SAM) mentioned throughout our studies, there is an ample opportunity to develop a new method of labelling emotion that can be used in the future psychological research, especially when using new technologies like mobile devices. In this research, SAM method has been adopted as data collection method in emotion sharing. The icons that are used in SAM method were originally created for

desktop or big screen use. To implement it to a mobile technology, we need to adjust them to simpler forms so that they are still easy to recognise and understand. In this research, I slightly modified the forms of SAM icons into simpler forms that are mobile friendly, as shown in Figure 23. SAM is an established and proven method that are widely used in many research. In this research, I try to be as close as the original method when it was introduced by not introducing new interactions to change valence or arousal by gestures, pressure, or other types of interactions. However, we can take this research into further directions by exploring: 1.) How we can express the level of valence or arousal with hand gestures or pressure? 2.) Is it more intuitive and effective for the emotion sharer?, and 3.) Is there any other possible way of expressing emotion that is more efficient for mobile technology or future technology use other than selecting valence and arousal level? For direction No. 3, we can also explore beyond self-reported emotion expression. As wearable technology advances, there are more opportunities coming along the way to explore automated emotion logging for more accurate and more seamless experience.

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Appendix 1 : Study 1 Result – Experiencing Positive Emotion

No.	Parti-cipant	Type	Content	Achieve-ment	Good News
1	P1	Interview	One time I won a competition, and I immediately call my sister, I wanted her to know, and it feels just nice when she appreciated what I had just achieved.	✓	
2	P1	Interview	I sometimes think when people brag about their achievement in social media, they just basically need appreciation, and validation, from their friends or family. I think it's completely normal.	✓	
3	P2	Interview	I always love it when people acknowleged my hard work. I play guitar in a band and one time an event organiser thanked and praised me that I played very well and would like to have me again.	✓	
4	P2	Interview	There was this time when I just finished delivering my final presentation that I prepared for weeks, and I felt really great about it. I texted [friend's name] right away after it's done and she responded: "Congratulations! Finally!!"	✓	
5	P2	Interview	On bad news, it takes more time for me to decide whether to share it or not. I need to digest, and I need to think. When it's a good news, it's more spontaneous.	✓	
6	P4	Photo	I CLEANED MY ROOM! 🎉	✓	
7	P4	Photo	The exhibition i helped to display	✓	
8	P5	Photo	Managed to form my chocolate beautifully	✓	
9	P5	Photo	My work for today!	✓	
10	P5	Interview	I am happy when I can listen and help them in providing the solution. Sometimes when I do that, it seems like I'm reminding myself, to be grateful for what I am right now. I feel content and accomplished when I can help and give support to my close ones.	✓	
11	P5	Interview	When I successfully made something, I will share it with my close friends. I will send pictures to them like, "Look at this cake I just made!", and they would respond "Wow, it's so pretty!"	✓	
12	P6	How did I care for my close ones today?	Took great photographs of my friend on her graduation day	✓	
13	P6	Interview	I want to accomplish more things tomorrow that what I did today. It would be good if someone can remind me about it. "Hey, [P6], let's get more work done! One more paper to read and you're better than yesterday!"	✓	
14	P6	How did I care for my close ones today?	Sent my girlfriend supportive voice notes. She always like when receiving them.		✓
15	P7	What was the last message I received today that boosted my positive mood?	A message from an old friend, telling me he's doing okay in a new country		✓
16	P8	What was the last message I received today that boosted my positive mood?	Finally we can meet after these 2 years!		✓
17	P8	Interview	I think I see Twitter is more for complaining, and Facebook is more for spreading good news, and sometimes I feel happy reading them.		✓
18	P8	Interview	When I feel down, I don't really feel the immediate urge to share it with my friend. I need time to think, ... should I tell it to someone? But when I feel great about something, I feel like I have to tell someone right away.	✓	

Appendix 2 : Study 1 Result – Experiencing Negative Emotion

No.	Parti-cipant	Type	Content	Failure/Not as expected	Human Relationship Problem
1	P1	What do I wish I could have done better today?	I'm a little off behind schedule at work	✓	
2	P1	What do I wish I could have done better today?	I want to have less sleep, or wake up earlier, so I have more time for work.	✓	
3	P1	Photo	I've had enough of this data....	✓	
4	P1	Interview	I feel like I'm more "social" with others when I have a problem.	✓	
5	P1	Interview	I rarely tell anyone about the problem that I'm currently facing. I tend to find distraction from the problem while I'm figuring out the solution (to the problem)	✓	
6	P2	What do I wish I could have done better today?	Should have stayed home rather than spending money eating outside	✓	
7	P2	What do I wish I could have done better today?	Should've done more research about my homework topic	✓	
8	P2	What do I wish I could have done better today?	Should have concentrate more	✓	
9	P2	What do I wish I could have done better today?	I'm behind the schedule for my presentation prep	✓	
10	P2	Interview	Nothing can beat sharing good food with good friends after school. I could even forget about my failed exams.	✓	
11	P2	Interview	On bad news, it takes more time for me to decide whether to share it or not. I need to digest, and I need to think. When it's a good news, it's more spontaneous.	✓	
12	P3	What do I wish I could have done better today?	I should have clean my messy room	✓	
13	P3	What do I wish I could have done better today?	Pay more attention	✓	
14	P3	What do I wish I could have done better today?	To learn more	✓	
15	P3	What do I wish I could have done better today?	Get all the moves right during my dance practice	✓	
16	P3	Interview	Sometimes, by just knowing that I can meet and hang out with my close friends after school, I feel like I can go through all those hard essay assignments.	✓	
17	P3	Interview	When I called [friend's name], she was like ... You know what, I just had this bad day and.. she was like talking for hours. I said, "Why didn't you call me, or tell me earlier?", and she replied, "I don't know when you're actually free and I don't want to disturb you.. We're miles away and in the different time zone..", and yeah, I actually felt the same, especially she's extremely busy in the medical school. I think we need some prompt to bring us to a conversation like this.	✓	
18	P4	What do I wish I could have done better today?	i just could've been more productive really	✓	
19	P4	What do I wish I could have done better today?	could've been more confident on my opinions, could've have better social skills 😂	✓	
20	P4	What do I wish I could have done better today?	less sleeping less procrastinating	✓	
21	P4	What do I wish I could have done better today?	be more enthusiastic about the classes, give meaningful inputs, actually stay in the library to do work	✓	

22	P4	Interview	Most of the time I blame myself for not doing what I am supposed to be doing. And sometimes I feel ashamed to tell anyone about it.	✓	
23	P4	What do I wish I could have done better today?	reply mum's messages		✓
24	P4	How did I care for my close ones today?	I did not reply to my mom's text until just now, so..probably not very well?		✓
25	P4	How did I care for my close ones today?	can't call mum even tho i promised her to. failed to inform my friends that i went out to eat so they waited for me for an hour :(		✓
26	P4	Interview	I only tell them about it when I know that they would actually care about me. Telling everything takes a lot of effort and when the response was like "Oh, okay.. I see..", it feels like you're not appreciated.		✓
27	P5	What do I wish I could have done better today?	Have more time to do laundry	✓	
28	P5	What do I wish I could have done better today?	More preparataion for my cooking class	✓	
29	P5	What do I wish I could have done better today?	Have more time to rest	✓	
30	P5	What do I wish I could have done better today?	Have more time to rest	✓	
31	P5	What do I wish I could have done better today?	More preparataion for my cooking class	✓	
32	P6	What do I wish I could have done better today?	Capable to understand something faster	✓	
33	P6	How did I care for my close ones today?	Tried to lift my gf up when she felt anxious about her clinical study but I failed	✓	
34	P6	Photo	Heavy rain comes with sadness of loneliness.	✓	
35	P6	Interview	I think interacting with people is a good thing when you are feeling so low. You don't have to tell the story yet, but just be with people. In that case for me, being alone is toxic and only make things worse.	✓	
36	P6	Interview	Sometimes I feel guilty and sad when I can't give enough support to my girlfriend	✓	
37	P6	Interview	After a phone call with my girlfriend, I often felt that I'm actually alone. In reality, she's not physically here. What if she's actually here? Would things be different?	✓	
38	P7	What do I wish I could have done better today?	I could have finished the essay earlier and do readings for the other one...but well as long as it is finished	✓	
39	P7	What do I wish I could have done better today?	Read more :p	✓	
40	P7	Interview	It's hard for me to tell someone that I need them, I need their support. I expect someone to feel it and give me some feedback.	✓	
41	P7	Interview	My friend would ask me out to have a meal together, or just hanging out, when they know I feel down, or I have a problem. I prefer to talk about it while having coffee or dinner. I am bad at texting, and people often misunderstood my text.		✓
42	P8	Interview	I feel sad when I understand about my best friends' problem from a social network news feed.. I think I hate the fact that they're not telling me personally.		✓

Appendix 3 : Study 1 Result – Shared Experience

No.	Parti-cipant	Type	Content	Meal	Vaca-tion	Hang Out	Struggle
1	P1	What am I grateful for?	Friends to share a dinner with	✓			
2	P1	Interview	Most of the time I don't tell the story. I just ask my friends to hang out or to have dinner together with me	✓			
3	P1	Photo	Nice and short holiday with friends should really help		✓		
4	P1	Photo	The ticket from my last trip with my friends to York		✓		
5	P1	Interview	I'm not a 'direct' person. I won't be telling my friends "Hey, I have this problem.." but it will be "Hey, let's hang out". But then again, we'll talk other things when I actually meet them. It's the conversation that helps.			✓	
6	P2	What am I grateful for?	I could still enjoy Korean food	✓			
7	P2	What am I grateful for?	Food and Good Friends	✓			
8	P2	Photo	Comfort food with friends!	✓			
9	P2	Photo	Been craving for this for months. Finally got to go!	✓			
10	P2	Photo	Late dinner with the team!	✓			
11	P2	Interview	Nothing can beat sharing good food with good friends after school. I could even forget about my failed exams.	✓			
12	P2	Photo	Chilling with my friends			✓	
13	P3	What am I grateful for?	I can still eat outside haha	✓			
14	P3	Photo	So sad that these people are leaving but	✓			
15	P3	Interview	Sometimes, by just knowing that I can meet and hang out with my close friends after school, I feel like I can go through all those hard essay assignments.			✓	
16	P3	Interview	My boyfriend sent me his e-ticket of him visiting me next weekend. Suddenly all the assignments I was working on that week feels easier to manage.			✓	
17	P3	Photo	I always love people behind the scene ^^				✓
18	P3	Interview	Knowing that my friend is also going through the same pain keeps me pushing myself to not giving up on my tasks.				✓
19	P4	Interview	I don't immediately tell my friends about what I have been to at school today. I know that I'm going to meet them, and I prefer to talk with them while having dinner together.	✓			
20	P4	Photo	a cool pic from a while back that i posted on instagram today. With my friend after watching one of our favourite band.			✓	
21	P4	Photo	a picture my friend posted on instagram of our shoes, it looks cute			✓	
22	P4	What was the last message I received today that boosted my positive mood?	a mssg frm my friend saying that she's stressed too, but we can do this together!!!!				✓
23	P6	Photo	ate chipotle with my friend	✓			
24	P6	How did I care for my close ones today?	Tried to lift my gf up when she felt anxious about her clinical study but I failed			✓	
25	P6	Interview	I don't want to tell, or show, that I am feeling down. I am afraid that they will get the negative energy from my story, and it makes them feel sad. Instead, when I feel down, I feel like I have to help people, to give happiness. I would call my friend and ask them out. I simply listen to their stories, treat them dinner, or give them gifts, and one of the reason is that I want to turn the negative energy into the positive one.			✓	

26	P6	Interview	I think interacting with people is a good thing when you are feeling so low. You don't have to tell the story yet, but just be with people. In that case for me, being alone is toxic and only make things worse.			✓	
27	P7	How did I care for my close ones today?	Just by being with them			✓	
28	P7	What am I grateful for?	That i got to meet my old friends from the uni			✓	
29	P7	Interview	My friend would ask me out to have a meal together, or just hanging out, when they know I feel down, or I have a problem. I prefer to talk about it while having coffee or dinner. I am bad at texting, and people often misunderstood my text.	✓		✓	
30	P7	Interview	It lightens a bit when you know that you can share your stress, of the upcoming exam for example, with someone. I feel grateful when I know I have such friends around me.				✓
31	P8	What am I grateful for?	Meeting my 10 years best friend today			✓	
32	P8	What am I grateful for?	Still managed to be very close with my 2 girls after separated London-Melbourne-Brisbane for 2 years			✓	
33	P8	Photo	Three of us accidentally wear black today!			✓	

Appendix 4 : Study 1 Result – Caring/Cheering Gestures

No.	Parti-cipant	Type	Content
1	P1	How did I care for my close ones today?	Called my sister
2	P1	What was the last message I received today that boosted my positive mood?	thank u email from my workshop lecturer
3	P1	Interview	A lot of times I call my grandfather when I'm feeling down, and only by hearing his voice I feel comforted. He will then cheer me to keep doing my best in my work and give me life advice in general, without me having to tell what exactly my problem is
4	P2	Interview	At times, someone from my family would send me some spontaneous message like "Hey, good luck for your work!" and I found it mood-boosting.
5	P2	Interview	A simple and short text, saying that everything will be fine, is enough to make my day.
6	P2	Interview	There was this time when I just finished delivering my final presentation that I prepared for weeks, and I felt really great about it. I texted [friend's name] right away after it's done and she responded: "Congratulations! Finally!!"
7	P2	Interview	(When I know that my friends need my support) I feel that I need to say something to support them, but it does not have to be like chat where you have to constantly reply.
8	P3	How did I care for my close ones today?	Simpy saying thank you for everything
9	P3	Interview	I feel like a more personalised short message like "Hey, it's cold out there. Stay warm and take care!" is more meaningful than a general "take care". It's not like I don't appreciate the other one, but still it feels different.
10	P4	What was the last message I received today that boosted my positive mood?	a "good luck on your studies" wish
11	P4	Interview	I felt so happy and grateful when my mum just suddenly called and calmed me, even before I tell her that I am not okay. I always believe that a mother has this kind of sixth sense about their children.
12	P4	Interview	I was so grateful that my tutor for the class really gave me the emotional support I need. He gave me useful feedback while keep reminding me not to be too stressful.
13	P5	What was the last message I received today that boosted my positive mood?	You can do it!
14	P5	What was the last message I received today that boosted my positive mood?	Your cake looks beautiful!
15	P5	Interview	I can sense when something is not right with my close ones, from example from how they use words when they text me. I think I'm quite sensitive to see small changes in them, and when I feel it, I will call them and ask if everything is okay.
16	P5	Interview	I am happy when I can listen and help them in providing the solution. Sometimes when I do that, it seems like I'm reminding myself, to be grateful for what I am right now. I feel content and accomplished when I can help and give support to my close ones.
17	P5	Interview	[friend's name] and [friend's name], they don't really like texting. When I feel that we're not having a conversation for so long, I will be the first one to call them, asking if everything is OK.
18	P5	Interview	When my close friend posts something unusual on Facebook, I will know that she's not alright, but I don't think anybody else does. It's like an implicit sign that only her close people know. I will then text or call her, asking if everything is OK.
19	P6	How did I care for my close ones today?	Tried to lift my gf up when she felt anxious about her clinical study but I failed
20	P6	How did I care for my close ones today?	Sent my girlfriend supportive voice notes. She always like when receiving them.
21	P6	Interview	(From the shared digital trace) My girlfriend would know if I'm not doing anything that day, not leaving my home and like, let's say my writing is not progressing. She would then send me a message, "What's the matter? Cheer up!"
22	P6	Interview	I chose voice note over a text message because I felt like I couldn't transform my whole emotion into text when trying to send her support.
23	P7	How did I care for my close ones today?	Went out and bought medicine for my sick friend

24	P8	How did I care for my close ones today?	Called my best friend just to ask about her day. I find it calming when I just listen to what my friends are up to right now.
25	P8	Interview	I still feel that a traditional greeting card has that warm and comforting feeling that any digital media still could not recreate. It is the tangibility, the handwriting; it is a gift, it shows how they really care about you. It's these little things that matter.
26	P8	Interview	Small talk is important I think, to show that you care. I feel comforted when someone says something simple like, 'Take Care!' to me.

Appendix 5 : Study 1 Result – Notion of Gift

No.	Parti-cipant	Type	Content	Physical	Digital
1	P3	Photo	His flight details! 🙈		✓
2	P3	Interview	My boyfriend sent me his e-ticket of him visiting me next weekend. Suddenly all the assignments I was working on that week feels easier to manage.		✓
3	P4	Interview	Sometimes I found myself staring at this ring from my grandma. Somehow I feel as if she's here with me, calming me with her words, just like when I was a kid.	✓	
4	P4	Interview	I felt happy when I know that my friend just uploaded a picture of us to her Instagram. For me it's a sign that she's thinking about me, it's a form of validation that we're friend, a close friend.		✓
5	P5	How did I care for my close ones today?	Gave chocolate to my close friend	✓	
6	P5	What was the last message I received today that boosted my positive mood?	I topped up my prepaid internet credit so we can skype tonight from my boyfriend		✓
7	P6	Interview	I don't want to tell, or show, that I am feeling down. I am afraid that they will get the negative energy from my story, and it makes them feel sad. Instead, when I feel down, I feel like I have to help people, to give happiness. I would call my friend and ask them out. I simply listen to their stories, treat them dinner, or give them gifts, and one of the reason is that I want to turn the negative energy into the positive one.	✓	
8	P6	How did I care for my close ones today?	Sent my girlfriend supportive voice notes. She always like when receiving them.		✓
9	P6	Interview	I share my digital accounts with my close ones. The computer at my parent's home is using the same Google credentials with the one I'm using right now, so it always syncs. My mum usually uses it, and I will always know about her browsing activity and vice versa. With my LDR (Long Distance Relationship) girlfriend, I share my Spotify account. I will know when and what she is listening on Spotify, which most likely she will be studying. We will notice when there's change in each other's activities. I know that everyone else will think it is strange or creepy, but we are totally fine with that. I believe that it is one way to feel the presence when you don't share the same space, and to know about what are you up to without always having to tell the story.		✓
10	P7	How did I care for my close ones today?	Went out and bought medicine for my sick friend	✓	
11	P7	What was the last message I received today that boosted my positive mood?	My friend and I talked about the new osomatsu-san (P7's favourite anime character) sticker (for mobile messaging app)...she joked and said how poor I am for not being able to buy it.. But she ended up bought it for me.. I'm sooo happy		✓
12	P7	What am I grateful for?	Gift from my friend		✓
13	P7	Photo	What i've been wanting for the last couple of months..		✓
14	P7	Interview	My friend sometimes would just randomly bought me digital stickers as a present. You know, those cute little character animations that you can exchange via messaging app. I know it is virtual but it still makes me happy and it shows how he cares about me.		✓
15	P8	Interview	I still feel that a traditional greeting card has that warm and comforting feeling that any digital media still could not recreate. It is the tangibility, the handwriting; it is a gift, it shows how they really care about you. It's these little things that matter.	✓	
16	P8	Interview	I wished there's something like greeting card exchange in a digital form. Something like, Good luck on your first day! or Take Care! that pops on your screen and you can see it without having to do anything, but it's not like the notification, it has to be more personal, like greeting card. This has to be inside something that we are already using. I think we had something like this back in the days when we were using Nokia phones. There's no urgent expectation to reply to each other. I know they'd be busy too.		✓

Appendix 6 : Study 1 Result – Picture Sharing

No.	Participant	Type	Content
1	P2	Interview	The other day I found myself staring at the photo of my dad playing tennis. I miss him so much and I wish both of my parents to be happy and healthy. It gave me motivation to do my study well.
2	P3	Photo	Family and friends portraits in my room
3	P3	What was the last message I received today that boosted my positive mood?	My mom's selfie pictures
4	P3	Photo	Family and friends portraits in my room
5	P4	Photo	the pic i posted on instagram for my friend's birthday
6	P4	Photo	a cool pic from a while back that i posted on instagram today. With my friend after watching one of our favourite band.
7	P4	Photo	a picture my friend posted on instagram of our shoes, it looks cute

Appendix 7 : Study 1 Result – Yields

No.	Parti-cipant	Type	Content	Feeling Grateful	Increase in Positive Affect	Decrease in Negative Affect
1	P1	What am I grateful for?	Loving family	✓		
2	P1	What am I grateful for?	Friends to share a dinner with	✓		
3	P1	What am I grateful for?	Still breathing	✓		
4	P1	What was the last message I received today that boosted my positive mood?	thank u email from my workshop lecturer		✓	
5	P1	Interview	I sometimes think when people brag about their achievement in social media, they just basically need appreciation, and validation, from their friends or family. I think it's completely normal.	✓	✓	
6	P1	Interview	I feel like I'm more "social" with others when I have a problem.	✓		
7	P1	Interview	I sometimes think when people brag about their achievement in social media, they just basically need appreciation, and validation, from their friends or family. I think it's completely normal.		✓	
8	P1	Interview	A lot of times I call my grandfather when I'm feeling down, and only by hearing his voice I feel comforted. He will then cheer me to keep doing my best in my work, and give me life advice in general, without me having to tell what exactly my problem is.			✓
9	P2	Interview	The other day I found myself staring at the photo of my dad playing tennis. I miss him so much and I wish both of my parents to be happy and healthy. It gave me motivation to do my study well.		✓	
10	P2	Interview	I always love it when people acknowleged my hard work. I play guitar in a band and one time an event organiser thanked and praised me that I played very well and would like to have me again.		✓	
11	P2	Interview	At times, someone from my family would send me some spontaneous message like "Hey, good luck for your work!" and I found it mood-boosting.		✓	
12	P2	Interview	There was this time when I just finished delivering my final presentation that I prepared for weeks, and I felt really great about it. I texted [friend's name] right away after it's done and she responded: "Congratulations! Finally!!"		✓	
13	P2	Interview	Nothing can beat sharing good food with good friends after school. I could even forget about my failed exams.			✓
14	P3	What am I grateful for?	How this life is so amazingly perfect and beautiful	✓		
15	P3	What am I grateful for?	Grateful of the people that I've meet, they're all nice	✓		
16	P3	What am I grateful for?	How this life is so amazingly perfect and beautiful	✓		
17	P3	Interview	Knowing that my friend is also going through the same pain keeps me pushing myself to not giving up on my tasks.			✓
18	P4	Interview	I felt so happy and grateful when my mum just suddenly called and calmed me, even before I tell her that I am not okay. I always believe that a mother has this kind of sixth sense about their children.	✓		
19	P4	Interview	Sometimes I found myself staring at this ring from my grandma. Somehow I feel as if she's here with me, calming me with her words, just like when I was a kid.			✓
20	P5	What am I grateful for?	Sunny London	✓		
21	P5	What am I grateful for?	Tasty food	✓		
22	P5	Interview	I am happy when I can listen and help them in providing the solution. Sometimes when I do that, it seems like I'm reminding myself, to be grateful for what I am right now. I feel content and accomplished when I can help and give support to my close ones.	✓	✓	
23	P6	What was the last message I received today	A supporting message from my girlfriend		✓	

		that boosted my positive mood?				
24	P6	What am I grateful for?	A supportive girlfriend, even on her busy times	✓		
25	P6	What was the last message I received today that boosted my positive mood?	Heard a positive story from a movie I watched		✓	
26	P6	What am I grateful for?	Great food after work	✓		
27	P6	Interview	I want to accomplish more things tomorrow that what I did today. It would be good if someone can remind me about it. "Hey, [P6], let's get more work done! One more paper to read and you're better than yesterday!"		✓	
28	P6	Interview	I think interacting with people is a good thing when you are feeling so low. You don't have to tell the story yet, but just be with people. In that case for me, being alone is toxic and only make things worse.			✓
29	P7	What am I grateful for?	Gift from my friend	✓		
30	P7	What am I grateful for?	That i got to meet my old friends from the uni	✓		
31	P7	What am I grateful for?	That i saw a great sunset	✓		
32	P7	What am I grateful for?	That i had a nice walk back home :) Oh and that i have better ideas for my new story	✓		
33	P7	What was the last message I received today that boosted my positive mood?	A message from an old friend, telling me he's doing okay in a new country		✓	
34	P7	What was the last message I received today that boosted my positive mood?	Having a conversation about my favourite anime with my friend		✓	
35	P7	What was the last message I received today that boosted my positive mood?	My friend and I talked about the new osomatsu-san (P7's favourite anime character) sticker (for mobile messaging app)...she joked and said how poor I am for not being able to buy it.. But she ended up bought it for me.. I'm sooo happy		✓	
36	P7	What was the last message I received today that boosted my positive mood?	A message from a friend reminding me about the deadline of that re-registration thingy... or else things would be sooo troublesome			✓
37	P7	Interview	It lightens a bit when you know that you can share your stress, of the upcoming exam for example, with someone. I feel grateful when I know I have such friends around me.	✓		
38	P7	Interview	My friend sometimes would just randomly bought me digital stickers as a present. You know, those cute little character animations that you can exchange via messaging app. I know it is virtual but it still makes me happy and it shows how he cares about me.		✓	
39	P7	Interview	I am happy today that old friend from uni called me, and we talked a lot about an anime that we used to watch together back then. I almost forgot that I had a bad day on campus today.			✓
40	P7	Interview	My friend who lives in another city suddenly called me and she said "Let's meet up! I'm in London!". I was really happy, and it really made my day indeed.			✓
41	P8	What am I grateful for?	Meeting my 10 years best friend today	✓		
42	P8	What am I grateful for?	Still managed to be very close with my 2 girls after separated London-Melbourne-Brisbane for 2 years	✓		
43	P8	What was the last message I received today that boosted my positive mood?	Looking forward to see you soon!		✓	
44	P8	What was the last message I received today that boosted my positive mood?	Finally we can meet after these 2 years!		✓	
45	P8	How did I care for my close ones today?	Called my best friend just to ask about her day. I find it calming when I just listen to what my friends are up to right now.		✓	

Appendix 8 : Study 1 Result – Immediacy of Feedback

No.	Parti-cipant	Type	Content	Immediate	Later / Involve Anticipation
1	P1	What am I grateful for?	Friends to share a dinner with		✓
2	P1	Interview	One time I won a competition, and I immediately call my sister, I wanted her to know, and it feels just nice when she appreciated what I had just achieved.	✓	
3	P1	Interview	Most of the time I don't tell the story. I just ask my friends to hang out or to have dinner together with me		✓
4	P1	Interview	I'm not a 'direct' person. I won't be telling my friends "Hey, I have this problem.." but it will be "Hey, let's hang out". But then again, we'll talk other things when I actually meet them. It's the conversation that helps.		✓
5	P2	What was the last message I received today that boosted my positive mood?	I'll be there soon!		✓
6	P2	What was the last message I received today that boosted my positive mood?	Everything will be fine	✓	
7	P2	Interview	I always love it when people acknowleged my hard work. I play guitar in a band and one time an event organiser thanked and praised me that I played very well and would like to have me again.	✓	
8	P2	Interview	There was this time when I just finished delivering my final presentation that I prepared for weeks, and I felt really great about it. I texted [friend's name] right away after it's done and she responded: "Congratulations! Finally!!"	✓	
9	P3	Photo	His flight details! 🙈		✓
10	P3	Interview	Sometimes, by just knowing that I can meet and hang out with my close friends after school, I feel like I can go through all those hard essay assignments.		✓
11	P3	Interview	My boyfriend sent me his e-ticket of him visiting me next weekend. Suddenly all the assignments I was working on that week feels easier to manage.		✓
12	P4	Interview	I don't immediately tell my friends about what I have been to at school today. I know that I'm going to meet them, and I prefer to talk with them while having dinner together.		✓
13	P4	Interview	When they responded with something short like.. "Oh, I see..", or something I did not expect, I would think that they are not available to listen to me at that moment, because maybe they're having something (problems) too, or maybe just busy. I would stop telling my story and talk again when they are available.		✓
14	P5	Interview	When I successfully made something, I will share it with my close friends. I will send pictures to them like, "Look at this cake I just made!", and they would respond "Wow, it's so pretty!"	✓	
15	P6	What was the last message I received today that boosted my positive mood?	Sent my girlfriend supportive voice notes. She always like when receiving them.	✓	
16	P6	What was the last message I received today that boosted my positive mood?	A supporting message from my girlfriend	✓	
17	P7	Interview	My friend would ask me out to have a meal together, or just hanging out, when they know I feel down, or I have a problem. I prefer to talk about it while having coffee or dinner. I am bad at texting, and people often misunderstood my text.		✓
18	P8	What was the last message I received today that boosted my positive mood?	Looking forward to see you soon!		✓
19	P8	What was the last message I received today that boosted my positive mood?	Finally we can meet after these 2 years!		✓
20	P8	Photo	Had a facetime session with the gang! Can't wait to meet them		✓

Appendix 9 : Source Code – LoginViewController.swift

```
//
//  ViewController.swift
//  Empatchi
//
//  Created by Gilang Pradana on 04/12/2016.
//  Copyright © 2016 Pradana. All rights reserved.
//
import UIKit
import UserNotifications
import FirebaseAuth
import FirebaseDatabase
import NotificationBannerSwift
import ChameleonFramework
class LoginViewController: UIViewController {
   @IBOutlet weak var emailTextField: UITextField!
   @IBOutlet weak var passwordTextField: UITextField!
   @IBOutlet weak var loginButton: UIButton!
   @IBOutlet weak var signupButton: UIButton!
   @IBOutlet var loginViewBg: UIView!
   var global = UIApplication.shared.delegate as!
AppDelegate
   @IBAction func loginPressed(_ sender: Any) {
      if let email = emailTextField.text, let pass =
       passwordTextField.text{
      FIRAuth.auth()?.signIn(withEmail: email, password:
pass, completion:
       { (user, error) in
         //is the user exist in the database?
         if let u = user{
            //user is found!
             self.dismiss(animated: true, completion: nil)

         }


else{

       //else check error
let banner = NotificationBanner(title: "Error", subtitle:


            error!.localizedDescription, style: .danger)
           banner.show()


} })


 }
e  lse{


      let banner = NotificationBanner(title: "Missing
Information",
       subtitle: "Please fill out all fields", style: .danger)
      banner.show()
   }
}
@IBAction func signupPressed(_ sender: Any) {
   //TODO: Here, perform login with tab controller
   self.global.onboardMe = 1
   print("udah di set ini")
   //TODO: Form Validation
   if let email = emailTextField.text, let pass =
    passwordTextField.text{
      FIRAuth.auth()?.createUser(withEmail: email,
password: pass,
       completion: { (user: FIRUser?, error: Error?) in
         let ref = FIRDatabase.database().reference()
         //let usersReference = ref.child("users")
         let uid = user?.uid
         //is the user exist in the database?
         if let u = user{
            //registration succeed!
           ref.child("Users").child(uid!).setValue(["email":
            email.lowercased(), "profileImageURL": "https://
            image.ibb.co/kWZbNk/def.png", "username":
"User", "uid"
            : uid])
           //self.global.justLoggedIn = true
           //Preset message for each category

ref.child("Posts").child(uid!).child("val+aro+").childB
            yAutoId().setValue(["message": "Great, well
            done!","order": 1])
 ref.child("Posts").child(uid!).child("val+aro+").childB
 yAutoId().setValue(["message": "So proud of
 you!","order": 2])
 ref.child("Posts").child(uid!).child("val+aro+").childB
 yAutoId().setValue(["message": "Let's
 celebrate!","order": 3])
ref.child("Posts").child(uid!).child("val-
 aro+").childByAutoId().setValue(["message": "Hang in
 there.","order": 1])
ref.child("Posts").child(uid!).child("val-
 aro+").childByAutoId().setValue(["message": "I wish you
 didn't feel this way","order": 2])
ref.child("Posts").child(uid!).child("val-
 aro+").childByAutoId().setValue(["message": "I know you
 will make it through.","order": 3])
ref.child("Posts").child(uid!).child("val-
 aro-").childByAutoId().setValue(["message": "You'll be
 fine.","order": 1])
ref.child("Posts").child(uid!).child("val-
 aro-").childByAutoId().setValue(["message": "Stay
 strong!","order": 2])
ref.child("Posts").child(uid!).child("val-
 aro-").childByAutoId().setValue(["message": "I know you
 will make it through.","order": 3])
 ref.child("Posts").child(uid!).child("val+aro-").childB
 yAutoId().setValue(["message": "Keep it up.","order":
 1])
 ref.child("Posts").child(uid!).child("val+aro-").childB
 yAutoId().setValue(["message": "Glad you feel this
 way.","order": 2])
 ref.child("Posts").child(uid!).child("val+aro-").childB
 yAutoId().setValue(["message": "Well done.","order":
 3])
 ref.child("Things").child(uid!).childByAutoId().setValu
 e(["message": "Have a call","order": 1])
  ref.child("Things").child(uid!).childByAutoId().setVal
  ue(["message": "Video call","order": 2])
  ref.child("Things").child(uid!).childByAutoId().setVal
  ue(["message": "Meet for coffee","order": 3])


}


           ref.child("Things").child(uid!).childByAutoId().setVal
           ue(["message": "Hang out","order": 4])
           ref.child("Things").child(uid!).childByAutoId().setVal
           ue(["message": "Have dinner","order": 5])

ref.child("When").child(uid!).childByAutoId().setValue(
          ["message": "Today","order": 1])

ref.child("When").child(uid!).childByAutoId().setValue(
          ["message": "At lunch time","order": 2])

ref.child("When").child(uid!).childByAutoId().setValue(
          ["message": "Tonight","order": 3])
```

```
ref.child("When").child(uid!).childByAutoId().setValue(
          ["message": "This weekend","order": 4])

ref.child("When").child(uid!).childByAutoId().setValue(
          ["message": "Soon","order": 5])
         print("i just signed up!")
         self.dismiss(animated: true, completion: nil)


  }
e  lse{
        //else check error
let banner = NotificationBanner(title: "Error",


         subtitle: error!.localizedDescription, style: .danger)
         banner.show()

} })


  }
e  lse{


   let banner = NotificationBanner(title: "Missing
Information",
    subtitle: "Please fill out all fields", style: .danger)
    banner.show()
}
override func viewDidLoad() {
      super.viewDidLoad()
      loginViewBg.backgroundColor =
       GradientColor(UIGradientStyle.topToBottom, frame:
view.bounds,
       colors: [HexColor("3C96D2")!,HexColor("3EE5AC")!])


}


   override func didReceiveMemoryWarning() {
      super.didReceiveMemoryWarning()
      // Dispose of any resources that can be recreated.


}


   override func touchesBegan(_ touches: Set<UITouch>,
with event:
    UIEvent?) {
      // Dismiss The Keyboard when the view is tapped
      emailTextField.resignFirstResponder()
      passwordTextField.resignFirstResponder()


} }
```

Appendix 10 : Source Code –

FriendsViewController.swift

```
//
//  FriendsViewController.swift
//  Empatchi
//
//  Created by Gilang Pradana on 10/05/2017.
//  Copyright © 2017 Pradana. All rights reserved.
//
import UIKit
import Firebase
import PMAlertController
import NotificationBannerSwift
import SwiftIcons
import ChameleonFramework
import ExpandingMenu
import UserNotifications
class FriendsViewController: UIViewController {
   @IBOutlet weak var reflectBtn: UIButton!
   @IBOutlet weak var addEmoBtn: UIButton!
   @IBOutlet weak var eNameLabel: UILabel!
   @IBOutlet weak var eDismissBtn: UIButton!
   @IBOutlet var eView: UIView!
   @IBOutlet weak var eImg: RoundedUIImageView!
   @IBOutlet weak var debugLabel: UILabel!
   @IBOutlet weak var valenceIcon: UIImageView!
   @IBOutlet weak var arousalIcon: UIImageView!
   @IBOutlet weak var valenceBar: UIImageView!
    @IBOutlet weak var arousalBar: UIImageView!
   @IBOutlet weak var dateLabel: UILabel!
   @IBOutlet weak var emptyImg: UIImageView!
   @IBOutlet weak var eSendSupportButton: UIButton!
   @IBOutlet weak var bubblesView: ContentBubblesView! {
      didSet {
         bubblesView.delegate = self as?
ContentBubblesViewDelegate
         bubblesView.dataSource = self as?
ContentBubblesViewDataSource
      }
   }
   var ref: FIRDatabaseReference?
   var databaseHandle:FIRDatabaseHandle?
   var emailnya = ""
   var userID = ""
   var global = UIApplication.shared.delegate as!
AppDelegate
var userLists = [String]()
override func viewDidLoad() {
   super.viewDidLoad()
    let nau = UInt64(floor(NSDate().timeIntervalSince1970 *
1000))
   eView.layer.cornerRadius = 10
   FIRMessaging.messaging().connect { (error) in
      if (error != nil) {
         print("Unable to connect with FCM. \(error)")
      } else {
         print("Connected to FCM.")
      }


}


   NotificationCenter.default.addObserver(
      self,
      selector: #selector(didBecomeActive),
      name:
NSNotification.Name.UIApplicationDidBecomeActive,
      object: nil)
   if(!self.global.notifying){
      UIApplication.shared.cancelAllLocalNotifications()
      print("local notif cleared")
   }


//reminder


   let today = Date()
   let calendar = NSCalendar.current
   let components =
calendar.dateComponents([.day, .month, .year],


from: today)


   var dateComp:DateComponents = DateComponents()
   dateComp.day = components.day
   dateComp.month = components.month
   dateComp.year = components.year
   dateComp.hour = 09
   dateComp.minute = 00
   let date = calendar.date(from: dateComp)
   let dateFormatter = DateFormatter()
   dateFormatter.dateFormat = "dd MM yyyy hh:mm:ss"
   let fireDate = dateFormatter.string(from: date!)
   print("fireDate: \(fireDate)")
   let localNotificationSilent = UILocalNotification()
   localNotificationSilent.fireDate = date
   localNotificationSilent.repeatInterval = .day
localNotificationSilent.alertTitle = "Good Morning"
localNotificationSilent.alertBody = "Share your emotion
today with


Empatchi"


localNotificationSilent.timeZone =
NSCalendar.current.timeZone


UIApplication.shared.scheduleLocalNotification(localNotific
ationSil


ent)


//questionnaire
let today1 = Date()
let calendar1 = NSCalendar.current
let components1 =
calendar1.dateComponents([.day, .month, .year],
 from: today1)
var dateComp1:DateComponents = DateComponents()
dateComp1.day = components1.day
dateComp1.month = components1.month
dateComp1.year = components1.year
dateComp1.hour = 21
dateComp1.minute = 00
let date1 = calendar1.date(from: dateComp1)
let dateFormatter1 = DateFormatter()
dateFormatter1.dateFormat = "dd MM yyyy hh:mm:ss"
let fireDate1 = dateFormatter1.string(from: date1!)
print("fireDate: \(fireDate1)")
let localNotificationSilent1 = UILocalNotification()
```

```
localNotificationSilent1.fireDate = date1
localNotificationSilent1.repeatInterval = .day
localNotificationSilent1.alertTitle = "Daily Questionnaire
Reminder"
localNotificationSilent1.alertBody = "It takes less than 2
minutes
 to complete your daily questionnaire"
localNotificationSilent1.timeZone =
NSCalendar.current.timeZone

UIApplication.shared.scheduleLocalNotification(localNotific
ationSil


ent1)


//-------------------------------------button inits
let empatchiColor =
GradientColor(UIGradientStyle.leftToRight,
 frame: view.bounds, colors:
 [HexColor("3C96D2")!,HexColor("3EE5AC")!])
eSendSupportButton.backgroundColor = empatchiColor
reflectBtn.setIcon(icon: .icofont(.history), iconSize: 32, color:
 empatchiColor, forState: .normal)
 let addConImg = UIImage.init(icon: .ionicons(.personAdd),
size:
  CGSize(width: 32, height: 32), textColor: .flatGreenDark)
 let giftBtnImg = UIImage.init(icon: .icofont(.pencilAlt2), size:
  CGSize(width: 32, height: 32), textColor: .flatGrayDark)
 let exchBtnImg = UIImage.init(icon: .icofont(.penaltyCard),
size:
  CGSize(width: 32, height: 32), textColor: .flatBlueDark)
 let settingBtnImg = UIImage.init(icon: .icofont(.settingsAlt),
size:
  CGSize(width: 32, height: 32), textColor: .flatGrayDark)
 let logoutBtnImg = UIImage.init(icon: .icofont(.logout), size:
  CGSize(width: 32, height: 32), textColor: .flatRedDark)
 let btnBgImg = UIImage.init(icon: .fontAwesome(.circle),
size:
  CGSize(width: 60, height: 60), textColor: .white)
 let menuButtonSize: CGSize = CGSize(width: 64.0, height:
64.0)
 let menuButton = ExpandingMenuButton(frame:
CGRect(origin:
  CGPoint.zero, size: menuButtonSize), centerImage:   ,
  centerHighlightedImage:   )
 menuButton.center = CGPoint(x: self.view.bounds.width -
44.0, y:
  self.view.bounds.height - 44.0)
 view.addSubview(menuButton)
let item2 = ExpandingMenuItem(size: menuButtonSize, title:
"Daily
 Questionnaire", image: giftBtnImg, highlightedImage:
giftBtnImg,
 backgroundImage: btnBgImg,
backgroundHighlightedImage: btnBgImg)
 { () -> Void in
    // Do some action
    //print("Menu 2 pressed")
    let vc: UIViewController =

self.storyboard!.instantiateViewController(withIdentifier:
     "NewAngketController") as UIViewController
    self.present(vc, animated: true, completion: nil)


}


 let itemEx = ExpandingMenuItem(size: menuButtonSize,
title: "View
  All Support Exchanges", image: exchBtnImg,
highlightedImage:
  exchBtnImg, backgroundImage: btnBgImg,
backgroundHighlightedImage:
  btnBgImg) { () -> Void in
    // Do some action
    //print("Menu 2 pressed")
    let vc: UIViewController =

self.storyboard!.instantiateViewController(withIdentifier:
     "TokenViewController") as UIViewController
    self.present(vc, animated: true, completion: nil)


}


 let item2x = ExpandingMenuItem(size: menuButtonSize,
title: "Add to
  Trusted Circle", image: addConImg, highlightedImage:
addConImg,
  backgroundImage: btnBgImg,
backgroundHighlightedImage: btnBgImg)
 { () -> Void in
    // Do some action
    //print("Menu 2x pressed")
    let alertVC = PMAlertController(title: "Add to Trusted
Circle",
     description: "Please enter your friend's email", image: nil,
     style: .alert)
    alertVC.addTextField { (emailtextField) in
    emailtextField?.placeholder = "Email"


}


    alertVC.addAction(PMAlertAction(title: "OK",
style: .default,
     action: { () in
    //print("Capture action OK")
    self.emailnya = alertVC.textFields[0].text!.lowercased()
    self.handlesearchUser()
    }))
    alertVC.addAction(PMAlertAction(title: "Cancel",
     style: .cancel, action: { () -> Void in
    print("Capture action Cancel")
    }))
    self.present(alertVC, animated: true, completion: nil)
}
let item3 = ExpandingMenuItem(size: menuButtonSize, title:
 "Settings", image: settingBtnImg, highlightedImage:
settingBtnImg,
 backgroundImage: btnBgImg,
backgroundHighlightedImage: btnBgImg)
 { () -> Void in
    // Do some action
    //print("Menu 3 pressed")
    let vc: UIViewController =
     self.storyboard!.instantiateViewController(withIdentifier:
     "SettingsViewController") as UIViewController
    self.present(vc, animated: true, completion: nil)
}
let item4 = ExpandingMenuItem(size: menuButtonSize, title:
"Logout",
 image: logoutBtnImg, highlightedImage: settingBtnImg,
 backgroundImage: btnBgImg,
backgroundHighlightedImage: btnBgImg)
 { () -> Void in
    // Do some action
    //print("Menu 4 pressed")
    self.handleLogout()
    //resetAll
    self.bubblesView.removeViewsFromBehaviors()
    self.bubblesView.removeViews()
    self.bubblesView.bubbleViews.removeAll()
    self.bubblesView.uidlist.removeAll()
    self.bubblesView.taplist.removeAll()
```

```
    self.bubblesView.emotionlist.removeAll()

}

menuButton.addMenuItems([item2, itemEx, item2x, item3,
item4])
//---------------------------------- bubbles inits : ONLY when user
 is logged in!
FIRAuth.auth()?.addStateDidChangeListener { auth, user in
   if let user = user {
      // User is signed in.
      self.userID = (FIRAuth.auth()?.currentUser?.uid)!
      self.ref = FIRDatabase.database().reference()
      self.bubblesView.reload(randomizePosition: true)
      self.bubblesView.tapEnabled = true
      self.bubblesView.panEnabled = true
      print("Did Load and Logged In")
      if(self.global.namaku==""){
         ///// --- Begin --- Snippets to get username from
userid
         let ref_: FIRDatabaseReference?
         ref_ = FIRDatabase.database().reference()

ref_?.child("Users").child(self.userID).observeSingleEv
          ent(of: .value, with: { (snapshot) in
            let value = snapshot.value as? NSDictionary
            let username = value?["username"] as? String ?? ""
            let myLatestTimestamp = value?["lastLogged"] as?
             Int64 ?? 0
            self.global.namaku = username
            self.global.latestT = myLatestTimestamp
            //print("retreiveD?")
            //print(self.global.latestT)
            let ppURLstring = value?["profileImageURL"] as?
             String ?? ""
            self.global.urlfotoku = ppURLstring
            let PictureURL = URL(string: ppURLstring)!
            // Creating a session object with the default
             configuration.
           // You can read more about it here https://
            developer.apple.com/reference/foundation/
            urlsessionconfiguration
           let session = URLSession(configuration: .default)
           // Define a download task. The download task will
            download the contents of the URL as a Data object
            and then you can do what you wish with that data.
           let downloadPicTask = session.dataTask(with:
            PictureURL) { (data, response, error) in
              // The download has finished.
              if let e = error {
                 print("Error downloading picture: \(e)")
              } else {
                 // No errors found.
                 // It would be weird if we didn't have a
                  response, so check for that too.
                 if let res = response as? HTTPURLResponse {
                    print("Downloaded picture with response
                     code \(res.statusCode)")
                    if let imageData = data {
                       // Finally convert that Data into an
                        image
                       self.global.fotoku = UIImage(data:
                        imageData)!


//


                    } else {
                       print("Couldn't get image: Image is


nil")
}
} else {

                    print("Couldn't get response code for
                     some reason")

                 }
              }
           }
           downloadPicTask.resume()


})


      ////// --- End --- Snippets to get username from userid
      let langganan = "/topics/untuk"+self.userID
      print("support token will be sent to "+langganan)
      FIRMessaging.messaging().subscribe(toTopic:
langganan)


}

} else {
   // No user is signed in.
        self.handleLogout()
      }

} }

 override func viewWillAppear(_ animated: Bool) {
    print("appeared")
    if(self.global.onboardMe == 1){
       print("will show onboard")
       print(self.global.onboardMe)
       print("onboard was true and just falsed")
       let vc: UIViewController =

self.storyboard!.instantiateViewController(withIdentifier:
        "SettingsViewController") as UIViewController
        self.present(vc, animated: true, completion: nil)

    }


else{

        print("status onboard")


       print(self.global.onboardMe)
    }
    //---------------------------------- bubbles refresh : ONLY
when
     user is logged in!
    FIRAuth.auth()?.addStateDidChangeListener { auth, user
in
       if let user = user {
       } else {
          // No user is signed in.
          self.handleLogout()
       }

} }

 override func viewWillDisappear(_ animated: Bool) {


}

/* override var preferredStatusBarStyle: UIStatusBarStyle {
      return .lightContent
 }*/
```

```
 func didBecomeActive() {
    if(self.global.welcomeBack){
       print("balik dari home")
       self.global.welcomeBack = false
       self.bubblesView.removeViewsFromBehaviors()
       self.bubblesView.removeViews()
       self.bubblesView.bubbleViews.removeAll()
      self.bubblesView.uidlist.removeAll()
      self.bubblesView.taplist.removeAll()
      self.bubblesView.emotionlist.removeAll()
      self.bubblesView.reload(randomizePosition: true)
   }


}

deinit {


   NotificationCenter.default.removeObserver(self)
}
func randRange (lower: UInt32 , upper: UInt32) -> UInt32 {
   return lower + arc4random_uniform(upper - lower + 1)
}
func handleLogout() {
   print ("handleLogout")
   do {

        try FIRAuth.auth()?.signOut()
      self.global.namaku = ""
   } catch let signOutError as NSError {
      print ("Error signing out: \(signOutError)")


} catch {


      print("Unknown error.")
   }
   let loginViewController =
    storyboard?.instantiateViewController(withIdentifier:
    "LoginViewController") as! LoginViewController
   self.present(loginViewController, animated: true,
completion: nil)
}
override func didReceiveMemoryWarning() {
   super.didReceiveMemoryWarning()
   // Dispose of any resources that can be recreated.


}

func callOnboard() {
}
func handlesearchUser(){
   var userIDnya = ""
   var namanya = ""
let ref0: FIRDatabaseReference?
ref0 = FIRDatabase.database().reference()
//start query for email
ref0?.child("Users").queryOrdered(byChild:
 "email").queryEqual(toValue:
 emailnya).observeSingleEvent(of: .value, with: { (snapshot)
in
   //if user found
   if let snapshots = snapshot.children.allObjects as?
    [FIRDataSnapshot] {


var found = 0


      for snap in snapshots


{
found = 1
        let name = snap.childSnapshot(forPath:
         "username").value! as! String
        namanya = name
        let uid = snap.childSnapshot(forPath: "uid").value! as!
         String
        userIDnya = uid
        //two way friend adding
         ref0?.child("Circles").child(self.userID).child(userIDn
         ya).setValue(["timestamp":
FIRServerValue.timestamp() ,
         "fid" : userIDnya])
         ref0?.child("Circles").child(userIDnya).child(self.user
         ID).setValue(["timestamp":
FIRServerValue.timestamp() ,
         "fid" : self.userID])


//alert user


        let banner = NotificationBanner(title: namanya,
         subtitle: "has been successfully added to your circle",
         style: .success)
        banner.show()
        self.bubblesView.reload(randomizePosition: true)
      }//end iteration on query result
      if (found == 0){


//alert user


        let banner = NotificationBanner(title: self.emailnya,
         subtitle: "is not on Empatchi :(", style: .danger)
        banner.show()
        }
      }//end check snapshot
   }) { (error) in
      print(error.localizedDescription)
   }
}//end function
func AnimateIn(){
   self.view.addSubview(eView)
   eView.center = self.view.center
   eView.transform = CGAffineTransform.init(scaleX: 1.2, y:
1.2)
   eView.alpha = 0
   UIView.animate(withDuration: 0.4) {
      self.eView.alpha = 1
      self.eView.transform = CGAffineTransform.identity
   }
}
@IBAction func eSendBtnPressed(_ sender: Any) {
   let vc: UIViewController =
    self.storyboard!.instantiateViewController(withIdentifier:
    "MessagesViewController") as UIViewController
   global.gonnaSend = true
   self.present(vc, animated: true, completion: nil)
}
@IBAction func eTokenBtnPressed(_ sender: Any) {
   let vc: UIViewController =
    self.storyboard!.instantiateViewController(withIdentifier:
    "TokenViewController") as UIViewController
   global.gonnaSend = true
   self.present(vc, animated: true, completion: nil)
}
@IBAction func eReflectBtnPressed(_ sender: Any) {
   let vc: UIViewController =
    self.storyboard!.instantiateViewController(withIdentifier:
    "ReflectViewController") as UIViewController
   global.gonnaSend = true
   self.present(vc, animated: true, completion: nil)
   }
   @IBAction func eDismissBtnPressed(_ sender: Any) {
      UIView.animate(withDuration: 0.3, animations: {
```

```
        self.eView.transform = CGAffineTransform.init(scaleX:
1.2, y:
          1.2)
        self.eView.alpha = 0
      }) { (succes: Bool) in
        self.eView.removeFromSuperview()
      }
    }
    @IBAction func reflectBtnPressed(_ sender: Any) {
      let vc: UIViewController =

self.storyboard!.instantiateViewController(withIdentifier:
        "ReflectViewController") as UIViewController
      self.present(vc, animated: true, completion: nil)
    }
    @IBAction func addEmoBtnPressed(_ sender: Any) {
      let vc: UIViewController =

self.storyboard!.instantiateViewController(withIdentifier:
        "FirstViewController") as UIViewController
      self.present(vc, animated: true, completion: nil)
    }


}

extension FriendsViewController:
ContentBubblesViewDelegate {
    func contentBubblesView(_ view: ContentBubblesView,
didSelectItemAt
      index: Int) {
      if let labelView = view.bubbleViews[index] as?
LabelBubbleView {
        self.eImg.image = nil


//data prep


        global.prepST.valence =
view.emotionlist[index].valence
        global.prepST.arousal =
view.emotionlist[index].arousal
        global.prepST.emotionID = view.emotionlist[index].id
        global.prepST.emotimestamp =
view.emotionlist[index].timestamp
        let tanggal =
TimeInterval(view.emotionlist[index].timestamp)/
          1000
        let tanggalan = NSDate(timeIntervalSince1970:
tanggal)
let formatter = DateFormatter()
//formatter.dateFormat = "yyyy-MM-dd 'at' HH:mm"
dateLabel.text = formatter.timeSince(from: tanggalan,
 numericDates: true)
//dateLabel.text = "on " + formatter.string(from:tanggalan)
switch view.emotionlist[index].valence{
/*case 1: self.valenceIcon.image =
 UIImage.init(icon: .icofont(.emoWorried), size:
CGSize(width:
 40, height: 40), textColor: .flatRedDark)
case 2: self.valenceIcon.image =
 UIImage.init(icon: .icofont(.emoSad), size: CGSize(width: 32,
 height: 32), textColor: .flatRed)
case 4: self.valenceIcon.image =
 UIImage.init(icon: .icofont(.emoSlightlySmile), size:
 CGSize(width: 32, height: 32), textColor: .flatGreen)
case 5: self.valenceIcon.image =
 UIImage.init(icon: .icofont(.emoSimpleSmile), size:
 CGSize(width: 32, height: 32), textColor: .flatGreenDark)
default: self.valenceIcon.image =
 UIImage.init(icon: .icofont(.emoExpressionless), size:
 CGSize(width: 32, height: 32), textColor: .flatGray)*/
case 1:
    self.valenceIcon.image =
    self.valenceBar.image =
case 2:
    self.valenceIcon.image =
    self.valenceBar.image =
case 4:
    self.valenceIcon.image =
    self.valenceBar.image =
case 5:
    self.valenceIcon.image =
    self.valenceBar.image =
default:
    self.valenceIcon.image =
    self.valenceBar.image =

}

switch view.emotionlist[index].arousal{
case 1:
    self.arousalIcon.image =
    self.arousalBar.image =
case 2:
    self.arousalIcon.image =
    self.arousalBar.image =
case 4:
    self.arousalIcon.image =
    self.arousalBar.image =
case 5:
    self.arousalIcon.image =
    self.arousalBar.image =

default:
    self.arousalIcon.image =
    self.arousalBar.image =
}
if(global.prepST.valence<3 && global.prepST.arousal<3){
    global.emoCond = "val-aro-"
}
else if(global.prepST.valence<3 &&
global.prepST.arousal>=3){
    global.emoCond = "val-aro+"
}
else if(global.prepST.valence>=3 &&
global.prepST.arousal<3){
    global.emoCond = "val+aro-"
}
else if(global.prepST.valence>=3 &&
global.prepST.arousal>=3){
    global.emoCond = "val+aro+"
}
global.selectedFID = view.taplist[index]
//print("sharing .." + global.selectedFID)
///// --- Begin --- Snippets to get username from userid
let ref_: FIRDatabaseReference?
ref_ = FIRDatabase.database().reference()
```

```
ref_?.child("Users").child(global.selectedFID).observeSingleE
ve
 nt(of: .value, with: { (snapshot) in
   let value = snapshot.value as? NSDictionary
   let username = value?["username"] as? String ?? ""
   let email = value?["email"] as? String ?? ""
   let imageURL = value?["profileImageURL"] as? String ?? ""
   self.eNameLabel.text = username
   self.debugLabel.text = " [" + email + "] [" +
    self.global.selectedFID + "]"
   //uiimageview = image from url
   let PictureURL = URL(string: imageURL)!
   let session = URLSession(configuration: .default)
   let downloadPicTask = session.dataTask(with:
PictureURL)
    { (data, response, error) in
      // The download has finished.
      if let e = error {
        print("Error downloading picture: \(e)")
      } else {
        // No errors found.
        if let res = response as? HTTPURLResponse {
          if let imageData = data {
            let image = UIImage(data: imageData)

                // Do something with your image.
                DispatchQueue.main.async {
                  self.eImg.image = image


}
} else {


                print("Couldn't get image: Image is nil")
              }
            } else {
              print("Couldn't get response code for some
                reason")

             }

          }
        }
        downloadPicTask.resume()


})


      ////// --- End --- Snippets to get username from
userid
      AnimateIn()
      //self.performSegue(withIdentifier: "showProfile",
sender: self)


} }


}


extension DateFormatter {
  /**
   Formats a date as the time since that date (e.g., “Last
week,
    yesterday, etc.”).


- Parameter from: The date to process.
- Parameter numericDates: Determines if we should return
a numeric


    variant, e.g. "1 month ago" vs. "Last month".


- Returns: A string with formatted `date`.
*/


  func timeSince(from: NSDate, numericDates: Bool = false)
-> String {
    let calendar = Calendar.current
    let now = NSDate()
    let earliest = now.earlierDate(from as Date)
    let latest = earliest == now as Date ? from : now
    let components =

calendar.dateComponents([.year, .weekOfYear, .month, .day,
.hour, .
     minute, .second], from: earliest, to: latest as Date)
    var result = ""
    if components.year! >= 2 {
      result = "\(components.year!) years ago"
    } else if components.year! >= 1 {
      if numericDates {
        result = "1 year ago"


} else {


        result = "Last year"
      }
    } else if components.month! >= 2 {
      result = "\(components.month!) months ago"
    } else if components.month! >= 1 {
      if numericDates {
        result = "1 month ago"
      } else {
        result = "Last month"
      }
    } else if components.weekOfYear! >= 2 {
      result = "\(components.weekOfYear!) weeks ago"
    } else if components.weekOfYear! >= 1 {
      if numericDates {
        result = "1 week ago"
      } else {
        result = "Last week"
      }
    } else if components.day! >= 2 {
      result = "\(components.day!) days ago"
    } else if components.day! >= 1 {
      if numericDates {
        result = "1 day ago"
      } else {
        result = "Yesterday"
      }
    } else if components.hour! >= 2 {
      result = "\(components.hour!) hours ago"
    } else if components.hour! >= 1 {
      if numericDates {
        result = "1 hour ago"
      } else {
        result = "An hour ago"
      }
    } else if components.minute! >= 2 {
      result = "\(components.minute!) minutes ago"
    } else if components.minute! >= 1 {
      if numericDates {
        result = "1 minute ago"
      } else {
        result = "A minute ago"
      }
    } else if components.second! >= 3 {
      result = "\(components.second!) seconds ago"


} else {


      result = "Just now"
    }
```

```
        return result
    }

}

extension FriendsViewController:
ContentBubblesViewDataSource {
    func countOfSizes(in view: ContentBubblesView) -> Int {

return 1 }

    func numberOfItems(in view: ContentBubblesView) -> Int
{

return 6 }

    func addOrUpdateBubbleView(forItemAt index: Int,
imgurl: String,
     currentView: BubbleView?) -> BubbleView {
       var view: BubbleView = currentView ?? BubbleView()
       //if view == nil {
          if let labelView = UINib(nibName: "LabelBubbleView",
bundle:
            nil).instantiate(withOwner: nil, options: nil).first as?
            LabelBubbleView {
              labelView.label.text = "Hey"
              if(!self.emptyImg.isHidden){
                 self.emptyImg.isHidden = true
              }
              let PictureURL = URL(string: imgurl)!
              let session = URLSession(configuration: .default)
              let downloadPicTask = session.dataTask(with:
PictureURL)
               { (data, response, error) in
                 // The download has finished.
                 if let e = error {
                    print("Error downloading picture: \(e)")
                 } else {
                    // No errors found.
                    if let res = response as? HTTPURLResponse {
                       if let imageData = data {
                          let image = UIImage(data: imageData)
                          DispatchQueue.main.async {
                             labelView.imageView.image = image
                             print("Downloaded picture with response
                              code \(index) " + imgurl)


}
} else {

                             print("Couldn't get image: Image is nil")
                          }
                       } else {
                          print("Couldn't get response code for some

reason") }

} }

downloadPicTask.resume()
            view = labelView
          }
//}
view.backgroundColor = .clear
let randomOrigin = CGPoint(x: CGFloat(drand48() *
 Double(self.view.frame.width * 2 / 3)),
                           y: CGFloat(drand48() *
                            Double(self.view.frame.height * 2 / 3)))
view.frame = CGRect(origin: randomOrigin,

return view }

}

size: .zero)
```

Appendix 11 : Source Code –

ShareViewController.swift

```
//
//  ShareViewController.swift
//  Empatchi
//
//  Created by Gilang Pradana on 09/05/2017.
//  Copyright © 2017 Pradana. All rights reserved.
//
import Foundation
import UIKit
import Firebase
import NotificationBannerSwift
import ChameleonFramework
import UserNotifications
class FirstViewController : UIViewController {
   var ref: FIRDatabaseReference?
   var databaseHandle:FIRDatabaseHandle?
   @IBOutlet weak var valence: UISegmentedControl!
   @IBOutlet weak var arousal: UISegmentedControl!
   @IBOutlet weak var logBtn: UIButton!
   @IBOutlet weak var status: UILabel!
   @IBOutlet weak var statusImgContainer: UIView!
   var userID = ""
   var val = 3
   var aro = 3
   var colourStr = "b8b8b8"
   var bRdMax: CGFloat = 0.0
   var bRdMin: CGFloat = 0.0
   var bRd: CGFloat = 0.0
   let screenSize = UIScreen.main.bounds
   var image: UIImage? = nil
   var imageView: UIImageView? = nil
   var global = UIApplication.shared.delegate as!
AppDelegate
   override func viewDidLoad() {
      super.viewDidLoad()
      valence.selectedSegmentIndex = 2
      arousal.selectedSegmentIndex = 2
      ref = FIRDatabase.database().reference()
   let empatchiColor =
GradientColor(UIGradientStyle.leftToRight,
    frame: view.bounds, colors:
    [HexColor("3C96D2")!,HexColor("3EE5AC")!])
   //valence.tintColor = empatchiColor
   //arousal.tintColor = empatchiColor
   logBtn.backgroundColor = empatchiColor
   self.image = self.global.fotoku
   self.imageView = UIImageView(image: self.image!)
   self.imageView?.contentMode =
UIViewContentMode.scaleAspectFill
   bRdMax = self.view.bounds.width/2.5
   bRdMin = self.view.bounds.width/5
   bRd = (((CGFloat(aro)-1.0)/4.0) * (bRdMax-bRdMin)) +
bRdMin
   self.updateMe(colour: self.colourStr, size: self.bRd)
}
@IBAction func valChange(_ sender: Any) {
   //Pensil Warna
   switch valence.selectedSegmentIndex


  {
c ase 0:
val = 1


      colourStr = "D71A1D"
   case 1:

val = 2


      colourStr = "FDAE61"
   case 2:

val = 3


      colourStr = "b8b8b8"
   case 3:

val = 4


      colourStr = "A6D96A"
   case 4:

val = 5


      colourStr = "1A9641"
   default:

val = 3


      colourStr = "fafafa"
   }
   /*switch valence.selectedSegmentIndex

{
 case 0:
val = 1


      colourStr = "ff0000"
   case 1:

val = 2


      colourStr = "f14e00"
   case 2:

val = 3


      colourStr = "b8b8b8"
   case 3:

val = 4


      colourStr = "98cd00"
   case 4:

val = 5


      colourStr = "00b53c"
   default:
      val = 3
```

```
        colourStr = "fafafa"
    }*/
    //status.text = "You are " + valStr + " and " + aroStr
    updateMe(colour: colourStr, size: bRd)
}
func updateMe(colour: String, size: CGFloat){
    for view in statusImgContainer.subviews{
        view.removeFromSuperview()
    }
    let ukuran: CGFloat = size
    let kurangberapa = (bRdMax - bRd)/2
    let theSize = CGSize(width: ukuran, height: ukuran)
    let originX = -1*((screenSize.width/2)+(ukuran/2))+
     (screenSize.width/2)
    let originY = (screenSize.height)-ukuran-128-
kurangberapa
    let theOrigin = CGPoint(x: originX, y: originY)
    imageView?.frame = CGRect(origin: theOrigin, size:
theSize)
    imageView?.layer.cornerRadius = ukuran / 2
    imageView?.clipsToBounds = true
    imageView?.layer.borderWidth = 6.0
    imageView?.layer.borderColor =
HexColor(colour)?.cgColor
    statusImgContainer.addSubview(imageView!)
}
@IBAction func aroChange(_ sender: Any) {
    switch arousal.selectedSegmentIndex


 {
c  ase 0:
aro = 1


case 1:
aro = 2


case 2:
aro = 3


case 3:
aro = 4


case 4:
aro = 5


default:


aro = 3 }


    //status.text = "You are " + valStr + " and " + aroStr
    bRd = (((CGFloat(aro)-1.0)/4.0) * (bRdMax-bRdMin)) +
bRdMin
    updateMe(colour: colourStr, size: bRd)


}


func randRange (lower: UInt32 , upper: UInt32) -> UInt32 {
    return lower + arc4random_uniform(upper - lower + 1)
}
@IBAction func logBtnPressed(_ sender: Any) {
    let userID : String = (FIRAuth.auth()?.currentUser?.uid)!
    let nau = UInt64(floor(NSDate().timeIntervalSince1970 *
1000))
    ref?.child("Emotions").childByAutoId().setValue(["o1val":
     val,"o2aro": aro,"timestamp": nau , "uid" : userID])

ref?.child("Users").child(userID).child("lastLogged").setValu
e(nau)
```

```
    var emoImgUrl = ""
    switch val{
    case 1:
        switch aro{
        case 1:
            emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
            empatchidev.appspot.com/o/notification%2F13.png?
            alt=media&token=eea811a2-f0b9-4ecc-b2aa-
2a0dc85ec26d"
        case 2:
            emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
            empatchidev.appspot.com/o/notification%2F5.png?
            alt=media&token=023fb42f-91e5-4596-88a2-
6a36c493e596"


case 3:


        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F4.png?
        alt=media&token=22dce1ad-d711-4e0a-96b4-
e78c829a7fbb"
    case 4:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F12.png?
        alt=media&token=f6a4d188-a8c3-4588-bdc0-
0d196e7bb04b"
    case 5:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F20.png?
        alt=media&token=f05e52d0-00bb-4f74-9968-
c0c1c553b785"
    default:
        emoImgUrl = ""

    }
case 2:
    switch aro{
    case 1:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F14.png?
        alt=media&token=2742b7e6-4027-4edb-b644-
59a5a3149c23"
    case 2:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F6.png?
        alt=media&token=8e70befb-2b80-4428-adb1-
49416e198c12"
    case 3:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F3.png?
        alt=media&token=3be410d1-92a6-48a4-858b-
c59a6d4f425c"
    case 4:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F11.png?
        alt=media&token=f8b1126f-bd4b-4c9a-935d-
103fe9ca050f"
    case 5:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F19.png?
        alt=media&token=8d04d347-2ac1-4fbd-be8d-
ef14159ba965"
    default:
```

```
        emoImgUrl = ""
    }
case 3:
    switch aro{
    case 1:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2Fv3a1.png?
        alt=media&token=8e110b19-64fc-4eeb-badd-
fa3f96a3b99a"
    case 2:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2Fv3a2.png?
        alt=media&token=74320176-de14-4408-ad07-
04cd1625ca8d"
    case 3:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2Fv3a3.png?
        alt=media&token=28c9fc47-4917-429a-acba-
14c3976aecee"

case 4:

        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2Fv3a4.png?
        alt=media&token=e976d85d-3308-40bf-bee2-
8795f2157c84"
    case 5:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2Fv3a5.png?
        alt=media&token=4c11a613-eebe-43cb-b74d-
d2289d629794"
    default:
        emoImgUrl = ""
    }
case 4:
    switch aro{
    case 1:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F15.png?
        alt=media&token=e43f0e1d-6f3a-46d0-976b-
e8ae37e9c313"
    case 2:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F7.png?
        alt=media&token=3c3529a9-4124-48e8-9f4c-
5e940cc8fbce"
    case 3:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F2.png?
        alt=media&token=5144407f-a818-4d72-b03b-
8d9f35c25453"
    case 4:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F10.png?
        alt=media&token=9fbe9546-3610-4005-9af5-
0d0490daafcc"
    case 5:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F18.png?
        alt=media&token=d938505d-4856-4f73-9c37-
54ce112691f3"
    default:
        emoImgUrl = ""
    }
case 5:
    switch aro{
    case 1:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F16.png?
        alt=media&token=f9146685-8e19-4e78-a41e-
769b2f4f0db4"
    case 2:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F8.png?
        alt=media&token=057779fa-f056-4e4f-a8e0-
c1990703e55a"
    case 3:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F1.png?
        alt=media&token=e1401e28-3a98-4637-a81d-
9bfc511ec540"
    case 4:
        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F9.png?
        alt=media&token=83559882-3fca-41a8-946f-
0723cebd1af0"

case 5:

        emoImgUrl =
"https://firebasestorage.googleapis.com/v0/b/
        empatchidev.appspot.com/o/notification%2F17.png?
        alt=media&token=93a99863-1b29-4288-9fdf-
eceaa52b8428"

default:

        emoImgUrl = ""
    }

default:

    emoImgUrl = ""
}
let tujuan = "/topics/"+userID
let notificationContent = [
    "to" : tujuan,
    "priority" : "high",
    "content_available": true,
    "mutable_content": true,
    "data": [
        "message": "Emotion!",
        "attachment": emoImgUrl
    ],
    "notification": [
        "body": "has shared emotion",
        "title": global.namaku,
        "sound": "default",
    ],
    ] as [String: Any]
var request = URLRequest(url: URL(string: "https://
 fcm.googleapis.com/fcm/send")!)
request.httpMethod = "POST"
request.addValue("application/json", forHTTPHeaderField:
"Content-
 Type")
request.addValue("key=AIzaSyArYnJ64Cy6PcZtFajN-
TeVJxLtv2kTc_0",
```

```
 forHTTPHeaderField: "Authorization")
request.httpBody = try!
JSONSerialization.data(withJSONObject:
 notificationContent, options: [])
URLSession.shared.dataTask(with:request,
completionHandler: {(data,
 response, error) in
   if error != nil {
      print(error)

} else {

      do {
           guard let json = try?
JSONSerialization.jsonObject(with:
          data!, options: .allowFragments) as? [String: Any] else
          { return }
         guard let errors = json?["errors"] as? [[String: Any]]
          else { return }
         if errors.count > 0 {
            // show error
            return
         } else {
// show confirmation

} }

    }
 }).resume()
let banner = NotificationBanner(title: "Emotion Shared",
subtitle:
 "You have successfully shared emotion", style: .success)
 banner.show()
 if(self.global.notifying){
 self.global.notifying = false
 UIApplication.shared.cancelAllLocalNotifications()
 print("local notif cancelled")
    //reset local schedule

//reminder

    let today = Date()
    let calendar = NSCalendar.current
    let components =
calendar.dateComponents([.day, .month, .year],

from: today)

    var dateComp:DateComponents = DateComponents()
    dateComp.day = components.day
    dateComp.month = components.month
    dateComp.year = components.year
    dateComp.hour = 09
    dateComp.minute = 00
    let date = calendar.date(from: dateComp)
    let dateFormatter = DateFormatter()
    dateFormatter.dateFormat = "dd MM yyyy hh:mm:ss"
    let fireDate = dateFormatter.string(from: date!)
    print("fireDate reset: \(fireDate)")
    let localNotificationSilent = UILocalNotification()
    localNotificationSilent.fireDate = date
    localNotificationSilent.repeatInterval = .day
    localNotificationSilent.alertTitle = "Good Morning"
    localNotificationSilent.alertBody = "Share your emotion
today
     with Empatchi"
    // no need to set time zone Remove bellow line
    localNotificationSilent.timeZone =
NSCalendar.current.timeZone

UIApplication.shared.scheduleLocalNotification(localNotific
atio

nSilent)

    //questionnaire
    let today1 = Date()
    let calendar1 = NSCalendar.current
let components1 =
         calendar1.dateComponents([.day, .month, .year],
from: today1)
        var dateComp1:DateComponents = DateComponents()
        dateComp1.day = components1.day
        dateComp1.month = components1.month
        dateComp1.year = components1.year
        dateComp1.hour = 21
        dateComp1.minute = 00
        let date1 = calendar1.date(from: dateComp1)
        let dateFormatter1 = DateFormatter()
        dateFormatter1.dateFormat = "dd MM yyyy
hh:mm:ss"
        let fireDate1 = dateFormatter1.string(from: date1!)
        print("fireDate reset: \(fireDate1)")
        let localNotificationSilent1 = UILocalNotification()
        localNotificationSilent1.fireDate = date1
        localNotificationSilent1.repeatInterval = .day
        localNotificationSilent1.alertTitle = "Daily
Questionnaire
         Reminder"
        localNotificationSilent1.alertBody = "It takes less than
2
         minutes to complete your daily questionnaire"
        // no need to set time zone Remove bellow line
        localNotificationSilent1.timeZone =
NSCalendar.current.timeZone

UIApplication.shared.scheduleLocalNotification(localNotific
atio

nSilent1) }

     self.dismiss(animated: true, completion: nil)
  }
  @IBAction func viewEmoBtnPressed(_ sender: Any) {
     let vc: UIViewController =

self.storyboard!.instantiateViewController(withIdentifier:
      "ReflectViewController") as UIViewController
     self.present(vc, animated: true, completion: nil)
  }
  @IBAction func dismissBtnPressed(_ sender: Any) {
     dismiss(animated: true, completion: nil)


}
```

Appendix 12 : Source Code –

MessagesViewController.swift

```
//
//  MessagesViewController.swift
//  Empatchi
//
//  Created by Gilang Pradana on 09/05/2017.
//  Copyright © 2017 Pradana. All rights reserved.
//
import UIKit
import FirebaseDatabase
import FirebaseAuth
import SwiftReorder
import SwiftIcons
import ChameleonFramework
import PMAlertController
import NotificationBannerSwift
class MessagesViewController: UIViewController,
UITableViewDelegate,
 UITableViewDataSource, TableViewReorderDelegate {
   @IBOutlet weak var tableView: UITableView!
   @IBOutlet weak var dismissBtn: UIButton!
   @IBOutlet weak var composeBtn: UIButton!
   @IBOutlet weak var toNameLabel: UILabel!
   @IBOutlet weak var descriptionLabel: UILabel!
   @IBOutlet weak var letKnowLabel: UILabel!
   @IBOutlet weak var sendButton: UIButton!
   @IBOutlet weak var tokenTextBox: UITextView!
   @IBOutlet weak var thingsDropBtn: UIButton!
   @IBOutlet weak var whenDropBtn: UIButton!
   @IBOutlet weak var saveTokenBtn: UIButton!
   @IBOutlet var addTokenView: UIView!
   var ref: FIRDatabaseReference?
   var databaseHandle:FIRDatabaseHandle?
   var userID = ""
   var msgToSend = ""
   var anticipate = false
   var postData = [String]()
   var postDataID = [String]()
   var maxMsg = 0
   var nowEditing = false
   var editingKey = 0
   var editingPath = IndexPath(row: 0, section: 0)
   var nowWhen = false
var global = UIApplication.shared.delegate as! AppDelegate
override func viewDidLoad() {
   super.viewDidLoad()
   addTokenView.layer.cornerRadius = 10
   addTokenView.layer.borderColor =
UIColor.flatGray.cgColor
   addTokenView.layer.borderWidth = 2
   tokenTextBox.layer.borderColor =
UIColor.flatGray.cgColor
   tokenTextBox.layer.borderWidth = 1
   thingsDropBtn.setTitleColor(UIColor.flatBlue, for:
    UIControlState.normal)
   whenDropBtn.setTitleColor(UIColor.flatBlue, for:
    UIControlState.normal)
   thingsDropBtn.setTitleColor(UIColor.flatGray, for:
    UIControlState.disabled)
   whenDropBtn.setTitleColor(UIColor.flatGray, for:
    UIControlState.disabled)
   // Do any additional setup after loading the view.
   sendButton.backgroundColor =
    GradientColor(UIGradientStyle.leftToRight, frame:
view.bounds,
    colors: [HexColor("3C96D2")!,HexColor("3EE5AC")!])
   if(!global.gonnaSend){
      toNameLabel.isHidden = true
      descriptionLabel.isHidden = true
      sendButton.isHidden = true


 }
e lse{
///// --- Begin --- Snippets to get username from userid let
ref_: FIRDatabaseReference?
ref_ = FIRDatabase.database().reference()



ref_?.child("Users").child(global.selectedFID).observeSingleE
vent(o
   f: .value, with: { (snapshot) in
      let value = snapshot.value as? NSDictionary
      let username = value?["username"] as? String ?? ""
      // do something with username
      self.toNameLabel.text = username
      self.letKnowLabel.text = "Let " + username + " know that
you are
       available to talk"


})


   ////// --- End --- Snippets to get username from userid


}


   dismissBtn.setIcon(icon: .icofont(.close), iconSize: 32,
    color: .flatGray, forState: .normal)
   composeBtn.setIcon(icon: .ionicons(.compose), iconSize:
32,
    color: .flatGrayDark, forState: .normal)
   tableView.delegate = self
   tableView.dataSource = self
   //tableView.reorder.delegate = self
   tableView.reorder.delegate = self
   userID = (FIRAuth.auth()?.currentUser?.uid)!
   ref = FIRDatabase.database().reference()
   //retreive data from database and listen for changes
   databaseHandle =

ref?.child("Posts").child(userID).child(self.global.emoCond).
queryO
    rdered(byChild: "order").observe(.childAdded, with:
{ (snapshot) in
      //code to exrcute when a child is added
      //take the val from the snapshot and add to postdata
array
      // try to convert the value of the data to string
      //let post = snapshot.value as? String
      let post = snapshot.childSnapshot(forPath:
"message").value! as?
       String
      if let actualPost = post {
         let theMessage = snapshot.childSnapshot(forPath:
          "message").value! as! String
         let currentOrder = snapshot.childSnapshot(forPath:
          "order").value! as! Int
         if(currentOrder > self.maxMsg){
            self.maxMsg = currentOrder
```

```
        }
        //append the data to our postdata array
        self.postData.append(theMessage)
        self.postDataID.append(snapshot.key)
        //reload the table view
        self.tableView.reloadData()
      }

}) }

override func didReceiveMemoryWarning() {
  super.didReceiveMemoryWarning()
  // Dispose of any resources that can be recreated.


}

override func viewWillAppear(_ animated: Bool) {
  thingsDropBtn.setTitle(self.global.selectedAction, for:
   UIControlState.normal)
  whenDropBtn.setTitle(self.global.selectedTime, for:
   UIControlState.normal)
}
@IBAction func dismissBtnPressed(_ sender: Any) {
  global.gonnaSend = false
  dismiss(animated: true, completion: nil)
}
@IBAction func saveTokenBtnPressed(_ sender: Any) {
  if(tokenTextBox.text != ""){
    if(nowEditing){

self.ref?.child("Posts").child(self.userID).child(self.glob

al.emoCond).child(self.postDataID[editingKey]).child("mess
a
       ge").setValue(tokenTextBox.text)
       self.postData[editingKey] = tokenTextBox.text
       self.tableView.cellForRow(at:
editingPath)?.textLabel?.text


                    }
= tokenTextBox.text e  lse{



self.ref?.child("Posts").child(self.userID).child(self.global.e
     moCond).childByAutoId().setValue(["message":
      tokenTextBox.text!,"order": self.maxMsg+1])

    }


                }
AnimateOut() e  lse{


    let banner = NotificationBanner(title: "Message is
Empty",
     subtitle: "Please enter your message to save your",
     style: .danger)
    banner.show()
  }

}

@IBAction func cancelBtnPressed(_ sender: Any) {
  //dismiss
  AnimateOut()
}
@IBAction func thingPressed(_ sender: Any) {
  nowWhen = false
  self.global.ThingsorWhen = "Things"
  let vc: UIViewController =
   self.storyboard!.instantiateViewController(withIdentifier:
   "PickerViewController") as UIViewController
  self.present(vc, animated: true, completion: nil)
}
@IBAction func whenPressed(_ sender: Any) {
  nowWhen = true
  self.global.ThingsorWhen = "When"
  let vc: UIViewController =
   self.storyboard!.instantiateViewController(withIdentifier:
   "PickerViewController") as UIViewController
  self.present(vc, animated: true, completion: nil)
}
@IBAction func anticipateToggle(_ sender: Any) {
  if !anticipate{
    thingsDropBtn.isEnabled = true
    whenDropBtn.isEnabled = true


                }
anticipate = true e  lse{


    thingsDropBtn.isEnabled = false
    whenDropBtn.isEnabled = false
    anticipate = false
  }
}
func AnimateIn(){
  self.view.addSubview(addTokenView)
  addTokenView.center = self.view.center
  addTokenView.transform =
CGAffineTransform.init(scaleX: 1.2, y: 1.2)
  addTokenView.alpha = 0
  UIView.animate(withDuration: 0.4) {
    self.addTokenView.alpha = 1
    self.addTokenView.transform =
CGAffineTransform.identity
  }


}

func AnimateOut(){
  UIView.animate(withDuration: 0.3, animations: {
    self.addTokenView.transform =
CGAffineTransform.init(scaleX:
     1.2, y: 1.2)
    self.addTokenView.alpha = 0
  }) { (succes: Bool) in
    self.addTokenView.removeFromSuperview()
  }
  self.tokenTextBox.text = ""
  nowEditing = false
  editingKey = 0
  editingPath = IndexPath(row: 0, section: 0)
}
@IBAction func composeBtnPressed(_ sender: Any) {
  let alertVC = PMAlertController(title: "Create Your Own
Support",
    description: "Please enter your message", image: nil,
    style: .alert)
  alertVC.addTextField { (composetextField) in
    composetextField?.placeholder = "Your message"


}


  alertVC.addAction(PMAlertAction(title: "OK",
style: .default,
   action: { () in
    print("Capture action OK")
    if(alertVC.textFields[0].text != ""){

self.ref?.child("Posts").child(self.userID).child(self.global.e
```

```
      moCond).childByAutoId().setValue(["message":
      alertVC.textFields[0].text!,"order": self.maxMsg+1])


 }
e lse{


        let banner = NotificationBanner(title: "Message is
Empty",
         subtitle: "Please enter your message to save",
         style: .danger)
        banner.show()
     }

//self.ref?.child("Emotions").childByAutoId().setValue(["o1v
al":
      val,"o2aro": aro,"timestamp":
FIRServerValue.timestamp() ,
      "uid" : self.userID])


})


   alertVC.addAction(PMAlertAction(title: "Cancel",
style: .cancel,
    action: { () -> Void in
       print("Capture action Cancel")
   }))
   self.present(alertVC, animated: true, completion: nil)
   nowEditing = false
  // AnimateIn()
}
@IBAction func sendBtnPressed(_ sender: Any) {
   if(msgToSend != ""){
      if anticipate{
      var jadigini = ""
      jadigini += " Let's " + thingsDropBtn.title(for: .normal)! +
" "
       + whenDropBtn.title(for: .normal)!
      print(jadigini as String)
      msgToSend += " " + jadigini
      }

self.ref?.child("SupportTokens").childByAutoId().setValue(
      ["fromID": userID,
       "toID": global.selectedFID,
       "message": msgToSend,
       "timestamp": FIRServerValue.timestamp(),
       "o1val": global.prepST.valence,
       "o2aro": global.prepST.arousal,
       "emotionID": global.prepST.emotionID,
       "emotimestamp": global.prepST.emotimestamp])
      global.gonnaSend = false
      let tujuan = "/topics/untuk" + global.selectedFID
      let pesan = msgToSend + " - " + global.namaku
let notificationContent = [
   "to" : tujuan,
   "priority" : "high",
   "content_available": true,
   "mutable_content": true,
   "data": [
      "message": "Emotion!",
      "attachment": global.urlfotoku
   ],
   "notification": [
      "body": pesan,
      "title": "New support received from " + global.namaku,
      "sound": "default",
   ],
   ] as [String: Any]
var request = URLRequest(url: URL(string: "https://
 fcm.googleapis.com/fcm/send")!)
request.httpMethod = "POST"
request.addValue("application/json", forHTTPHeaderField:
 "Content-Type")
request.addValue("key=AIzaSyArYnJ64Cy6PcZtFajN-
TeVJxLtv2kTc_0",
 forHTTPHeaderField: "Authorization")
request.httpBody = try!
JSONSerialization.data(withJSONObject:
 notificationContent, options: [])
URLSession.shared.dataTask(with:request,
completionHandler:
 {(data, response, error) in
   if error != nil {
      print(error)


} else {


      do {
         guard let json = try?
       JSONSerialization.jsonObject(with: data!,
       options: .allowFragments) as? [String: Any] else
       { return }
       guard let errors = json?["errors"] as? [[String:
        Any]] else { return }
       if errors.count > 0 {
          // show error
          return
       } else {
          // show confirmation


} }


   }
}).resume()
let banner = NotificationBanner(title: "Support Sent",
subtitle:
 "You have successfully sent support to " +
toNameLabel.text!,
 style: .success)
banner.show()


                                                  }
dismiss(animated: true, completion: nil) e  lse{


      let banner = NotificationBanner(title: "No Message
Selected",
       subtitle: "Please select a message to send",
style: .danger)
      banner.show()
   }


}


func tableView(_ tableView: UITableView,
numberOfRowsInSection section:
 Int) -> Int {
   return postData.count
}
func tableView(_ tableView: UITableView, cellForRowAt
indexPath:
 IndexPath) -> UITableViewCell {
   if let spacer = tableView.reorder.spacerCell(for:
indexPath) {
      return spacer
   }
   let cell = tableView.dequeueReusableCell(withIdentifier:
"PostCell")
   cell?.textLabel?.text = postData[indexPath.row]
   cell?.textLabel?.font = UIFont(name: "Poppins-Regular",
size: 16)
```

```
    cell?.textLabel?.textColor = UIColor.flatGrayDark
    return cell!
}
func tableView(_ tableView: UITableView,
editActionsForRowAt: IndexPath)
 -> [UITableViewRowAction]? {
    /*let more = UITableViewRowAction(style: .normal, title:
"More")
     { action, index in
     print("more button tapped")


}
  more.backgroundColor = .lightGray


     let favorite = UITableViewRowAction(style: .normal, title:
      "Favorite") { action, index in
     print("favorite button tapped")
     }
 favorite.backgroundColor = .orange*/
let delete = UITableViewRowAction(style: .normal, title:
"Delete") {
 action, index in
    print("Will delete " +
self.postDataID[editActionsForRowAt.row])


/ /
  s  elf.ref?.child("Posts").child(self.userID).child(self.global.e
moCond).childByAutoId().setValue(["message":
alertVC.textFields[0].text!,"order": self.maxMsg])


     self.ref?.child("Posts").child(self.userID).child(self.global.e

moCond).child(self.postDataID[editActionsForRowAt.row]).
removeV
     alue()
    self.postData.remove(at: editActionsForRowAt.row)
    self.postDataID.remove(at: editActionsForRowAt.row)
    self.tableView.deleteRows(at: [editActionsForRowAt],
     with: .automatic)


}
  delete.backgroundColor = .flatRed


let edit = UITableViewRowAction(style: .normal, title: "Edit")
 { action, index in
    print("Will edit " +
self.postDataID[editActionsForRowAt.row])
   /* let alertVC = PMAlertController(title: "Edit Support
Token",
    description: "Please enter your message", image: nil,
    style: .alert)
    alertVC.addTextField { (composetextField) in
       composetextField?.placeholder = "Your message"
       composetextField?.text =
        self.postData[editActionsForRowAt.row]
    }
    alertVC.addAction(PMAlertAction(title: "OK",
style: .default,
     action: { () in
       print("Capture action OK")
       if(alertVC.textFields[0].text != ""){
        self.ref?.child("Posts").child(self.userID).child(self.glob

al.emoCond).child(self.postDataID[editActionsForRowAt.ro
w])
        .child("message").setValue(alertVC.textFields[0].text!)
       self.postData[editActionsForRowAt.row] =
        alertVC.textFields[0].text!
       self.tableView.cellForRow(at:
       editActionsForRowAt)?.textLabel?.text =
       alertVC.textFields[0].text!


}
 else{
        let banner = NotificationBanner(title: "Message is
Empty", subtitle: "Please enter your message to edit your
selected Support Token", style: .danger)


           banner.show()
         }


}))


      alertVC.addAction(PMAlertAction(title: "Cancel",
style: .cancel,
       action: { () -> Void in
          print("Capture action Cancel")

      }))
      self.present(alertVC, animated: true, completion: nil)*/
      self.editingKey = editActionsForRowAt.row
      self.editingPath = editActionsForRowAt
      self.nowEditing = true
      self.tokenTextBox.text =
self.postData[editActionsForRowAt.row]
      self.AnimateIn()


}
  edit.backgroundColor = .flatBlue return [delete]


}


func tableView(_ tableView: UITableView, canEditRowAt
indexPath:
 IndexPath) -> Bool {


return true


}
func tableView(_ tableView: UITableView, reorderRowAt
sourceIndexPath:
 IndexPath, to destinationIndexPath: IndexPath) {
   //print(postData)
   //print(postDataID)

self.ref?.child("Posts").child(self.userID).child(self.global.em
oCo

nd).child(self.postDataID[sourceIndexPath.row]).child("ord
er").setV
    alue(destinationIndexPath.row)

self.ref?.child("Posts").child(self.userID).child(self.global.em
oCo

nd).child(self.postDataID[destinationIndexPath.row]).child(
"order")
    .setValue(sourceIndexPath.row)
   let item = postData[sourceIndexPath.row]
   let itemID = postDataID[sourceIndexPath.row]
postData.remove(at: sourceIndexPath.row)
      postData.insert(item, at: destinationIndexPath.row)
      postDataID.remove(at: sourceIndexPath.row)
      postDataID.insert(itemID, at: destinationIndexPath.row)
      //print(postData)
      //print(postDataID)
```

```
}


    func tableView(_ tableView: UITableView, didSelectRowAt
indexPath:
     IndexPath) {
        var selectedCell:UITableViewCell =
tableView.cellForRow(at:
         indexPath)!
        selectedCell.contentView.backgroundColor =
         GradientColor(UIGradientStyle.leftToRight, frame:
view.bounds,
         colors: [HexColor("3C96D2")!,HexColor("3EE5AC")!])
        selectedCell.textLabel?.textColor = UIColor.white
        msgToSend = (selectedCell.textLabel?.text)!
        print("message to send: " + msgToSend)


}
```

```
    func tableView(_ tableView: UITableView,
didDeselectRowAt indexPath:
     IndexPath) {
        var cellToDeSelect:UITableViewCell =
tableView.cellForRow(at:
         indexPath)!
        cellToDeSelect.contentView.backgroundColor =
UIColor.white
        cellToDeSelect.textLabel?.textColor =
UIColor.flatGrayDark
        msgToSend = ""
    }
    override func touchesBegan(_ touches: Set<UITouch>,
with event:
     UIEvent?) {
        // Dismiss The Keyboard when the view is tapped
        tokenTextBox.resignFirstResponder()
    }


}
```

Appendix 13 : Source Code –

TokenViewController.swift

```
//
//  TokenViewController.swift
//
import UIKit
import FirebaseDatabase
import FirebaseAuth
import ChameleonFramework
import UserNotifications
struct SupportToken {
    var id = ""
    var fromID = ""
    var toID = ""
    var message = ""
    var timestamp: Int64 = 0
    var valence = 0
    var arousal = 0
    var emoID = ""
    var emotimestamp: Int64 = 0
}
class TokenViewController: UIViewController {
    var collectionView: UICollectionView!
    var postData = [SupportToken]()
    var ref: FIRDatabaseReference?
    var databaseHandle:FIRDatabaseHandle?
    var userID = ""
    var global = UIApplication.shared.delegate as!
AppDelegate
    @IBOutlet weak var TokenTitle: UILabel!
    @IBOutlet weak var emptyImg: UIImageView!
    override func viewDidLoad() {
        super.viewDidLoad()
        let layout = CardLayout()
        layout.scale = 1.2
        layout.itemSize = CGSize(width: 240, height: 320)
        layout.spacing = CGFloat(25.0)
        collectionView = UICollectionView(frame: view.bounds,
         collectionViewLayout: layout)
        let emp1 = HexColor("3C96D2")
        let emp2 = HexColor("3EE5AC")
        UIGraphicsBeginImageContext(self.view.frame.size)
        UIImage(named: "tokenbg")?.draw(in: self.view.bounds)
        let image: UIImage =
UIGraphicsGetImageFromCurrentImageContext()!
        UIGraphicsEndImageContext()
collectionView.backgroundColor = UIColor.clear
//collectionView.backgroundColor =
 GradientColor(UIGradientStyle.topToBottom, frame:
view.bounds,
 colors: [HexColor("3C96D2"),HexColor("3EE5AC")])
collectionView.dataSource = self
collectionView.showsVerticalScrollIndicator = false
collectionView.showsHorizontalScrollIndicator = false
collectionView.register(UINib(nibName:
"CollectionViewCell", bundle:
 nil), forCellWithReuseIdentifier: "CellID")
view.addSubview(collectionView)
let menuButton = UIButton(frame: CGRect(x: 0, y: 0, width:
44,
 height: 44))
menuButton.center = CGPoint(x: 24.0, y: 48.0)
menuButton.setTitle("X", for: .normal)
menuButton.addTarget(self, action:
 #selector(TokenViewController.menuButtonTapped(_:)),
 for: .touchDown)
menuButton.setIcon(icon: .icofont(.close), iconSize: 32,
 color: .white, forState: .normal)
view.addSubview(menuButton)
if(self.global.gonnaSend){
///// --- Begin --- Snippets to get username from userid
let refJ: FIRDatabaseReference?
refJ = FIRDatabase.database().reference()

refJ?.child("Users").child(global.selectedFID).observeSingleE
vent(o
 f: .value, with: { (snapshot) in
    let value = snapshot.value as? NSDictionary
    let username = value?["username"] as? String ?? ""
    // do something with username
    self.TokenTitle.text = "Support Exchanges with " +
username


})


////// --- End --- Snippets to get username from userid
}
userID = (FIRAuth.auth()?.currentUser?.uid)!
ref = FIRDatabase.database().reference()
//retreive data from database and listen for changes
databaseHandle =
ref?.child("SupportTokens").observe(.childAdded,
 with: { (snapshot) in
    //code to exrcute when a child is added
    //take the val from the snapshot and add to postdata
array
// try to convert the value of the data to string
//let post = snapshot.value as? String
let post = snapshot.childSnapshot(forPath:
"message").value! as?
 String
if let actualPost = post {
    var theSupportToken = SupportToken()
    if(self.global.gonnaSend){
    if(snapshot.childSnapshot(forPath: "fromID").value! as?
     String == self.global.selectedFID &&
     snapshot.childSnapshot(forPath: "toID").value! as? String
     == self.userID){
        //print("not empty - option 1");
        if(!self.emptyImg.isHidden){
            self.emptyImg.isHidden = true

        }
        theSupportToken.id = snapshot.key
        theSupportToken.fromID =
snapshot.childSnapshot(forPath:
         "fromID").value! as! String
        theSupportToken.toID =
snapshot.childSnapshot(forPath:
         "toID").value! as! String
        theSupportToken.message =
         snapshot.childSnapshot(forPath: "message").value! as!


String


        theSupportToken.timestamp =
         snapshot.childSnapshot(forPath: "timestamp").value!
as!
          Int64
        theSupportToken.valence =
         snapshot.childSnapshot(forPath: "o1val").value! as! Int
```

```
      theSupportToken.arousal =
       snapshot.childSnapshot(forPath: "o2aro").value! as! Int
      theSupportToken.emoID =
snapshot.childSnapshot(forPath:
       "emotionID").value! as! String
      theSupportToken.emotimestamp =
       snapshot.childSnapshot(forPath:
"emotimestamp").value!
       as! Int64
      if (self.global.latestT ==
theSupportToken.emotimestamp)
       {
         print("will send trigger")
         if(!self.global.notifying){
         self.global.notifying = true
         if #available(iOS 10.0, *) {
            let notification =
             UNMutableNotificationContent()
            notification.title = "How do you feel now?"
            notification.body = "Let your trusted circle
know how you feel after receiving support"
         let notificationTrigger =
          UNTimeIntervalNotificationTrigger(timeInterval:
          3600, repeats: false)
         let request = UNNotificationRequest(identifier:
          "notification1", content: notification,
          trigger: notificationTrigger)
         UNUserNotificationCenter.current().add(request,
          withCompletionHandler: nil)

} else {

         // Fallback on earlier versions

}
  }

   self.postData.append(theSupportToken)
   self.collectionView.reloadData()

  }
e  lse if (snapshot.childSnapshot(forPath: "fromID").value!
as? String == self.userID &&
snapshot.childSnapshot(forPath: "toID").value! as? String ==
self.global.selectedFID){

   //print("not empty - option 2");
   if(!self.emptyImg.isHidden){
      self.emptyImg.isHidden = true
   }
   theSupportToken.id = snapshot.key
   theSupportToken.fromID =
snapshot.childSnapshot(forPath:
    "fromID").value! as! String
   theSupportToken.toID = snapshot.childSnapshot(forPath:
    "toID").value! as! String
   theSupportToken.message =
    snapshot.childSnapshot(forPath: "message").value! as!

String

   theSupportToken.timestamp =
    snapshot.childSnapshot(forPath: "timestamp").value! as!
    Int64
   theSupportToken.valence =
    snapshot.childSnapshot(forPath: "o1val").value! as! Int
   theSupportToken.arousal =
    snapshot.childSnapshot(forPath: "o2aro").value! as! Int
   theSupportToken.emoID =
snapshot.childSnapshot(forPath:
    "emotionID").value! as! String
   theSupportToken.emotimestamp =
    snapshot.childSnapshot(forPath: "emotimestamp").value!
    as! Int64
   self.postData.append(theSupportToken)
   self.collectionView.reloadData()

}
 else{
// include all messages to Me

   //uncomment to revoke superuser
   if (snapshot.childSnapshot(forPath: "toID").value! as?
    String == self.userID){
      //print("not empty - option 3");
      if(!self.emptyImg.isHidden){
         self.emptyImg.isHidden = true
      }
      theSupportToken.id = snapshot.key
      theSupportToken.fromID =
       snapshot.childSnapshot(forPath: "fromID").value!
       as! String
      theSupportToken.toID =
       snapshot.childSnapshot(forPath: "toID").value! as!

String

      theSupportToken.message =
       snapshot.childSnapshot(forPath: "message").value!
       as! String
      theSupportToken.timestamp =
       snapshot.childSnapshot(forPath: "timestamp").value!
       as! Int64
      theSupportToken.valence =
       snapshot.childSnapshot(forPath: "o1val").value! as!
       Int
      theSupportToken.arousal =
       snapshot.childSnapshot(forPath: "o2aro").value! as!
       Int
      theSupportToken.emoID =
       snapshot.childSnapshot(forPath: "emotionID").value!
       as! String
      theSupportToken.emotimestamp =
       snapshot.childSnapshot(forPath:
       "emotimestamp").value! as! Int64
      if (self.global.latestT ==
       theSupportToken.emotimestamp){
         print("will send trigger - all")
         if(!self.global.notifying){
            self.global.notifying = true
            if #available(iOS 10.0, *) {
               let notification =
                UNMutableNotificationContent()
               notification.title = "How do you feel
                now?"
                     notification.body = "Let your trusted
                      circle know how you feel after
                      receiving support."
                     let notificationTrigger =
                      UNTimeIntervalNotificationTrigger(timeI
                      nterval: 3600, repeats: false)
                     let request =
                      UNNotificationRequest(identifier:
                      "notification1", content: notification,
                      trigger: notificationTrigger)
                      UNUserNotificationCenter.current().add(
                      request, withCompletionHandler: nil)
```

```
} else {

                    // Fallback on earlier versions

} }

            }
            self.postData.append(theSupportToken)
            self.collectionView.reloadData()
          //uncomment to revoke superuser

} }

} })

}
override func viewDidLayoutSubviews() {
   super.viewDidLayoutSubviews()
   collectionView.frame = view.bounds

}

override var preferredStatusBarStyle: UIStatusBarStyle {
   return .lightContent
}
func menuButtonTapped(_ button: UIButton) {
   global.gonnaSend = false
   dismiss(animated: true, completion: nil)
}
}
extension TokenViewController:
UICollectionViewDataSource {
   func collectionView(_ collectionView: UICollectionView,
    numberOfItemsInSection section: Int) -> Int {
      return postData.count
   }
   func collectionView(_ collectionView: UICollectionView,
cellForItemAt
    indexPath: IndexPath) -> UICollectionViewCell {
      //map array data to each card
      let cell =
collectionView.dequeueReusableCell(withReuseIdentifier:
       "CellID", for: indexPath) as! CollectionViewCell
      //cell.layer.cornerRadius = 10
      var entryke = postData.count-indexPath.row-1
      cell.pesan.text = postData[entryke].message
      /*var valStr = ""
      var aroStr = ""
      switch postData[entryke].valence{
      case 1: valStr = "Very Unhappy"
      case 2: valStr = "Unhappy"
      case 4: valStr = "Happy"
      case 5: valStr = "Very Happy"
      default: valStr = "Neutral"
      }
      if(postData[entryke].valence>=3){
         switch postData[entryke].arousal{
         case 1: aroStr = "Very Calm"
         case 2: aroStr = "Calm"
         case 4: aroStr = "Excited"
         case 5: aroStr = "Very Excited"
         default: aroStr = "Neutral"


 }
}
```

```
else{
      switch postData[entryke].arousal{ case 1: aroStr =
"Very Sluggish" case 2: aroStr = "Sluggish"
case 4: aroStr = "Frenzied"


       case 5: aroStr = "Very Frenzied"
       default: aroStr = "Neutral"


    }
}*/

     switch postData[entryke].valence{
     case 1: cell.valImg.image =


case 2: cell.valImg.image =
case 4: cell.valImg.image =
case 5: cell.valImg.image =
default: cell.valImg.image =
}
switch postData[entryke].arousal{
case 1: cell.aroImg.image =
case 2: cell.aroImg.image =
case 4: cell.aroImg.image =
case 5: cell.aroImg.image =
default: cell.aroImg.image =
}
///// --- Begin --- Snippets to get username from userid
let refE: FIRDatabaseReference?
refE = FIRDatabase.database().reference()

refE?.child("Users").child(postData[entryke].toID).observeSi
ngleEve
 nt(of: .value, with: { (snapshot) in
   let value = snapshot.value as? NSDictionary
   let username = value?["username"] as? String ?? ""
   // do something with username
   cell.emoLabel.text = username + " was "
})
////// --- End --- Snippets to get username from userid
if(postData != nil){
///// --- Begin --- Snippets to get username from userid
let ref_: FIRDatabaseReference?
ref_ = FIRDatabase.database().reference()

ref_?.child("Users").child(postData[entryke].fromID).observ
eSingleE
 vent(of: .value, with: { (snapshot) in
   let value = snapshot.value as? NSDictionary
   let username = value?["username"] as? String ?? ""
   let imageURL = value?["profileImageURL"] as? String ?? ""
   cell.fromLabel.text = "- " + username
   //uiimageview = image from url
   if(self.postData[entryke].fromID == self.userID){
      cell.tokenImg.image =
      cell.fromImg.isHidden = true
      //cell.tokenDate.textColor = HexColor("008BB2")


  }
e lse{
       cell.tokenImg.image =
```

```
    cell.fromImg.isHidden = false
    //cell.tokenDate.textColor = HexColor("CB3168")
//mulai download gambar
let PictureURL = URL(string: imageURL)!
let session = URLSession(configuration: .default)
let downloadPicTask = session.dataTask(with: PictureURL)
 { (data, response, error) in
    // The download has finished.
    if let e = error {
       print("Error downloading picture: \(e)")
    } else {


  }
}


// No errors found.
if let res = response as? HTTPURLResponse {
    if let imageData = data {
       let image = UIImage(data: imageData)
       // Do something with your image.
       DispatchQueue.main.async {
          cell.fromImg.image = image


}
} else {


       print("Couldn't get image: Image is nil")
    }
} else {
     print("Couldn't get response code for some reason")
}
    downloadPicTask.resume()
    //selesai download gambar
    }


})


// --- end of snippet
    var tanggal:TimeInterval =
     TimeInterval(postData[entryke].emotimestamp)/1000
    var tanggalan = Date(timeIntervalSince1970: tanggal)
    var formatter = DateFormatter()
    formatter.timeZone = TimeZone.current
    let myCalendar = Calendar(identifier: .gregorian)
    let weekDay = myCalendar.component(.weekday, from:
tanggalan)
    //print("untuk hari apa")
    //print(weekDay)
    var hari = ""
    switch weekDay{
    case 1: hari = "Sun"
    case 2: hari = "Mon"
case 3: hari = "Tue"
        case 4: hari = "Wed"
        case 5: hari = "Thu"
        case 6: hari = "Fri"
        case 7: hari = "Sat"
        default: hari = ""


}


        // initially set the format based on your datepicker
date
        formatter.locale = Locale(identifier: "en_GB")

formatter.setLocalizedDateFormatFromTemplate("MMM d")
        cell.emodate.text = hari + ", " + formatter.string(from:


tanggalan)


        tanggal =
TimeInterval(postData[entryke].timestamp)/1000
        tanggalan = Date(timeIntervalSince1970: tanggal)
        formatter = DateFormatter()
        formatter.dateFormat = "dd.MM.yy"
        //cell.tokenDate.text =
formatter.string(from:tanggalan)


  }
/  /cell.backgroundColor = UIColor(white: 0.8, alpha: 1)//
indexPath.item%2==0 ? UIColor(white: 0.8, alpha: 1) :
UIColor(white: 0.6, alpha: 1)


return cell }


}
```

Appendix 14 : Study 2 Result – Experiencing Positive and Negative Emotion

No	Parti-cipant	Content	Positive	Negative
1	6	So when I was using this app, let's say when I'm really really happy or I'm really really sad, It's pretty clear on how to use this app. But when I'm just feeling normal or doing my day as usual I'm not really sure what to do with that.	✓	✓
2	5	The thing about *Empatchi* is it's not very different when we are in neutral or happy situation. Because we still tend to call each other or WhatsApp each other directly.	✓	
3	5	I think it's also the reason when we feel happy and when there are so many things we wanna talk about. We don't use *Empatchi* to share that we are happy. We just share it, we have so many energy to share that this is da-da-da-da on the WhatsApp	✓	
4	7	When I post a good mood, I wouldn't mind if they don't immediately respond.	✓	
5	9	For positive emotion, It's not that I want to share, I just express that I'm happy today. It's not verbally, I just show it in my actions.	✓	
6	11	Sometimes I use facebook and pick one of their emotions to share about my feeling. Other times I'd pick up my phone and call my friend and tell them about how I feel. Sometimes when I share it publicly, deep down I want to know how many people would care about my feeling, but 80% of it is for the positive emotion.	✓	
7	1	, and I think overall emotion is always bad during this research because I'm doing my dissertation.		✓
8	1	once I got really really angry and I want to share, really want to share emotion, sometimes I want to let her now that I need her support, right now.		✓
9	1	When I share my emotions especially bad emotion to *Empatchi*, most of the time I need a support immediately from her. But if she hasn't replied, I will, I will try to reach her by using a call. If she's not picking up, I will try to leave a text/message to her but not using *Empatchi*, but other whatsapp probably, to share.		✓
10	3	Before, it maybe takes longer to get to the point that we talk about the feelings because then we're talking about like daily things and then at the end it's like probably you don't want to say oh I'm feeling bad and so maybe only at the end of the conversation that we can finally talk about it. I would say that was will be the difference. I mean, it's like, we're trying to like, I don't know, keep cheerful and all of that, and then until you discover that the other person is a bit sad.		✓
11	4	I try to share emotion that I didn't share before.. for example, before using this app I experienced some negative feelings and I think I didn't try to show or share it, but after I started to use this application, I tried to share these emotions, and so she's trying to support me and can give me some words using this app, and I become better.		✓
12	5	Um. Yeah. There're times sometimes, when I feel like.. I want to be passive aggressive in a way. I want to tell, that I'm feeling down, but I can't really express it directly through Whatsapp, because I'm not the kind of person who actually express my feeling when I feel disappointed or sad.		✓
13	5	It doesn't really express the actual feeling, but, yeah, but, again, in a way, for certain cases like that it might be useful for me, but it also depends on the person's personality. Some people would love to directly tell somebody else up front that, hey, I'm disappointed to you, I'm disappointed by what you've been doing so far, but I'm, it just, I mean if it fits me well in the sense that I don't, I'm not the kind of person who will tell directly that I'm disappointed, but I will give a hint first,		✓
14	7	I mean I've had some bad days. I think while using the app. So you know and my friend is quite a busy bloke. So you know he's working on quite a lot of project and all that... So for me I don't want to disturb any of these activities.. So through the app by setting my mood to red and then you know doing all that, it allows my friend to know that I'm feeling that way and then so he responds to that, and then I let him know that I kind of want to talk and then later on we can kind of just set a time where we where we are both available to talk to each other, and just talk about my feelings. I think that's quite helpful		✓
15	9	when it's negative, I tend to be more direct in sharing the emotion.		✓
16	9	I don't want to be seen as an emotional people, online. If I have a bad day, I want to solve the problem myself. I also sometimes overthink and I don't want people to comment on me when I feel sad for example.		✓
17	10	I think for me into a very negative situation, I would just pick up my phone and call someone, but in a sense like you feel a little bit down, I think that's when it does make a difference. In that sense you don't expect someone will care about it so much, but it still open the opportunity for them to talk to you.		✓

Appendix 15 : Study 2 Result – Emotion Regulation With Empatchi

No.	Parti-cipant	Content	Phatic Interaction in Sharing Emotion	Receiving Lightweight Signals of Emotion	Exchange Support	Sharing with Trusted Circle
1	7	The strong point of this app is , I feel is the fact that I can just allows people, close friends to be straight with each other. They don't have to beat around the bush too much when they're talking in a when they're engaged in a conversation. They can just go straight into the matter at hand just solve the problem immediately because I think that's quite important . Often times there are people who have difficulties in expressing themselves, often times when they talk to even their closest friends, they would still talk but end up not talking what they want to talk about.. And this app prevents just that.	✓	✓	✓	
2	14	I guess when you share something you will raise the curiosity of your friends, and they will be like oh, why do you feel this way? And you can carry on a conversation. Before using this app, you may be bothering other people if you ask like, hey is it ok if we speak?	✓	✓	✓	
3	5	If you know that other people are active the you can be more active as well	✓	✓		
4	5	But when we had an issue, for instance, then that's when *Empatchi* plays in role. He kinda, it kinda send me a signal that his, for example, his sadness is being amplified but he does not want to share it through WhatsApp.	✓	✓		
5	7	We don't know when to, you know, talk about feelings because it's kind of a touchy subject i guess? So, it's quite a difficult subject to approach, so we don't want to offend or make our friend uncomfortable. But, with this app, it's you know, we sort of already know what he's feeling. So you know in a way, we know that they want us to engage in a conversation.	✓	✓		
6	8	In social media people sometimes approach us as well, but it's more like a chit-chat like oh, how are you and then just 15 minutes later the conversation ends there. *Empatchi* is bridging that gap.	✓	✓		
7	8	Before I use the app me and [P7] has this tendency that we wait for each other whenever we want to talk about something. For example if I have something I want to share with [P7] especially, I just wait until he texted me. That's where I found *Empatchi* really helping me to just express myself and then he can ask me how I feel based on my emotion.	✓	✓		
8	8	I like how it helped me and [P7] to start a conversation because we are both really really shy, so yeah just by sharing it there, it really helps us to get things going.	✓	✓		
9	13	Well I think with or without the app we are going to talk anyway, but I think it's more to the openness of our emotions because most of the time when we talk by phone, and they might say that they're alright, but like with the app, I knew that they're not because they had something going on so I think it's more to an openness, because they're reluctant to share their emotions. It triggers what we're going to say during our chat or are video calls or skype, and we're going to talk about it, and it's really good that... like for example because I'm really self-centered person, and I know that they're feeling something too... I can like ask what they are feeling or what they've been going through. So since we start using the app, we had more deeper conversations about that.	✓	✓		
10	13	What I like the most is how we share our emotion. I think it really opens my mind about my peers. Of course we do talk a lot by phones or by video calls, but they don't really talk about their problems. They just say that yeah, I had a bad day. But with this app I can go deeper than that.	✓	✓		
11	15	It is interesting how we can share our emotion with only one tap. It is not complicated. It is easier for me to share my feelings and it is easier for me to understand her feelings.	✓	✓		
12	12	I think the app really, really makes me think like why am I sad, I want to be happy, I want to improve gradually. I can see what I posted, and I can see like how it affects other people, the closest people for me	✓		✓	✓
13	4	I try to share emotion that I didn't share before.. for example, before using this app I experienced some negative feelings and I think I didn't	✓		✓	

		try to show or share it, but after I started to use this application, I tried to share these emotions, and so she's trying to support me and can give me some words using this app, and I become better.				
14	7	Well of course compared to an actual chatting platform like for example whatsapp or you know any other it's not as elaborate of course, but I think, that's that's where it works the best because the whole.. I feel like the premises you just let each other know how we doing but then we don't have to, you know, immediately get in contact. We can always contact later on when we're both available, so I think the short kind of responses allow us just to do that	✓		✓	
15	7	During those times when, you know, we still want to call each other, but we are kind of preoccupied or we're just tired from because we're both university students, a lot of things going on during the day, so we're just kind of tired from the day, so we just decide that, you know, we can talk any other time. I think we respect each other's rest time and privacy.	✓		✓	
16	7	this app, it kind of helps just to jump straight into the matter.. We know how the other person is feeling so.. for example if my friend is showing a red on the app, which is sign for not very good mood I think? Yeah, well I can just ask them straight away, hey dude what's going on. Do you need some help or , or someone to talk to? Something like that. So, It's definitely helpful for both parties I think.	✓		✓	
17	9	I think the good thing from using the app is that it helped me think ... It help me like... kind of like reflect my emotion daily..., It was not a normal thing that I do... but and then when I look back, I think that's a good thing, like okay even if today is a bad day, you also have a good day as well. I think it's like the recording of my emotion.	✓		✓	
18	11	I feel better inside, I feel good... I kinda know that they know what I'm feeling and that's what I needed. I just want them to know, I don't know ... I think it's good enough to know that someone really cares about you, even it's only through the app, and I think it's good enough for me.	✓		✓	
19	12	So the people in the app, they really care about you so like everything that you do, anything that you post there, they will ask like even if you're happy or you're sad.	✓		✓	
20	12	I think for me personally like I really... I really like it because like you don't need to read all those unnecessary text (like in chat history) and looking back at the history like what, what are the responses? I was like. Yeah, they do care, oh, they lift up the spirit, and like changed the emotions. It really helped to know that they got the notification, and I know that they know.	✓		✓	
21	14	I like how it's fast to share my emotion, and to tell people that 'Hey, I'm here', and at the same time, they can tell me that they're there for me.	✓		✓	
22	*3*	*Empatchi*, for me, it became like a like a place in which we knew we were vulnerable, in a place, I don't know, for me... I could be like sensitive or I could share because it was like specifically for sharing emotions. So it became like a place,like nobody has a facade. In my opinion, I feel safe like, I can share everything and then it was like okay to be bad, like okay to be sad, and okay to be that and then because I knew that I will receive support, so it was like fine.	✓			✓
23	5	I think just being able to share it, not publicly, is good enough. So, but, this is really personal though, I don't expect him to reply immediately actually. I just need to vent	✓			✓
24	1	However, after one week, I feel like I can just use whatsapp or phone call. I still use *Empatchi* sometimes, but what I found quite hard is, umm... If you share emotions everyday, sometimes people don't always share emotion, sometimes we share and sometimes we don't, and I don't think the app kind of encourage you to share because it's actually limited of what you can do inside the app. On the first week, we were quite excited, but when I actually need to call, I think whatsapp call is quite effective, especially when we need immediate support when we can't hold it.	✓			
25	3	So I found an interesting that maybe it became kind of like a double kind of like two aspects in my day, I don't know like, yeah of course I was like cheerful like going to work and doing all of myself, but then I will put in *Empatchi* like I was sad, which was genuinely true. So I kind of like separate my, I don't know maybe I kind of like understood more about myself.	✓			
26	3	The thing that I felt the most was that it was like somebody told me like okay, this is a safe place for you to like ,like really tell how you are. On *Empatchi*, it was like the moment where I really kind of like self analyse my emotions, which didn't happen when I try to express it with whatsapp or other messages. Maybe the app just made me think more and aware about like how I was feeling.	✓			

27	3	I think it is more like truthful in *Empatchi*, it's like putting us in a situation like we're kids, where we show everything using colour and shapes, and we're becoming, I think in my opinion more like transparent. I really trusted the big circles, and small circles, I think he's being very like honest.	✓			
28	4	It's definitely easier to show because I don't have to type in text. I try to share more emotion, and we talk more about our feelings and emotions after using it, like why do you feel like this.. so I think that's the difference from before.	✓			
29	5	but the problem with it is--so overall I think it's a great concept but sometimes it gets a bit too oversimplified. So in a way that because it only has several options on the way of emotion I can express. Sometimes it can be a bit--I wouldn't say it's boring it. I would say it's a bit stagnant, and we only have several options to tell every day how we feel and let's say if we keep doing that that repetitively for couple of week, it's get dull and we kinda—we think that direct communication is more beneficial in this way	✓			
30	5	When you feel that you don't wanna go to the extent to tell that I'm feeling sad because of this this this, but okay, helping you to simplify and gave a signal that I'm feeling sad.	✓			
31	5	I think the whole idea of sharing it to *Empatchi* is you just need a media to tell how you feel right now, so in that sense, it sounds like your posting a tweet saying that I feel sad... you just want to express it, but you don't necessarily need an immediate response.	✓			
32	5	At first, I'm actually impressed with the concept of *Empatchi*. It simplifies everything. Meanwhile we don't have to, if I'm busy in certain times, *Empatchi* will be a—such a great help in just summarizing everything on how I feeling one day, and then just let him know how I feel	✓			
33	5	—I think it's quite troublesome to be able to express everything what I'm experiencing, so that's when *Empatchi* gets really helpful, but again as I mentioned if it's get being overly simplified, the experience is kinda stagnant and we actually want something more from it, I mean, there's potentially good to be explored a bit more.	✓			
34	5	So *Empatchi* kinda gives him a hint that, this is how I'm feeling, but I want you to reach me for that.	✓			
35	5	It doesn't really express the actual feeling, but, yeah, but, again, in a way, for certain cases like that it might be useful for me, but it also depends on the person's personality. Some people would love to directly tell somebody else up front that, hey, I'm disappointed to you, I'm disappointed by what you've been doing so far, but I'm, it just, I mean if it fits me well in the sense that I don't, I'm not the kind of person who will tell directly that I'm disappointed, but I will give a hint first,	✓			
36	5	I think the whole idea of sharing it to *Empatchi* is you just need a media to tell how you feel right now, so in that sense, it sounds like your posting a tweet saying that I feel sad... you just want to express it, but you don't necessarily need an immediate response.	✓			
37	5	But given the case that I should know that he knows how I'm feeling, I should know that he saw that message.	✓			
38	5	Yeah. Actually I think it's a bit redundant from giving support from the *Empatchi*. I think it's useful when sharing emotion, but once we see the emotion, we will just reach each other through WhatsApp. I think that's what we did, rather than just going from *Empatchi* and then goes to WhatsApp again.	✓			
39	5	I think it's also the reason when we feel happy and when there are so many things we wanna talk about. We don't use *Empatchi* to share that we are happy. We just share it, we have so many energy to share that this is da-da-da-da on the WhatsApp	✓			
40	5	It's quick and handy when for example, one day I have several events and just want to share with him, but I feel happy because of this event, let's say if we're just in the different time zone, when I feel I feel sad, As I said before, we can just summarise, we don't need to go to the extent of before you say something that you just don't wanna say. I think that *Empatchi* is a good mediator.	✓			
41	5	But the thing that I like the least is it's overly simplified	✓			
42	6	What I like the most is the idea that you can simplify or symbolise your feelings...	✓			
43	6	OK so first of all I think basically for me, the concept of this app is just trying to simplify how you communicate, which I totally get the point.. But from my experience of using is... I think this is a really oversimplified way to communicate.	✓			
44	6	So when I was using this app, let's say when I'm really really happy or I'm really really sad, It's pretty clear on how to use this app. But when	✓			

		I'm just feeling normal or doing my day as usual I'm not really sure what to do with that.				
45	7	I mean I've had some bad days. I think while using the app. So you know and my friend is quite a busy bloke. So you know he's working on quite a lot of project and all that... So for me I don't want to disturb any of these activities.. So through the app by setting my mood to red and then you know doing all that, it allows my friend to know that I'm feeling that way and then so he responds to that, and then I let him know that I kind of want to talk and then later on we can kind of just set a time where we where we are both available to talk to each other, and just talk about my feelings. I think that's quite helpful	✓			
46	7	However when I posted a bad mood, I think it's kind of a signal to my friend that.. I guess I'm kind of signalling my friend that, Hey I kinda want to talk.. So only when I post a bad mood that I mind a little bit, but you know as I said we've been close friends for a long time. So we understand when they don't respond immediately, but there is some kind of hope that he would respond immediately when I posted.	✓			
47	8	In the first few days I'm using this application, I felt like there must be a way where I can just share how I feel, just... Just to be more specific about what I feel. That's just what I was thinking back then but the more I use the app, the more I understand the whole purpose of the app, and I feel like it's more simple basically.	✓			
48	9	I think it's always the same pattern and not so dynamic. I want to express myself more with this app, and I don't feel so engaged with this app.	✓			
49	10	I think the important thing is like having a preset of response and status that prompt you to share all the negative experiences is somewhat helpful for me to do that. But of course it's not so easy because it's not exactly a platform you would look forward to go to share.	✓			
50	10	Maybe it's just like the deliveries, how you deliver that or how you actually interact with the app, It's a bit, Maybe it's not so natural. When you feel bad or whatever,It's not something that you feel like you need to go to that app the first, so most of the time the data that you're getting maybe it's already something passed by.	✓			
51	10	I would say that It's not, for example when you have negative experience sometimes you want quicker response, so either you just call or text that person. So sharing that and waiting for them to come, for me is not the best, umm.. scenario, but that's also different between people.	✓			
52	10	but in a sense like you feel a little bit down, I think that's when it does make a difference. In that sense you don't expect someone will care about it so much, but it still open the opportunity for them to talk to you.	✓			
53	10	I like how it's prompting people to be okay to, to share like the negative part of their life	✓			
54	11	Normally when I have free time or I'm back for work, when I need to talk to someone, I don't want to call them. First I'm afraid it will disturb them, and I think calling friend and talk about your emotion is like a girly thing, but this app help me to express my emotion without having to express it by calling my friend.	✓			
55	11	I think I expect some questions from them. I expect them to be curious about my feeling, both in positive or negative emotion. If it's on positive emotion, I want them to ask what's good about it? On negative emotion, I want them to ask, what's wrong? It's a sign that they really care.. I want to show them about my feeling.. So when they send support without asking, it still feels good, but I think.. Do you actually know what's actualy happening?	✓			
56	11	I like how easy it is to share and my emotions, to let my friends know what I'm feeling today, maybe in like two clicks?	✓			
57	13	It's good that the app is really fast in expressing our emotion and sharing support, and everything can happen in just a few taps.	✓			
58	14	For me personally being able to express how I feel helps me a lot. I do like talking about like, my emotions are happy and so on. The app is good in that sense, I can quickly tell my inner circle, hey I'm having a good day, or the other way around. It's like a relief I guess.	✓			
59	15	It depends, I think when I'm not busy enough, I can try to share my emotion with phone call or text message with my wife.. But when I am busy, this app helps me because it is simple and quick, and I don't have to engage in a conversation immediately at that particular time.	✓			
60	16	I'm not using words, so it's very convenient convenient because it will be very frustrating for me to share my days by typing them.	✓			
61	16	We are having a long-distance relationship, and I know he has a different schedule, and he has his own business to take care of. When I	✓			

		share emotion I know that he noticed my emotions. I feel like I'm relieved like he know what happens with me.				
62	7	However, with the app I think our conversations, mean more in a way, because as I said before, we just know what what is going on with the other party with the app, which means it allows directly to ask about the problem, and then you know so the bond is kind of stronger.		✓	✓	
63	12	So it actually helps connecting to people like how you, how they know your feelings. Every time I post like the emotions are, for example If I was sad, they will just straight respond from the app, but also like outside the app they always try to reach for me. Actually I'd never express my feelings in social media, and no one knows like what I'm going through... only the happy parts, the fun parts. But using the app, I can show the emotions that I feel, and the support from your closest friends really helps in those sad moments.		✓	✓	
64	12	I think the app really increase the amount of talking to them, we're like what did you do? What happened? It really increased that. And in terms of quality, I feel like I know them more. I don't know like, they never informed me about their emotion, so with this app they gave me something new. I think it allows them to share what they couldn't share before in social media.		✓	✓	
65	15	I sometimes do call her after receiving support from her, or after she updates her emotion.		✓	✓	
66	16	I don't really have much experience in giving support to other people. So with this app, I know how my how other people feel, and I know I can share my support with them, and I can.... I can tell them how they can endure the problems with their life and how they can go on, and I'm happy with me supporting them.		✓	✓	
67	16	The app is showing me what other people feel, what have they been through in their days and I know what kind of struggle they have... And with that I have the urge to give them my support.		✓	✓	
68	16	When he posted something about his emotions, I now know that he had such a rough day or he had a happy day. He's not really open about his work and I'm the one who always talk about my days, but he rarely does it.		✓	✓	
69	1	In fact actually I'm really curious what happened to her. That's what I did. Okay. What happened? I always send why, what happened to you, and then I try to give her support in *Empatchi*. If she's not replying, I will try to call her.		✓		
70	2	Sometimes after I got a notification I was questioning in my in my head what happened to him because the app only gives me the symbols like the red or a green one but I don't know how does he feel about it, then I have to comment on that but there are no place to comment on them, It's is just giving support. I think I need a place where I can chat with him but I don't know if it only makes it like another Facebook but maybe it should be like that.		✓		
71	3	Before, it maybe takes longer to get to the point that we talk about the feelings because then we're talking about like daily things and then at the end it's like probably you don't want to say oh I'm feeling bad and so maybe only at the end of the conversation that we can finally talk about it. I would say that was will be the difference. I mean, it's like, we're trying to like, I don't know, keep cheerful and all of that, and then until you discover that the other person is a bit sad.		✓		
72	3	Because maybe the day we will be talking like fine, but then I'll see like a giant red circle, and then I was like, We were talking fine but why is there a red circle, and then I'll be like.... interested to know and then I'll try to remember like maybe in that day like oh yeah, he had like a presentation. Maybe it didn't it didn't go well so I'll be like, I don't know.,I think I'll be more self-conscious about his day.		✓		
73	3	I really like the idea of, it's like having to see my boyfriend's feelings, and then I'll be like feeding him with good comments and that's really nice. I think that's something very positive in someone's life. In my opinion they have more value, and more truthful, and more honest. I think you also get to know more about the other person. It adds, in my opinion, another dimension in my relationship.		✓		
74	4	Yeah when I saw it... it's, I know something happened to her. Sometimes it's hard to detect her emotions so compared to text it's easier to detect emotion from *Empatchi* because from text message every time we don't talk about our emotion so it's a bit hard to detect or emotion from the usual text.		✓		
75	4	For me it... may be for me it's how I can see her emotion and it's easier to detect her emotion.		✓		
76	5	it's like a mini conversation kind of thing. We usually just want each other know without wanting to be called immediately.		✓		
77	7	So you know in a way, we know that they want us to engage in a conversation. If they want to talk to us yes, maybe tomorrow or later or		✓		

		a few hours later, or something like that, we can set that.. so it's, I found it really helpful.				
78	8	I personally have the tendency to whenever I'm on my phone, and I see the notification (from *Empatchi*), I reply to it directly. If I see it red, I will be, I'm kind of worried about what happened to him so I try to respond directly, because I know that he's in his in Japan and he is living alone, and he doesn't really have that much friend there.		✓		
79	10	It's nice to be able to notice like a little difference in, you know, all the negatives (emotions) like that, You didn't actually think it's a big enough to you to actually call up your friends and stuff like that, so it's a good way to discover more about emotion.		✓		
80	11	With the app, I can see how my friends is feeling. And that make me feel like I can do something with that. Like I can ask, What happened? Without the app I would never know because sometimes they just don't tell.		✓		
81	11	we can call for no reason, for an hour, like what are you doing this weekend, or can you talk to me because I feel sad? But I didn't really know about how they're feeling. Without this app I would never know. I feel like by knowing it and asking them directly, I feel closer to them.		✓		
82	3	I think because the app is like made specifically for that, and then maybe I'm still conscious about it, but I feel like... I don't know... Like there's whatsapp and they are for everyday things and then *Empatchi* becomes more like private, so if he goes there to see and send me some support, I feel that he's really like caring about my feelings			✓	✓
83	11	Unlike facebook, I feel more comfortable in sharing my emotion with my close friends in this app, because I know that they will see it and they will support me in a way. I feel more comfortable to ask them for dinner, to discuss about my feelings.			✓	✓
84	15	This app helps me so much, it only takes few seconds to share your emotion and you can get support from your inner circle			✓	✓
85	1	So what really good is, I can get support from her, and we don't only use *Empatchi* to give support, but also to leave positive notes, like "good luck darling!". *Empatchi* has a good feature to create beautiful notes.			✓	
86	1	The way she tries to, to support me is quite different when we use *Empatchi*. Sometimes she sent: Okay, Good luck! or like are you okay? But sometimes it is not quite enough for me, so I expect more when she said she will video call me later. But I think every support that provided by *Empatchi* is always in a positive way.			✓	
87	2	I don't know whether my husband is not creative in making a comment on supporting me.. The options inside the app is not much right, it's like, you can do it or, I actually forget about that, but for example glad you feel this way or something like that... so I wonder why he's not really creative when we can create our own message... but he only sent me the template message.. Although I sent my original and longer sentence in my comments or support to him... I think my husband could do better than that...			✓	
88	2	I think it works for me the way that the app stimulates me to give support or making comments on others' emotions. I also would love to see them getting stimulated by that and create their own original message to give support.			✓	
89	3	I think I never expected him to reply me immediately, mostly because of time difference, and yeah, because I thought yeah, he'll see it and he'll know like and then whenever he replied.			✓	
90	3	I like the fact that you put them (the supports) in notes, so I love that it was like someone put you a post-it note ,which is something that also happens in the real life, so I felt that was really nice. It was also interesting to see what we've been sending each other and how our emotion changes through time.			✓	
91	4	I think it's... Sometimes I will check these messages, for example when I have sad feelings I can open the app and see the support messages... and it can help me and I feel... I definitely feel better after seeing it.			✓	
92	5	I think if you don't talk to them everyday, this might be useful to give a note that, hey i'm looking forward to talk to you later.			✓	
93	8	Even though it's just a short message, It's like he's letting me know like, it's OK, calm down.. I'll talk to you later.. like that			✓	
94	9	So all this feedback, the good thing is for me I think is about the recording.. because I can see like the history thing... So it's more like when I get the support from my friend today it might not feel like "Oh, thank you very much!", but when I go back and see it again, looking at the history, I feel like, it sounded like a lot of good things happen, a lot of good supports happened. For me I feel positive in that way.			✓	
95	9	So all this feedback, the good thing is for me I think is about the recording.. because I can see like the history thing... So it's more like when I get the support from my friend today it might not feel like "Oh,			✓	

		thank you very much!", but when I go back and see it again, looking at the history, I feel like, it sounded like a lot of good things happen, a lot of good supports happened. For me I feel positive in that way.				
96	9	However, sometimes when I receive the support, and I know that it's a template... I think I will have better feeling if they're different words from what I 'm also seeing when I send support, if it's different from what I have seen from my app.			✓	
97	9	I think it's about the reflection, and I feel really positive about the app. It's the recording of my emotion, like a diary of my emotion that helps me reflect.			✓	
98	11	There's something good and bad about this. Sometimes I look at it to see how many times I've sent supports to them, sometimes I kind of comparing if I think I've sent more, and kind of expect them to send more supports to me. I feel like it's not fair. On the other hand, I will feel good if they actually send more support than what I sent to them. I also think that it's good to keep track of my interaction with them and what happened to me and them lately.			✓	
99	11	I think the app creates a chance to actually meet them. When I see one of them in the app and they are not feeling well, I will send support and ask them to meet this weekend.			✓	
100	12	When my first use the app, I didn't realise like they will respond so quickly, so I was like, wow, they do really care... that's my first impression. Not just in the app, but also outside the app, they will message me and stuff.			✓	
101	12	In the beginning I was like sceptic about the app, I hesitate to share my emotion. But after try to share emotion and receiving fast response from them, I feel like, wow, they really do care, so I think the response really helped me a lot.			✓	
102	14	I think with the app you can also sort of saying, hey I'm here... and I want to hear more about this... what's going on?			✓	
103	14	I think with the app you can also sort of saying, hey I'm here... and I want to hear more about this... what's going on?			✓	
104	15	My wife responded fast enough, she sent me support almost immediately after I shared my emotion. When she didn't reply, I think I will reach her by calling her.			✓	
105	16	It's good to know that I have someone that care for me, like supporting me , and the exchange of the support is very positive.			✓	
106	1	How we share emotion in *Empatchi* is better than Facebook or Instagram or everything else, I like how the app allows me to choose the people that I care about to share my emotion, and it's not as public as facebook or any other social media.				✓
107	1	In *Empatchi* you can share emotion only to your closest circle, so that's quite good.				✓
108	2	But I think it's good that you only have a few people that are really close to you and decide who are you going to share your emotion with not like any other social media. As an introvert I feel comfortable to share everything.				✓
109	7	It would be a lot more engaging to, you know, have multiple people in your circle, we can have multiple interactions, and communicate with those people later on. I think that would be a pleasant experience.				✓
110	8	What I found really interesting about *Empatchi* is the way we only share it to our close cricles because me and [P7] we have this ... we share this common thing where we don't want to have like just a chit-chat. We want to have like a serious talk whenever we, like shared things..				✓
111	9	I think I only share with people, who, even if I'm right or wrong they will support me. If I share online, some people might not agree.				✓
112	2	I was using this app with my husband and I try to share emotion in the application which is not that clear... The emotion, it's just a symbol in the app whether it is happy or sad and then we should measure the number or the amount or whatever you call it... Whereas in another application for example when I directly call him I can tell him everything what I want... This is an interesting application but somehow it restricts the user to express their emotions. I feel like it's not enough and I still have to use other applications.				
113	2	The symbol that was provided to express emotion is kind of limited and it can have many interpretations. So I think I need to type a comment or to tell them Story by sharing a picture... Or maybe you could add more emoticons there... Maybe it can be helpful too.				

Appendix 16 : Study 2 Result – Challenges in Using Self-Assessment Manikin

No.	Parti-cipant	Content
1	1	The way we share emotion in the app, there are two parameters, which is the arousal and valence, but I think if you want to share emotion mostly you need to add more parameters , for example... I don't know... I want to say more, but sometimes it's quite hard for me.
2	1	I don't think so. One important thing when we want to share our emotion, when we want to express our emotions fully, I think you need to add more parameters and... I think that's that's my my suggestion because once I got really really angry and I want to share, really want to share emotion, sometimes I want to let her now that I need her support, right now.
3	1	But I think if you want to fully express your emotions, I think there should be more additional features in input. I don't know what exactly... Probably if I suggest maybe there can be a real-time video or call or something...
4	2	I was using this app with my husband and I try to share emotion in the application which is not that clear... The emotion, it's just a symbol in the app whether it is happy or sad and then we should measure the number or the amount or whatever you call it... Whereas in another application for example when I directly call him I can tell him everything what I want... This is an interesting application but somehow it restricts the user to express their emotions. I feel like it's not enough and I still have to use other applications.
5	2	The symbol that was provided to express emotion is kind of limited and it can have many interpretations. So I think I need to type a comment or to tell them Story by sharing a picture... Or maybe you could add more emoticons there... Maybe it can be helpful too.
6	4	The emotion level from sad to happy, it's easy to understand but sometimes I feel hard to pick the activation level and I also don't know the level of my activation and sometimes it makes me confused.
7	4	I'm only confused about the activation part when sharing emotion... And yeah it's... I wish if I can tell or if I can understand more specific information of... why it's like, what type of happy or what type of sad?
8	5	At first, I'm actually impressed with the concept of *Empatchi*. It simplifies everything. Meanwhile we don't have to, let's say I'm living in different zone from him, so to be able to summarize how I feel
9	5	if I'm busy in certain times, *Empatchi* will be a—such a great help in just summarizing everything on how I feeling one day, and then just let him know how I feel
10	5	but the problem with it is--so overall I think it's a great concept but sometimes it gets a bit too oversimplified. So in a way that because it only has several options on the way of emotion I can express. Sometimes it can be a bit--I wouldn't say it's boring it. I would say it's a bit stagnant, and we only have several options to tell every day how we feel and let's say if we keep doing that that repetitively for couple of week, it's get dull and we kinda—we think that direct communication is more beneficial in this way
11	5	—I think it's quite troublesome to be able to express everything what I'm experiencing, so that's when *Empatchi* gets really helpful, but again as I mentioned if it's get being overly simplified, the experience is kinda stagnant and we actually want something more from it, I mean, there's potentially good to be explored a bit more.
12	5	But also again. Because there are only four levels and it's only you're happy neutral or sad. I think it could be more if you know what a Facebook's I'm feeling happy sad this one, yeah, that kind of thing, more variety, I think that would be more interesting because I kinda like, I wanna get something that actually express my current feeling but I couldn't really find the right one so it's like sad and probably I don't remember what (did I do), but I put it as sad though
13	5	But the thing that I like the least is it's overly simplified
14	6	What I like the most is the idea that you can simplify or symbolise your feelings...
15	6	I think it's one of the Bulletproof way of showing my feelings and it's really beneficial for me... But I think I also would like to have more selections in how to symbolise my feelings.
16	6	So from the interface itself we only have five choices of emotion scales and five choices of how... how that emotion is, right? So you maybe going have 25 options which I couldn't really relate on my own scale of emotions. Ok, so I would think that the way I want to communicate is a bit more complex than this and quite a bit more... I think branches of emotions.. So when I was using this app, let's say when I'm really really happy or I'm really really sad, It's pretty clear on how to use this app. But when I'm just feeling normal or doing my day as usual I'm not really sure what to do with that.
17	7	At first it's kind of did (confusing) because you know the activation part i think, because often times my friend is sad, but you know they're activated so it's kind of the opposite so sometimes we get kind of scrambled up, but I think the more important aspect of the app is the feeling one I think we paid more attention to the mood one I think.
18	7	The activation part, we, both of us are not sure of what it meant, so we just assume that it was our level of activity for example.. Like when we are doing some exercise or something..
19	8	In the first few days I'm using this application, I felt like there must be a way where I can just share how I feel, just... Just to be more specific about what I feel. That's just what I was thinking back then but the more I use the app, the more I understand the whole purpose of the app, and I feel like it's more simple basically.
20	9	For the emoticons, first for the pleasantness part is easy to understand because it's like, you know, and using all of these smileys, but for me little bit hard to understand what is the activation, so I interpret is kind of like how active I am daily. For me to express emotion, maybe it's, only using these two categories I feel like it's quite limited. I also found that it's quite hard for me to scale my emotion.
21	9	About the scale, if I'm not that unhappy, I rarely choose 1 or 5, I try to choose between 2,3, or 4.. you know what I mean.. I think it's another challenge to express.. I think if you come up with one keyword, for example if I'm very happy and very active, it can be, oh I feel very awesome today, I think I feel more connected that way. I think people need more example about what each scale means. I just feel like it's sometimes difficult for me to rate my emotion today. It's

		not like, a standard for everyone. We don't know why people rate 3 or 4, for my personality, I try to avoid selecting 1 or 5. When I don't see sample scenario, I have no benchmark. But if I rate yesterday, today would be easier to rate because I can compare with how I felt yesterday. Maybe if you can have some questions to lead or to help me rate, I can feel more connected to the app.
22	9	I think it's always the same pattern and not so dynamic. I want to express myself more with this app, and I don't feel so engaged with this app.
23	10	I think it's okay, the pleasantness is easy to understand, but maybe the activation is a bit difficult to say, and it's not so much as I am feeling that way all the time, it depends on when I share.
24	11	I feel like it's quite limited. I feel like this is not complete, and could be more than this. At first, I thought of facebook where you have more selections on emotion. I think your emotion is not limited to 5 selections.
25	13	It's good that the app is really fast in expressing our emotion and sharing support, and everything can happen in just a few taps.
26	13	I think the icons (of the emotions) could be better. It needs to be understandable by everyone who sees it for the first time.
27	15	I think it is somehow limited, how we can express our emotion with this app.
28	15	It is a bit confusing at first, but I think as I use it for a while I get to understand. I also discussed it with my wife and we tried to figure out what does it mean.
29	16	I'm not using words, so it's very convenient convenient because it will be very frustrating for me to share my days by typing them.

Appendix 17 : Study 2 Result – Yields

No	Parti-cipant	Content	Reassu-rance and Relief	Impro-ved Rela-tionship	Sparking Conver-sations	Awareness in Emotion
1	16	I don't really have much experience in giving support to other people. So with this app, I know how my how other people feel, and I know I can share my support with them, and I can.... I can tell them how they can endure the problems with their life and how they can go on, and I'm happy with me supporting them.	✓	✓		
2	3	I like the fact that you put them (the supports) in notes, so I love that it was like someone put you a post-it note ,which is something that also happens in the real life, so I felt that was really nice. It was also interesting to see what we've been sending each other and how our emotion changes through time.	✓			✓
3	5	I think just being able to share it, not publicly, is good enough. So, but, this is really personal though, I don't expect him to reply immediately actually. I just need to vent. But given the case that I should know that he knows how I'm feeling, I should know that he saw that message.	✓			✓
4	6	it's kind of hard for me to write sentences and from the fear of being judged or having typos here and there are grammatical errors that people will point out or something like that... and so I think it's one of the Bulletproof way of showing my feelings and it's really beneficial for me...	✓			✓
5	9	So all this feedback, the good thing is for me I think is about the recording.. because I can see like the history thing... So it's more like when I get the support from my friend today it might not feel like "Oh, thank you very much!", but when I go back and see it again, looking at the history, I feel like, it sounded like a lot of good things happen, a lot of good supports happened. For me I feel positive in that way.	✓			✓
6	2	I think it's good that you only have a few people that are really close to you and decide who are you going to share your emotion with not like any other social media. As an introvert I feel comfortable to share everything.	✓			
7	4	I try to share emotion that I didn't share before.. for example, before using this app I experienced some negative feelings and I think I didn't try to show or share it, but after I started to use this application, I tried to share these emotions, and so she's trying to support me and can give me some words using this app, and I become better.	✓			
8	4	It's really helpful when I got some support message from her, my feeling become better	✓			
9	4	I think it's... Sometimes I will check these messages, for example when I have sad feelings I can open the app and see the support messages... and it can help me and I feel... I definitely feel better after seeing it.	✓			
10	9	So all this feedback, the good thing is for me I think is about the recording.. because I can see like the history thing... So it's more like when I get the support from my friend today it might not feel like "Oh, thank you very much!", but when I go back and see it again, looking at the history, I feel like, it sounded like a lot of good things happen, a lot of good supports happened. For me I feel positive in that way.	✓			
11	11	I feel better inside, I feel good... I kinda know that they know what I'm feeling and that's what I needed. I just want them to know, I don't know ... I think it's good enough to know that someone really cares about you, even it's only through the app, and I think it's good enough for me.	✓			
12	14	For me personally being able to express how I feel helps me a lot. I do like talking about like, my emotions are happy and so on. The app is good in that sense, I can quickly tell my inner circle, hey I'm having a good day, or the other way around. It's like a relief I guess.	✓			
13	16	We are having a long-distance relationship, and I know he has a different schedule, and he has his own business to take care of. When I share emotion I know that he noticed my emotions. I feel like I'm relieved like he know what happens with me.	✓			
14	7	However, with the app I think our conversations, mean more in a way, because as I said before, we just know what what is going on with the other party with the app, which means it allows directly to ask about the problem, and then you know so the bond is kind of stronger.		✓	✓	
15	15	It is interesting how we can share our emotion with only one tap. It is not complicated. It is easier for me to share my feelings and it is easier for me to understand her feelings.		✓		✓
16	2	I think it works for me the way that the app stimulates me to give support or making comments on others' emotions. I also would love to see them getting stimulated by that and create their own original message to give support.		✓		

17	3	Because maybe the day we will be talking like fine, but then I'll see like a giant red circle, and then I was like, We were talking fine but why is there a red circle, and then I'll be like.... interested to know and then I'll try to remember like maybe in that day like oh yeah, he had like a presentation. Maybe it didn't it didn't go well so I'll be like, I don't know.,I think I'll be more self-conscious about his day.		✓		
18	3	I really like the idea of, it's like having to see my boyfriend's feelings, and then I'll be like feeding him with good comments and that's really nice. I think that's something very positive in someone's life. In my opinion they have more value, and more truthful, and more honest. I think you also get to know more about the other person. It adds, in my opinion, another dimension in my relationship.		✓		
19	4	I think it's really important for us especially in this relationship because it shows how we are taking care of each other.		✓		
20	7	this app, it kind of helps just to jump straight into the matter.. We know how the other person is feeling so.. for example if my friend is showing a red on the app, which is sign for not very good mood I think? Yeah, well I can just ask them straight away, hey dude what's going on. Do you need some help or , or someone to talk to? Something like that. So, It's definitely helpful for both parties I think.		✓		
21	7	The strong point of this app is , I feel is the fact that I can just allows people, close friends to be straight with each other. They don't have to beat around the bush too much when they're talking in a when they're engaged in a conversation. They can just go straight into the matter at hand just solve the problem immediately because I think that's quite important . Often times there are people who have difficulties in expressing themselves, often times when they talk to even their closest friends, they would still talk but end up not talking what they want to talk about.. And this app prevents just that.		✓		
22	11	we can call for no reason, for an hour, like what are you doing this weekend, or can you talk to me because I feel sad? But I didn't really know about how they're feeling. Without this app I would never know. I feel like by knowing it and asking them directly, I feel closer to them.		✓		
23	16	It's good to know that I have someone that care for me, like supporting me , and the exchange of the support is very positive.		✓		
24	1	It's a really good feature, but I wish there's a feature when I can tell my wife that I really need a call right now, like a pop up special notification like bling bling for example, I don't know. Maybe the app can send a notification like, "he needs your help", "he needs a call right now".			✓	
25	3	I would just feel more like looking forward to talk about like, yeah, whatever happened.			✓	
26	4	In *Empatchi*. I feel it's a lot easier because I don't need to text first, I don't need to explain. I can send some kind of signal first and then we can talk later. Yeah it's really helpful to I don't know yeah it's really helpful to... create conversation.			✓	
27	4	It's definitely easier to show because I don't have to type in text. I try to share more emotion, and we talk more about our feelings and emotions after using it, like why do you feel like this.. so I think that's the difference from before.			✓	
28	4	one time when I saw some negative emotion from her I tried to call her because I'm curious why does she feel like that so it's triggers conversation between us.			✓	
29	4	I always call her so it's like, I know it's a daily habit yeah, but yeah, but I feel so, for example, we have this "Let's have a call soon" or something like that, and then I press it and send it, I feel stronger need to, okay, I need to go to call her.			✓	
30	7	We don't know when to, you know, talk about feelings because it's kind of a touchy subject i guess? So, it's quite a difficult subject to approach, so we don't want to offend or make our friend uncomfortable. But, with this app, it's you know, we sort of already know what he's feeling. So you know in a way, we know that they want us to engage in a conversation.			✓	
31	8	I like how it helped me and [P7] to start a conversation because we are both really really shy, so yeah just by sharing it there, it really helps us to get things going.			✓	
32	9	I usually I call them and said that his advise and support is really helpful, and I say thank you. I don't update again from the app, I just keep it for myself and if I see each other or talk to each other again I will talk to them about it.			✓	
33	10	but in a sense like you feel a little bit down, I think that's when it does make a difference. In that sense you don't expect someone will care about it so much, but it still open the opportunity for them to talk to you.			✓	
34	11	With the app, I can see how my friends is feeling. And that make me feel like I can do something with that. Like I can ask, What happened? Without the app I would never know because sometimes they just don't tell.			✓	

35	11	Unlike facebook, I feel more comfortable in sharing my emotion with my close friends in this app, because I know that they will see it and they will support me in a way. I feel more comfortable to ask them for dinner, to discuss about my feelings.			✓	
36	11	I think the app creates a chance to actually meet them. When I see one of them in the app and they are not feeling well, I will send support and ask them to meet this weekend.			✓	
37	12	So the people in the app, they really care about you so like everything that you do, anything that you post there, they will ask like even if you're happy or you're sad.			✓	
38	12	I think the app really increase the amount of talking to them, we're like what did you do? What happened? It really increased that. And in terms of quality, I feel like I know them more. I don't know like, they never informed me about their emotion, so with this app they gave me something new. I think it allows them to share what they couldn't share before in social media.			✓	
39	13	Well I think with or without the app we are going to talk anyway, but I think it's more to the openness of our emotions because most of the time when we talk by phone, and they might say that they're alright, but like with the app, I knew that they're not because they had something going on so I think it's more to an openness, because they're reluctant to share their emotions. It triggers what we're going to say during our chat or are video calls or skype, and we're going to talk about it, and it's really good that... like for example because I'm really self-centered person, and I know that they're feeling something too... I can like ask what they are feeling or what they've been going through. So since we start using the app, we had more deeper conversations about that.			✓	
40	14	I guess when you share something you will raise the curiosity of your friends, and they will be like oh, why do you feel this way? And you can carry on a conversation. Before using this app, you may be bothering other people if you ask like, hey is it ok if we speak?			✓	
41	3	So I found an interesting that maybe it became kind of like a double kind of like two aspects in my day, I don't know like, yeah of course I was like cheerful like going to work and doing all of myself, but then I will put in *Empatchi* like I was sad, which was genuinely true. So I kind of like separate my, I don't know maybe I kind of like understood more about myself.				✓
42	3	The thing that I felt the most was that it was like somebody told me like okay, this is a safe place for you to like ,like really tell how you are. On *Empatchi*, it was like the moment where I really kind of like self analyse my emotions, which didn't happen when I try to express it with whatsapp or other messages. Maybe the app just made me think more and aware about like how I was feeling.				✓
43	3	I think it is more like truthful in *Empatchi*, it's like putting us in a situation like we're kids, where we show everything using colour and shapes, and we're becoming, I think in my opinion more like transparent. I really trusted the big circles, and small circles, I think he's being very like honest.				✓
44	3	I think like a graph of our ups and downs is something that can help me understand. I think it will help more in the self awareness about my feeling, and it takes you to a good management of like, emotions.				✓
45	8	I can also view our emotion based on the time when we posted that emotion. I feel like that helps me to track how I feel during particular moment. It helps me to track like, my own...It helps me to express my feeling and then it also helps me to track like what makes me sad, and what makes me happy as well.				✓
46	9	I think the good thing from using the app is that it helped me think ... It help me like... kind of like reflect my emotion daily..., It was not a normal thing that I do... but and then when I look back, I think that's a good thing, like okay even if today is a bad day, you also have a good day as well. I think it's like the recording of my emotion.				✓
47	9	I think it's about the reflection, and I feel really positive about the app. It's the recording of my emotion, like a diary of my emotion that helps me reflect.				✓
48	9	I think the good thing from using the app is that it helped me think ... It help me like... kind of like reflect my emotion daily..., It was not a normal thing that I do... but and then when I look back, I think that's a good thing, like okay even if today is a bad day, you also have a good day as well. I think it's like the recording of my emotion.				✓
49	9	In terms of the recording of emotion, I think it will help if it can be shown in graph, and also with stories so I know what makes me feel good or sad.				✓
50	10	It's nice to be able to notice like a little difference in, you know, all the negatives (emotions) like that, You didn't actually think it's a big enough to you to actually call up your friends and stuff like that, so it's a good way to discover more about emotion.				✓

51	12	I think the app really, really makes me think like why am I sad, I want to be happy, I want to improve gradually. I can see what I posted, and I can see like how it affects other people, the closest people for me				✓
52	13	The daily questionnaire can be like a journal. I think it'll be really really cool if we can like reflect on every day like for example today I want to see what I wrote yesterday, I can see it... and maybe more question, more detailed questions...				✓

Appendix 18 : Study 2 Result – Use of Other Media for Emotion Regulation

No	Parti-cipant	Content	Direct Conver-sation	Text Based	Social Media
1	1	When I share my emotions especially bad emotion to *Empatchi*, most of the time I need a support immediately from her. But if she hasn't replied, I will, I will try to reach her by using a call. If she's not picking up, I will try to leave a text/message to her but not using *Empatchi*, but other whatsapp probably, to share.	✓	✓	
2	1	However, after one week, I feel like I can just use whatsapp or phone call. I still use *Empatchi* sometimes, but what I found quite hard is, umm... If you share emotions everyday, sometimes people don't always share emotion, sometimes we share and sometimes we don't, and I don't think the app kind of encourage you to share because it's actually limited of what you can do inside the app. On the first week, we were quite excited, but when I actually need to call, I think whatsapp call is quite effective, especially when we need immediate support when we can't hold it.	✓	✓	
3	4	But also for me, when I text her sometimes I choose one topic of what I want to talk to her so it's not about everything, and when I text sometimes I still need to explain everything about why do I feel this emotion, why do I feel happy, something like that. Usually I share everything to her, not only by texting but also like video chatting and have conversation	✓	✓	
4	5	Ya, we use everything actually. FaceTime, Skype, and WhatsApp. But there's also time when I wanna share with him, the experience that I'm actually having during the day which actually night time in his time zone. I kinda get—sometimes—I think it's quite troublesome to be able to express everything what I'm experiencing,	✓	✓	
5	6	So the way we share emotions is usually just through direct chat, or even just talking about it or having a call so we never... we rarely use any other public social media in public or any other social media that's not related to just directly talking to each other or anything that is similar to empatchi where you give some sort of symbol to... to kind of show how you're feeling. So it's mostly just words.	✓	✓	
6	10	I would say that It's not, for example when you have negative experience sometimes you want quicker response, so either you just call or text that person. So sharing that and waiting for them to come, for me is not the best, umm.. scenario, but that's also different between people.	✓	✓	
7	14	Before using this app, you may be bothering other people if you ask like, hey is it ok if we speak?	✓	✓	
8	15	Before using this app, I basically use phone calls or mostly whatsapp to share my emotions.. I think basically with text. I live separately with my wife right now because of my work, so I think we try our best to contact each other when we can.	✓	✓	
9	1	In fact actually I'm really curious what happened to her. That's what I did. Okay. What happened? I always send why, what happened to you, and then I try to give her support in *Empatchi*. If she's not replying, I will try to call her.	✓		
10	1	However, on the second week when I tried to share large or extreme emotion, we often directly use whatsapp call to talk or video call, and we share everything about our emotion.	✓		
11	2	I was using this app with my husband and I try to share emotion in the application which is not that clear... The emotion, it's just a symbol in the app whether it is happy or sad and then we should measure the number or the amount or whatever you call it... Whereas in another application for example when I directly call him I can tell him everything what I want... This is an interesting application but somehow it restricts the user to express their emotions. I feel like it's not enough and I still have to use other applications.	✓		
12	2	I mean, we have to call every day and every time we want so not only through the app that we can let them know or let him know then we are available to have call soon but we just did it regularly before this app exist. Maybe other people think different, but not in my case.	✓		
13	3	Before, it maybe takes longer to get to the point that we talk about the feelings because then we're talking about like daily things and then at the end it's like probably you don't want to say oh I'm feeling bad and so maybe only at the end of the conversation that we can finally talk about it. I would say that was will be the difference. I mean, it's like, we're trying to like, I don't know, keep cheerful and all of that, and then until you discover that the other person is a bit sad.	✓		
14	3	Because maybe the day we will be talking like fine, but then I'll see like a giant red circle, and then I was like, We were talking fine but why is there a red circle, and then I'll be like.... interested to know and then I'll try to remember like maybe in that day like oh yeah, he had like a presentation. Maybe it didn't it didn't go well so I'll be like, I don't know.,I think I'll be more self-conscious about his day.	✓		

15	5	And sometimes during the event we can't really do video call or voice call, or the problem because of the timezone. Yeah. It's not very handy that way, but still it's a good media to be able to get the holistic understanding on how I feel during the event.	✓		
16	7	However, you know whenever we're catching up, umm we often don't know what to talk about or, you know how we're feeling.. We have to kind of talk for a few hours before we actually, umm you know, can get into the matter at hand when, you know, about how are we feeling right now, and to express all that	✓		
17	9	I usually I call them and said that his advise and support is really helpful, and I say thank you. I don't update again from the app, I just keep it for myself and if I see each other or talk to each other again I will talk to them about it.	✓		
18	9	But if we really want to talk or call, we just go directly to call each other. But what I think would be quite helpful is to have some special notification when they're really unhappy or really need support. I think that way I will really mean it when I say I want to call or talk to them.	✓		
19	9	I normally share my emotions offline. I am not the person who share anything online and express my emotions. I usually call my friends my girlfriend and my family... For me I'm the person who talk a lot and be honest about my emotions when I share with people around me.. For example when I feel sad, I will call my girlfriend tell her why what happened today, I just need someone to listen to me.	✓		
20	10	I think the more immediate the respond, the more effect you can feel, but it's not always the case. But it depends on the situation, if it's something really bad, I'd call them	✓		
21	10	I think for me into a very negative situation, I would just pick up my phone and call someone,	✓		
22	11	we can call for no reason, for an hour, like what are you doing this weekend, or can you talk to me because I feel sad? But I didn't really know about how they're feeling. Without this app I would never know. I feel like by knowing it and asking them directly, I feel closer to them.	✓		
23	11	if it's something really important, and I really need to talk to someone, I just call them up.	✓		
24	13	Well I think with or without the app we are going to talk anyway, but I think it's more to the openness of our emotions because most of the time when we talk by phone, and they might say that they're alright, but like with the app, I knew that they're not because they had something going on so I think it's more to an openness, because they're reluctant to share their emotions. It triggers what we're going to say during our chat or are video calls or skype, and we're going to talk about it, and it's really good that... like for example because I'm really self-centered person, and I know that they're feeling something too... I can like ask what they are feeling or what they've been going through. So since we start using the app, we had more deeper conversations about that.	✓		
25	13	What I like the most is how we share our emotion. I think it really opens my mind about my peers. Of course we do talk a lot by phones or by video calls, but they don't really talk about their problems. They just say that yeah, I had a bad day. But with this app I can go deeper than that.	✓		
26	16	When we were communicating, it's more like household problems like hey can you buy something from the grocery store, something like that. We can have a dinner and in the table, but I don't really know what happens in his days	✓		
27	3	I think I found it really interesting I can have compare it to I don't know let's say like WhatsApp or other things it's become a bit more superficial. So you say on the surface of like you know, like daily life.		✓	
28	3	Like there's whatsapp and they are for everyday things		✓	
29	5	But when we had an issue, for instance, then that's when *Empatchi* plays in role. He kinda, it kinda send me a signal that his, for example, his sadness is being amplified but he does not want to share it through WhatsApp.		✓	
30	5	And I'm not really sure whether it would be the same that we could share an emoticon through WhatsApp it's not a very different thing.		✓	
31	5	The thing about Empathy is it's not very different when we are in neutral or happy situation. Because we still tend to call each other or WhatsApp each other directly.		✓	
32	5	I think it's also the reason when we feel happy and when there are so many things we wanna talk about. We don't use *Empatchi* to share that we are happy. We just share it, we have so many energy to share that this is da-da-da-da on the WhatsApp		✓	
33	5	Yeah. Actually I think it's a bit redundant from giving support from the *Empatchi*. I think it's useful when sharing emotion, but once we see the emotion, we will just reach each other through WhatsApp. I think that's what we did, rather than just going from *Empatchi* and then goes to WhatsApp again.		✓	
34	5	to be able to explain everything in Whatsapp, for instance, will take sometimes		✓	
35	5	Right. Typing could be a problem though. You wanna share something in real time but you can't early type everything at the same time, I think that's what WhatsApp is lacking of.		✓	
36	5	Um. Yeah. There're times sometimes it when I feel like I want to be passive aggressive in a way. I want to tell, that I'm feeling down, but I can't really express it directly through Whatsapp, because I'm not the kind of person who actually express my feeling when I feel disappointed or sad.		✓	
37	5	if we're just in the same timezone we just go to WhatsApp directly		✓	

38	6	I really like that direction especially because it's kind of hard for me to write sentences and from the fear of being judged or having typos here and there are grammatical errors that people will point out or something like that...		✓	
39	7	Well of course compared to an actual chatting platform like for example whatsapp or you know any other it's not as elaborate of course, but I think, that's that's where it works the best because the whole.. I feel like the premises you just let each other know how we doing but then we don't have to, you know, immediately get in contact. We can always contact later on when we're both available, so I think the short kind of responses allow us just to do that		✓	
40	8	Before I use the app me and [P7] has this tendency that we wait for each other whenever we want to talk about something. For example if I have something I want to share with [P7] especially, I just wait until he texted me. That's where I found *Empatchi* really helping me to just express myself and then he can ask me how I feel based on my emotion.		✓	
41	1	I usually share my emotion to by using whatsapp and sometimes I also upload some message to Facebook or to Twitter and instagram about my emotion and what happens to to my daily life.			✓
42	1	When I try to share my emotion using another social Media, I don't consider if it is shared to large or small group. I just need support from everyone. I don't care whether it's from my old friends or new friends or... I don't know, I don't care about that, but I only need support. I'm going to use instagram and other social media if there is no privacy, but if it's private, I need to share only with my closest friends.			✓
43	1	I think in social media, people don't really care about your status. They can talk to you, and can also talk behind you. For example if I make status about something, some of my friends can talk about me without me knowing, probably in negative way. And sometimes the comment makes your emotion worse.			✓
44	1	How we share emotion in *Empatchi* is better than Facebook or Instagram or everything else, I like how the app allows me to choose the people that I care about to share my emotion, and it's not as public as facebook or any other social media.			✓
45	2	I think for example in instagram, I kind of want to know what other people going to say about my picture, while for *Empatchi* I just check it 2 times or 3 times per day, so I don't think I need the response from him as soon as possible.			✓
46	8	In social media people sometimes approach us as well, but it's more like a chit-chat like oh, how are you and then just 15 minutes later the conversation ends there. *Empatchi* is bridging that gap.			✓
47	9	I don't want to be seen as an emotional people, online. If I have a bad day, I want to solve the problem myself. I also sometimes overthink and I don't want people to comment on me when I feel sad for example. I only share something funny I saw online.			✓
48	10	Well I think usually on social network, you tend to only share about positive stuff, so you're not looking forward to tell your concern or condition to your friend. That's what I feel prior to using *Empatchi*. For me social network is not so... isn't so intimate, because it has bigger crowd... So you usually only curate the positive contents, thinking it might bother other people and you don't feel good when you share all the negatives. I'm more like sharing good experience, so it's kind of like you doing it because you want to sort of remember and at the same time be able to let people know what you're up to, but I guess for the negative part isn't really considered because you only want to portray only like to know the OK side of your life.			✓
49	11	Sometimes I use facebook and pick one of their emotions to share about my feeling. Other times I'd pick up my phone and call my friend and tell them about how I feel. Sometimes when I share it publicly, deep down I want to know how many people would care about my feeling, but 80% of it is for the positive emotion.			✓
50	11	Unlike facebook, I feel more comfortable in sharing my emotion with my close friends in this app, because I know that they will see it and they will support me in a way. I feel more comfortable to ask them for dinner, to discuss about my feelings.			✓
51	12	Actually I'd never express my feelings in social media, and no one knows like what I'm going through... only the happy parts, the fun parts. But using the app, I can show the emotions that I feel, and the support from your closest friends really helps in those sad moments.			✓

Appendix 19 : Study 3 Result – Emotion Regulation With Empatchi

No.	Parti-cipant	Content	Phatic Interaction in Sharing Emotion	Getting Updates	Exchange Support	Self – Reflect-ion	Closed Network
1	14	She never shared or show her negative feelings before, so I assume that when she shared negative feelings in Empatchi, it's very new to me. She was not the type of person who calls or texts when she's down, so the fact that she shared it in the app, I responded and sent her support, asking if she's OK, that whole interaction is new for us. It gives me the opportunity to approach her and talk about things that we weren't used to talking about.	✓	✓	✓		
2	14	The whole interface is interesting and simple. I have no problem in using the app. The interaction, sharing emotion, send support, it does not have to be more complicated than this.	✓	✓	✓		
3	19	It is easier to know about what my close circle feels at certain day and how their mood changes, i could easily ask them what's wrong and supports them easily in the app. I think it also happens vice versa.	✓	✓	✓		
4	14	I sometimes avoid posting the negative emotion because I don't want her to worry about me. But after seeing her also post negative emotions, I feel OK about it, and I think I have no problem now to post the negative ones.	✓	✓		✓	✓
5	15	Sharing my emotion with her makes me feel relieved. We can see each others' emotion and I feel like someone is always there to listen to me.	✓	✓			✓
6	13	When I share my emotion to others, it means I trust them. I trust them to know what's inside, what is my feeling right now, What's inside my mind and um, I need something bigger and more significant than just support and sometimes when I was feeling down and lonely I shared I tried to share my emotion with the app and I really expected that my friend will contact me rather than only give me support because I think that uh, if he just give me that support, especially the default one, Uh, I feel that he didn't really care. So yeah, sometimes I hope that I... I need a bigger support..	✓		✓		✓
7	8	I understand how to use it and the thing is that it's a very simple.. I think it is a simple solution, a simple way to let your friends know that they're not alone. You feel that way too, so it's a very important emotional support.	✓		✓		
8	10	So when you use text messages we need to wait for the communication to happen, so probably they need attention and then they reach out to me, and then I will reply to them. So it's more like two ways but in empatchi for me it's like one way. I show how my feelings are and then if they want to respond, good, but I mean if they don't want to respond it is fine Uh, I think it's like very voluntarily compared to text messaging because here we just show it one way and we don't need the two way communication like text messaging.	✓		✓		
9	13	Um, yeah, I still feel that something is missing in this application. I think that it can be developed more to be a very useful application, especially when it's related to emotions, but like for now, if it is only about sharing emotion and then sending a support, it's like something missing and thinking of its name: Empatchi, we need something more to like, to give them the appropriate support. Actually, I don't know how exactly, but I think you need to let people to express more about their emotion.	✓		✓		
10	1	Sometimes I just need to be around people when I am really really vulnerable and. When I'm really down, I actually need this kind of simple way to signal someone.. because if I post something on Facebook, I can actually talk really crazy, I can post crazy picture in instagram, when I am angry, I can get angrier in the chat, I might use harsh languages... but instead I can use this and tell my inner circle that I actually need someone, and that's without telling why and it's actually really helpful for me. Yeah, I think that my experience so far is actually good .. it's a good app to signal someone.	✓				

11	1	I think in my experience, it's the most efficient way to actually express my emotion because sometimes when I get angry and I want to get attention from people I tend to write like a lot of sentences , making efforts for conversation.. I need to do a lot of stuff to get attention. This app is kind of like a good digital signal that actually shows my emotion and is actually a good way to share my emotion.	✓				
12	1	I like how quick it is to signal my girlfriend. How I did that before is by posting a certain picture, change my tone on the phone, or using capital letters in chat. But as I said before, it's actually quite dangerous to type when you are actually affected with your emotion, right?	✓				
13	1	I think there's a limit of what a verbal language can do. You know looking at Trump's tweet, you know, when he got angry he tweets like, very horrible stuff, you know. When you are angry with your girlfriend, you don't chat her. It's very dangerous because you tend to make rational justification of why you are angry, and you can get mad with her reply.	✓				
14	2	It makes me easier to express what I feel at that moment through the emoticon in Empatchi	✓				
15	2	It is very useful especially after the routine (at the night after work) when usually I am to lazy to text my partner. This apps allows me to update the status so my partner could understand what I feel during the day without texting him	✓				
16	3	I think it is quite limited. I think emotion is more complex than this, and I don't think it represents my emotion. Sometimes I don't even know whether I'm sad or angry.	✓				
17	4	The app makes me feel more aware about emotion in my daily life. I have never thought about the level of my emotion before using this app.	✓				
18	5	I think I like to show like, hey I'm sad because my my job is very hectic right now, so can you cheer me up a bit? I was kind of expecting that from my husband. and this app helps me with that need.	✓				
19	5	when I'm having a bad mood, I am trigerred to share my emotion in empatchi to seek for attention	✓				
20	6	I think I often share my grateful feeling.. and when I do that I actually signal my wife and opening space for her to ask me: what story do you have? why do you feel happy? What do you learn today? Okay, that's a kind of my expectation. On the other hand, when sharing a negative emotion, it means that I really need someone, I want a quick response from someone to actually come and approach me.	✓				
21	7	Although, maybe as you can see in my shared emotion, I wasn't using it that much because when I was at the office, I don't really have time to access my phone so I think that's my number one problem	✓				
22	8	I think the first one is that it's really important to know what your circle is feeling right now.. and why I say that it is very important because... honestly I read many articles and Uh, I'm surprised how humans can be depressed, and I think this is one of the way... or one of the simple solution, to just letting your friends know like what you're actually feeling...	✓				
23	8	I think it's very important to let your friend knows when... you know, sometimes we don't want to tell anything about it.. We just want to show the feeling like: I'm sad, what's going on with my life.. I just want to tell them that I am sad and I would like to go out and and have fun.. I just want them to know that.	✓				
24	9	It makes me easier to share emotion because I don't have to think about how to express it in words. Sometimes it's hard to write or think about how to express it in details when we want to share it.	✓				
25	10	when I'm stuck in the traffic and then I really have a bad mood and then I can like snap a picture and then post it, so it has more details, where in empatchi is like the summary of your feeling.	✓				
26	11	I don't really want to post something negative, or constant negative things in social media. Like for example, I use instagram stories everyday, but I don't want it to be like negative stories like complaining about traffic all the time because I feel like I'm becoming a negative person for the followers.. So I think it's more comfortable to share that to empatchi instead of to other social media. Because you only share it to your inner circle, and you are comfortable to share it and to show it when you have a really bad day and then you are feeling very very unpleasant and you can't use your social media.	✓				

27	11	But again after all, I think it's very useful to just letting your friends know what's going on in your life, so after that we can just see and talk to each other.	✓				
28	11	I think I tend to share my emotion when I'm feeling really in a bad mood. So if I'm feeling happy or I don't have anything negative, I don't really use it. I will post my emotion because like, I only need others to know if I need support when I'm in a bad mood	✓				
29	11	It helps me to share my emotion because it's very easy to use, and like you can use it even at times when you don't really want to talk to each other, you just want to show them. I think this is really useful because it's very convenient.	✓				
30	12	Uh, well um, overall I think it is a useful app. I mean, you know, I can express my emotion and then share it with my friends and you know, I can get feedback from them. And I think it's interesting because somehow sometimes I can't, you know, express my emotion through like social media or email for example, but um through this app, I can express, you know, um my everyday or probably... it could be many times in a day or so. I think it could be an app to help people to get better with their mental health, I think.	✓				
31	12	before I knew this app, I thought that um, You know, for example, whatsapp, could not facilitate (expressing) my emotion because... um, I don't know I couldn't find myself satisfied just by using whatsapp and the emoji.. but by using this app, I think I can be more expressive to express my my emotion. But you know, I know that this is just the beginning for this app and I know it's gonna be improved further but I think yeah, it's a good start.	✓				
32	15	first of all I really like the simplicity of the app. I have used several apps to record my emotions to look back, but none of them are good in design. I believe that's because they puts too many functions.	✓				
33	15	I first thought it is better to have a short status message pop up from my emotion circle to tell my friends what actually happened around me. But I also think it is better to separate my emotions and stresses from environments and me and simply focus on the feelings.	✓				
34	16	The app is simple and easy to use, it's becoming like a habit for me to share my emotion	✓				
35	17	I think compared to other apps, it is easy enough to record my emotion	✓				
36	17	I think that this is a very good method that enables us to express our emotion specifically; how pleasant are we feeling right now and how intense is “this” current feeling. This feature has not been offered, to my knowledge, in any other social network, so I think it is really unique	✓				
37	17	While messengers like WhatsApp work through sending words and emotion that could be perceive as a something that urgently need immediate response, Empatchi works in a calmer manner and send our emotional information as a more subtle, non-invasive message to our circle that could be followed up through phone or coffee... By using this app I can inform and release my emotional feeling promptly to my close circle.	✓				
38	17	It takes time for me and my friend to digest this. I think the scale of emotion is very important to decide what kind of action that the emotion sharer will get. For example, sharing a big smiley green emotion prompt different response than smaller green, or maybe sharing a medium grey can trigger similar reaction with medium red.	✓				
39	18	The app experience was great. In particular, it was really convenient for me to be able to express my current emotional state to my circles via the app in a specific manner that I was able to “post” my current emotion (either positive or negative) and the intensity of the selected emotion that I experienced. I would say that this app is revolutionary by appealing to the need of people to be able to easily share their specific emotion with others.	✓				
40	19	With this app, I can share about my feelings easily rather than being asked by someone	✓				
41	19	The app helps the most in how I can communicate my emotion. I communicate about my feelings and how to cope with it easily with my brother	✓				
42	7	Compared to other app, empatchi is directly linked to a certain emotion. We talked a lot in the group chat, and we meet quite often, maybe in the weekend or after work, sometimes we have dinner		✓	✓		

		together. The good thing is, I feel like uh, I don't know, this past few weeks when I have a lot of work. I can't really keep up with our group chat, I can't even like keep up one by one. And, I feel like I can't reply to the chat because of my work. I don't know if someone need my support two or three hours ago . But this one is more direct, and personal, to the certain types of emotion.					
43	10	I think it doesn't affect the direct communication, but it makes it easier for us to send support because the effort is very small, you only need a few clicks to send support and you already have the messages like "hang in there" so it's like by two, three clicks, you can send support and show your attention and show that you care about your friend. It will then lead to following up in text messages or WhatsApp, and not necessarily through meeting		✓	✓		
44	11	but it makes me confused when I don't know why they are feeling happy, I don't know the reasons behind her or his happiness, and then that sometimes when I want to give my feedback. I'm kinda confused about what feedback can I give to her or him that's related to his or her situation		✓	✓		
45	12	Personally it helps me to understand others and others' emotion because I know empathy is an important thing and we need to communicate it better with people. Because I can, you know, show my empathy easily because I know what was the emotion that she is feeling, and so it helps me to support her better. Because to be honest, sometimes it's hard for me to, you know, to understand what other feelings just by looking at them, but um, you know, by using this app at least I have the understanding about what they're feeling right now.		✓	✓		
46	4	I think that, when we can observe how emotional states of a person progress over time, our emotional sharing quality can be significantly improved, because each of us can know that our supports to one another matter in influencing the improvements of moods or emotions.		✓		✓	
47	6	However, for me it is useful to see someone else's history because I know how well I am becoming one of her inner circle. Like how well I'm actually helping her, it's actually kind of looking at, you know, are you giving enough support? I can evaluate myself. It's actually quite helpful and very useful information for me.		✓		✓	
48	8	Okay, looking at my friends' history actually at the first time I was like, because I don't know what's going on with them, I have switch to another app to ask.. It's kinda, not difficult, but it would be more practical if we can have it in one place. We do have the section to write support and you provided some examples, but yeah, I just.. I don't know what's good to support her.. It would be good if I can text back and forth inside the app		✓		✓	
49	9	When I see their emotion history, I can understand about what kind of week they have had, and when we actually meet, I can start asking, what happened yesterday? It creates conversations that wouldn't have happened if I didn't understand how they have been feeling in the past week.		✓		✓	
50	2	I know when he did not respond to my emotion, it's not because he doesn't care. I know he just have not seen it or he hasn't had time to respond.		✓			✓
51	17	I think I'd get more active on sharing my emotion when seeing others actively shared theirs.		✓			✓
52	18	The app really helped me raise my awareness when my close peers or family is currently experiencing hard times, so that I can immediately give them support or nudges to have conversations together in the near future.		✓			✓
53	1	I think one of the things that helped me the most is actually making sure that my hunch is correct about my girlfriend. Okay, so sometimes when you have a long distance relationship, sometimes you need to guess whether she's sad or happy.. Both of us are quite busy, we have to work so we don't actually have a lot of time to chat and having an intimate communication. This is very helpful because I can react quicker than I used to be.		✓			
54	1	In long distance relationship, emotional connection is something that is hard to do, you know? I wonder how do you actually facilitate those emotional connection? We are far far away. That's what I think is the benefit of empatchi: I don't need to guess anymore. Before, how do I know that she's actually sad? because they were no direct, you know, straightforward signals from her before you must guess from how she behave. It is, in my opinion, a very good way to actually start the conversation that can fill the gap in our emotional connection.		✓			

55	3	I like the notification after my friend shared her emotion. For me, it's like an emergency sad button that she pressed and then it notifies me that she needs help.		✓			
56	4	I really love the function, I can understand what's going on with my friend and.. to just hear it from her, it makes me feel like I'm not alone and it's a relief for me because, she's still there and she's doing great.		✓			
57	5	I like how I can see how he is currently feeling in a quick way by only looking at the home screen.		✓			
58	5	For me I think it is probably the colour and the size of the circle, it is not really contrast for me, so it is kind of hard for me to distinguish those colors. I think you can make it thicker to make it easier to distinguish.		✓			
59	6	When I see changes in my wife's empatchi, I will go straight and text her and try to give her support, instead of sending the support inside the app. So, you know, I will be happy if there's a direct link to facilitate talking in another app.		✓			
60	6	Before, I need to guess how she feels from the music that she listened or how she types in the chat. This app is more like a straightforward signal. I need to make sure that I am there when she needs me. If she's really really sad, I need to be there. I must be there.		✓			
61	7	If it's in the group chat someone can some common thing like: "Oh I hate this traffic!" while she actually meant that she's really having a bad day and wanted someone to approach her, I couldn't tell. But beacuse we already know that this is the place to share our emotion, I can be more aware that there might be something good or bad happened to her today.		✓			
62	8	I think it gives me more understanding of my friends.. People usually hang out and just do the fun.. Where after using this app, I know that they are struggling, feeling this and that way during the day, have some troubles at work, I think it gives me feeling that I do care for them.. It's also, I thought that I was the only one struggling at work until I realised that they are too		✓			
63	9	I get to know more about them, so when I meet them in person, I can try to start talking about why they shared that emotion. It's kind of provoking them to share more about their story.		✓			
64	10	it helps me a lot to know what happens with my inner circle like if they are in a good mood or they need like to talk with me		✓			
65	11	I think I'm really, I'm really happy actually when I know that someone is very happy		✓			
66	12	Yeah. I mean, I think from her emotion updates I know that my friend, you know, I know better about her, I mean like her habit or something that she doesn't like or something that can make her feeling down in the end.. Yeah, it changed the way I communicate with her.. Before I know this app I was just like a guessing what is she feeling and then this app made me communicate with her better I think.		✓			
67	13	It's absolutely changed how we communicate, because uh, because emotion is something personal.. After I get his emotion update, I follow up to ask about the cause of his feeling and we, um, finally talk about something personal that may be bothering his mind. And of course the frequency is also increased. Yeah. Uh, I think our communication is currently becoming more intense more personal and also more frequent. Okay, especially when we talk about emotion. Before, it was only about like, something really really common, Like what do you think about this research, like a simple discussion about our life, or our common interest, or just commenting on his posts on Instagram. But after using this is this application I can say that our communication is becoming more intense.		✓			
68	16	It is easier for me to understand how my friend feels by looking at the size of the bubbles		✓			
69	18	The app specifically raised my awareness of how my sister feels in real time. Also, the platform has simple, yet effective design and methods of usage, which was another plus point for me.		✓			
70	3	I don't really see the history of support messages between us, because as I said before, I managed to maintain my daily journal writing and that habit is what really makes me motivated and proud of myself.			✓		
71	7	After using it, maybe it doesn't really change how I communicate with them but I think what I like about this app is like I can actually respond to that certain types of emotion. For example when my friends are tired or just like having too much work like I do, I can relate to their emotion even when we're not together, so			✓		

		it's easier to give an appropriate support or start a conversation about what happened yesterday or something like that.					
72	8	It would be great to have more conversations inside the app			✓		
73	12	Yeah, umm, the time when I was like, feeling down and then uh, you know, I open it up and then I expressed my emotion and then my friend sent the feedback and then, but um to be honest sometimes I can't, you know, get the full feedback because there is no chatting feature. And then I think somehow that makes me like, um, okay, I need to move to whatsapp or another app like messenger to continue the conversation with my friend. Usually what I did was I chatted my friend and then asked about what um, the feedback means and something and yeah, the conversation continued until it (my problem) got solved.			✓		
74	13	I think it's inconvenient that I could not reply to the support that my friend gave me.			✓		
75	15	I think that we got closer than before when I see how we send supportive messages to each other inside the app.			✓		
76	17	When I see the support messages, I think it is far less personalised, and it's not something that my friend would say to me. I think she doesn't really care about me. I know that I can create my own message, but it's the very first thing that I see.			✓		
77	17	Yeah, I like the "let's talk now" part in the support message, because it's like more personal. after you type the support message, I can let them know that we can talk now because I'm free.			✓		
78	18	Couple of times, people in my circle would react to my “posts” and they would send me encouraging messages that, actually, lifted me up at that moment. There was a time when I post about being stressed by the overwhelming burden from work with very high activation. At that time, everyone in my circles responded by encouraging me to stay positive and the fact that they expressed their willingness to hear from me via calls or private chats really soothed me.			✓		
79	18	I actually had a great conversation with my sister after we exchanged supports inside the app when each of us were feeling blue and posted our emotions. It helped us, to some extent, get closer, as we converse much more frequently now than before using the app.			✓		
80	19	Looking at the support messages made me realised how much we care for each other and it really helps me to be aware of my own emotion			✓		
81	14	It's really interesting for me to actually see how my emotion changed over time. It's also my first time to actually see how my friend's emotion changed over time. It's really nice and it feels like we found a new way of communicating with each other with emotion.				✓	✓
82	3	I like the fact that I'm being reminded to fill the daily questionnaire. I keep offline journal for myself and I think it is a really good habit.				✓	
83	5	Looking at my emotion history, I get to understand more about myself, and it somehow gives me motivation and hopes that I don't get to experience another negative emotion again today.				✓	
84	5	I know that I'm a moody person. So, uh, I.. I'm really aware that um sometimes um, you know, my mood is changing dramatically and somehow, um, you know, I don't really like this kind of person but, this is me .. This app is like a highlight of my mood, a moody person. But I don't think that there's a correlation with how I share emotion with others.. I just.. When I want to share my emotion, I want to look at myself deeply and then okay, I got it. And then I share it with my husband.				✓	
85	7	I actually think it's a good way to know .. like for me last two weeks was like, not so good week... I had a rough week.. and then for the following week, it's like better... So I think it's good and it would be nice If I can have like some kind of chart or something, I don't know, so I can see my ups and downs in graph and I actually can see the progress of my moods.				✓	
86	8	Yeah, I understand better.. A lot actually after it was mentioned in our group chat and we were discussing them and kind of making an agreement for understanding it. After that I think I was just, going with the flow.. I think I managed to express my emotion with it.				✓	
87	8	Yeah it actually does, Once I remember once I was in the office and I was very like demotivated, and few days after I was like looking back to it and I think it was like so so emotional and I felt like I don't want to feel that way again, I don't want to have that				✓	

		kind of demotivated state again. But yeah I realised that it didn't really capture my whole ups and downs because sometimes I just forgot to share especially when I'm hectic, I think it's also because this app is new for me..					
88	10	So, uh so we have the record of our emotion, like how our emotion changed for the whole week. I think before using this app, I didn't realize that I'm constantly in a bad mood. But after using the app, I kind of noticed like how my emotion is going day by day by looking at the data, but I don't know if I can take any insight from it. I don't know how to use this data for myself.				✓	
89	10	Yeah, I kind of understand it over time so I know the difference between like, level 1 and level four, and then I can um, give value to my emotion and divide it into levels.				✓	
90	12	I um, you know, I realize that my emotion was changing dramatically like somehow. Sometimes in morning, I'm feeling happy but in the evening I was sad.. It happens, um, almost all the time and it happens as well to my friend.. sometimes she shared the happy face in the morning, but in the evening, she shared the sad face, but yeah, i think it represents the dynamic of the emotion.				✓	
91	13	When I was looking back at my emotion history, because it was full of something unpleasant, I tried to talk to myself like well, uh, it seems like I tend to share my emotion to my inner circle if I feel something unpleasant, and it's really rare for me to share my feelings when I get very happy or joyful. Maybe I would say that it is not directly helping me to share, but I got to understand that I need a support particularly when I feel sad or I have something bad during the day, I tend to share my emotions to get support.				✓	
92	14	Sharing emotion actually helps me to cope with my daily life. This app helps me to see and reflect on what happened in the past few days.				✓	
93	19	I think looking at my emotion history especially helped me in terms of maintaining and controlling my mental health				✓	
94	9	I usually share my emotion really personally with one person at a time. The idea of sharing it simultaneously with four people, even though all of them are really close to me, is new to me.					✓
95	10	I think it is the fact that we can only use this with a very limited people. But I imagine if I have like 11 people, I don't know how it will look like in the screen because right now it looks fool with only four people. Maybe we can divide to different groups of, let's say your really close friends and your colleagues. So I think uh, even like with your colleagues you have like the closest friend among them, so you can share something that is more related to work. For example if I have a really bad day because I am very overwhelmed with work today, I think we can relate to each other and discuss it.					✓
96	10	Because you only share it to your inner circle, and you are comfortable to share it and to show it when you have a really bad day and then you are feeling very very unpleasant and you can't use your social media.					✓
97	13	So far, I think that if I only use this application, I can't really cope or handle my emotion, but sometimes I think that maybe because, Um, the application is only used by me and one of my friend. I don't know if uh, I have more people in my circle, then the condition is going to be really different. Okay, let's say that um, there are more people in the group. When I didn't receive support from one person, I still have three people that are able to support me.					✓

Appendix 20 : Study 3 Result – Challenges in Using Self-Assessment Manikin

No	Parti-cipant	Content
1	1	I think it's it's actually good enough for me to actually express the complexity of the emotional state with this two parameter. For me, with the smaller activation I just want to keep it for myself very very deeply, so you need to approach me and ask me and make me tell the story.
2	1	It's not difficult. But it takes time. Actually in the first two days, we were discussing about our interpretation of the icons and colours and we kind of decide how we want to proceed with that.. What's the meaning of that? How do I react with that? There's still no agreement of that. We're actually creating rules for it. I also talked with her about my expectation.
3	2	To be honest, at the first time I tried, i was confused. But it gets better as I used it and as I discussed with my partner
4	3	I think it is quite limited. I think emotion is more complex than this, and I don't think it represents my emotion. Sometimes I don't even know whether I'm sad or angry.
5	4	the first time I used it to share my emotion, I felt like, there is something missing because I can only share my emotion and receive support from my friend without being able to have further conversation inside the app. It's confusing sometimes for me because, uh, when my friend shared emotion and I send her support, without knowing the reason behind how can we say that we empathise with her properly?
6	5	Um, yeah, I still feel that something is missing in this application. I think that it can be developed more to be a very useful application, especially when it's related to emotions, but like for now, if it is only about sharing emotion and then sending a suppor, it's like something missing and thinking of its name: Empatchi, we need something more to like, to give them the appropriate support. Actually, I don't know how exactly, but I think you need to let people to express more about their emotion.
7	6	It's misleading sometimes. One of the icon for the very active looks like someone is having a stomachache and it feels hurt. I think the colour and the size of the circle is more straightforward to me.
8	7	It's actually easy to share emotion in the app. It's nice to be able to share it in just a few clicks, but I think maybe if you have the levels in even number, maybe four? I think it will force me to pick whether it's more positive or negative.
9	7	What I perceive from the activation part is like how tired you are, because the first icon is like calm the last icon is like exploding, which happens to my life every day. I think it's nice to have this dimension other than just happy or sad, and it is interesting to think about how activated I am in the workplace.
10	8	Um I think for the first time I did not know what activation means, but I thought it's like... I don't know I have no idea about this activation .. But it was mentioned in our group chat and we were discussing about it, and it was fine.. That's one, but the other one is the valence right? that one is very obvious.
11	9	So I understand clearly pleasantness but I don't really understand but activation. I know right away about happy or sad but activation, I think it's uh, something about if you are excited or not and uh, but the pleasantness level is easy to recognize.
12	10	Uh, it's not really confusing but I think for the symbol of pleasantness and activation, I think it's better to make it simpler and clearer, especially for the activation because sometimes it's, especially when you first using the app, it's kind of confusing.
13	11	I start to understand more as I use the app. I kind of have this understanding that the bigger the activation is, the more they want to be approached.
14	12	before I knew this app, I thought that um, You know, for example, whatsapp, could not facilitate (expressing) my emotion because... um, I don't know I couldn't find myself satisfied just by using whatsapp and the emoji.. but by using this app, I think I can be more expressive to express my my emotion. But you know, I know that this is just the beginning for this app and I know it's gonna be improved further but I think yeah, it's a good start.
15	12	yeah, um, I was a bit confused but with these two parameters because I thought, okay, emotion just probably like, I am feeling bad or I'm feeling happy. But in this app I have to express it this way, and then it could be somehow confusing because I have to think that, okay, I'm feeling sad but uh on the other side, I am feeling energized.. For me, it's a to be honest, it's a bit confusing. But um, well so far I got used to it.
16	13	As I use this application, I feel that it easier for me to share emotion using those two dimensions. But still I sometimes... when I really need to share my emotion I was like, uh, I need a little time to think that okay what is the pleasantness and what is the arousal?
17	14	It's very simple, and the tutorial was very helpful. I didn't feel confused and starting from day 3 I think, it's getting even easier, I don't know, it's getting like a habit.
18	15	I first thought it is better to have a short status message pop up from my emotion circle to tell my friends what actually happened around me. But I also think it is better to separate my emotions and stresses from environments and me and simply focus on the feelings
19	16	It's a good app, but not too different to using Emojis in Whatsapp for me.
20	17	I don't use either term in my regular vocabulary, particularly to describe my emotional states. So I'd rather just use an Emoji or a more familiar word such as "low" or "energetic".
21	17	It takes time for me and my friend to digest this. I think the scale of emotion is very important to decide what kind of action that the emotion sharer will get. For example, sharing a big smiley green emotion prompt different response than smaller green, or maybe sharing a medium grey can trigger similar reaction with medium red.
22	18	It was difficult for me to get the hang of SAM method on the beginning. But, I could feel that, as the time went by, I got more accustomed to this method of posting emotional states. So, it was very straightforward for me and not confusing at all.
23	19	I think I'm still quite unsure about what the activation really means

Appendix 21 : Study 3 Result – Yields

No	Parti-cipant	Content	Reassu-rance and Relief	Impro-ved Relation-ship	Spark-ing Conver-sations	Better Under-standing in emotion
1	4	I really love the function, I can understand what's going on with my friend and.. to just hear it from her, it makes me feel like I'm not alone and it's a relief for me because, she's still there and she's doing great.	✓	✓		✓
2	7	Okay, so the good part of my experience is that after I came home from the office, sometimes I just feel like , really really tired and then I can see from the app that, Oh, okay I'm not alone since my friends are also feeling the same thing. I feel that I'm not the only one, I feel connections with them. I can relate with their emotions.	✓	✓		
3	15	Sharing my emotion with her makes me feel relieved. We can see each others' emotion and I feel like someone is always there to listen to me.	✓	✓		
4	18	Couple of times, people in my circle would react to my "posts" and they would send me encouraging messages that, actually, lifted me up at that moment. There was a time when I post about being stressed by the overwhelming burden from work with very high activation. At that time, everyone in my circles responded by encouraging me to stay positive and the fact that they expressed their willingness to hear from me via calls or private chats really soothed me.	✓	✓		
5	11	I think I'm really, I'm really happy actually when I know that someone is very happy	✓			
6	19	The app helps the most in how I can communicate my emotion. I communicate about my feelings and how to cope with it easily with my brother	✓			
7	1	In long distance relationship, emotional connection is something that is hard to do, you know? I wonder how do you actually facilitate those emotional connection? We are far far away. That's what I think is the benefit of empatchi: I don't need to guess anymore. Before, how do I know that she's actually sad? because they were no direct, you know, straightforward signals from her before you must guess from how she behave. It is, in my opinion, a very good way to actually start the conversation that can fill the gap in our emotional connection.		✓	✓	✓
8	18	I actually had a great conversation with my sister after we exchanged supports inside the app when each of us were feeling blue and posted our emotions. It helped us, to some extent, get closer, as we converse much more frequently now than before using the app.		✓	✓	
9	2	It is very useful especially after the routine (at the night after work) when usually I am to lazy to text my partner. This apps allows me to update the status so my partner could understand what I feel during the day without texting him		✓		✓
10	6	However, for me it is useful to see someone else's history because I know how well I am becoming one of her inner circle. Like how well I'm actually helping her, it's actually kind of looking at, you know, are you giving enough support? I can evaluate myself. It's actually quite helpful and very useful information for me.		✓		✓
11	15	I think that we got closer than before when I see how we send supportive messages to each other inside the app.		✓		
12	19	Looking at the support messages made me realised how much we care for each other and it really helps me to be aware of my own emotion		✓		
13	9	I get to know more about them, so when I meet them in person, I can try to start talking about why they shared that emotion. It's kind of provoking them to share more about their story.			✓	✓
14	9	When I see their emotion history, I can understand about what kind of week they have had, and when we actually meet, I can start asking, what happened yesterday? It creates conversations that wouldn't have happened if I didn't understand how they have been feeling in the past week.			✓	✓
15	12	Yeah. I mean, I think from her emotion updates I know that my friend, you know, I know better about her, I mean like her habit or something that she doesn't like or something that can make her feeling down in the end.. Yeah, it changed the way I communicate with her.. Before I know this app I was just like a guessing what is she feeling and then this app made me communicate with her better I think.			✓	✓
16	13	It's absolutely changed how we communicate, because uh, because emotion is something personal.. After I get his emotion update, I follow up to ask about the cause of his feeling and we, um, finally talk about something personal that may be bothering his mind. And of course the frequency is also increased. Yeah. Uh, I think our communication is			✓	✓

		currently becoming more intense more personal and also more frequent. Okay, especially when we talk about emotion. Before, it was only about like, something really really common, Like what do you think about this research, like a simple discussion about our life, or our common interest, or just commenting on his posts on Instagram. But after using this is this application I can say that our communication is becoming more intense.				
17	14	She never shared or show her negative feelings before, so I assume that when she shared negative feelings in Empatchi, it's very new to me. She was not the type of person who calls or texts when she's down, so the fact that she shared it in the app, I responded and sent her support, asking if she's OK, that whole interaction is new for us. It gives me the opportunity to approach her and talk about things that we weren't used to talking about.			✓	✓
18	18	The app really helped me raise my awareness when my close peers or family is currently experiencing hard times, so that I can immediately give them support or nudges to have conversations together in the near future.			✓	✓
19	17	We were talking about the emotion that we have shared.. So from that and then we, you know, we have the same reason why we communicate and then we try to solve the problem, if any, and try our best to communicate each other from based on the emotion that we have shared.			✓	
20	19	It is easier to know about what my close circle feels at certain day and how their mood changes, i could easily ask them what's wrong and supports them easily in the app. I think it also happens vice versa.			✓	
21	1	I think one of the things that helped me the most is actually making sure that my hunch is correct about my girlfriend. Okay, so sometimes when you have a long distance relationship, sometimes you need to guess whether she's sad or happy.. Both of us are quite busy, we have to work so we don't actually have a lot of time to chat and having an intimate communication. This is very helpful because I can react quicker than I used to be.				✓
22	3	I like the fact that I'm being reminded to fill the daily questionnaire. I keep offline journal for myself and I think it is a really good habit.				✓
23	3	I like the notification after my friend shared her emotion. For me, it's like an emergency sad button that she pressed and then it notifies me that she needs help.				✓
24	4	I think that, when we can observe how emotional states of a person progress over time, our emotional sharing quality can be significantly improved, because each of us can know that our supports to one another matter in influencing the improvements of moods or emotions.				✓
25	4	The app makes me feel more aware about emotion in my daily life. I have never thought about the level of my emotion before using this app.				✓
26	5	Looking at my emotion history, I get to understand more about myself, and it somehow gives me motivation and hopes that I don't get to experience another negative emotion again today.				✓
27	5	I like how I can see how he is currently feeling in a quick way by only looking at the home screen.				✓
28	6	Before, I need to guess how she feels from the music that she listened or how she types in the chat. This app is more like a straightforward signal. I need to make sure that I am there when she needs me. If she's really really sad, I need to be there. I must be there.				✓
29	7	After using it, maybe it doesn't really change how I communicate with them but I think what I like about this app is like I can actually respond to that certain types of emotion. For example when my friends are tired or just like having too much work like I do, I can relate to their emotion even when we're not together, so it's easier to give an appropriate support or start a conversation about what happened yesterday or something like that.				✓
30	8	I think it gives me more understanding of my friends.. People usually hang out and just do the fun.. Where after using this app, I know that they are struggling, feeling this and that way during the day, have some troubles at work, I think it gives me feeling that I do care for them.. It's also, I thought that I was the only one struggling at work until I realised that they are too				✓
31	8	Yeah, I understand better.. A lot actually after it was mentioned in our group chat and we were discussing them and kind of making an agreement for understanding it. After that I think I was just, going with the flow.. I think I managed to express my emotion with it.				✓
32	9	It makes me easier to share emotion because I don't have to think about how to express it in words. Sometimes it's hard to write or think about how to express it in details when we want to share it.				✓
33	10	it helps me a lot to know what happens with my inner circle like if they are in a good mood or they need like to talk with me				✓
34	11	If it's in the group chat someone can some common thing like: "Oh I hate this traffic!" while she actually meant that she's really having a bad day and wanted someone to approach her, I couldn't tell. But beacuse we				✓

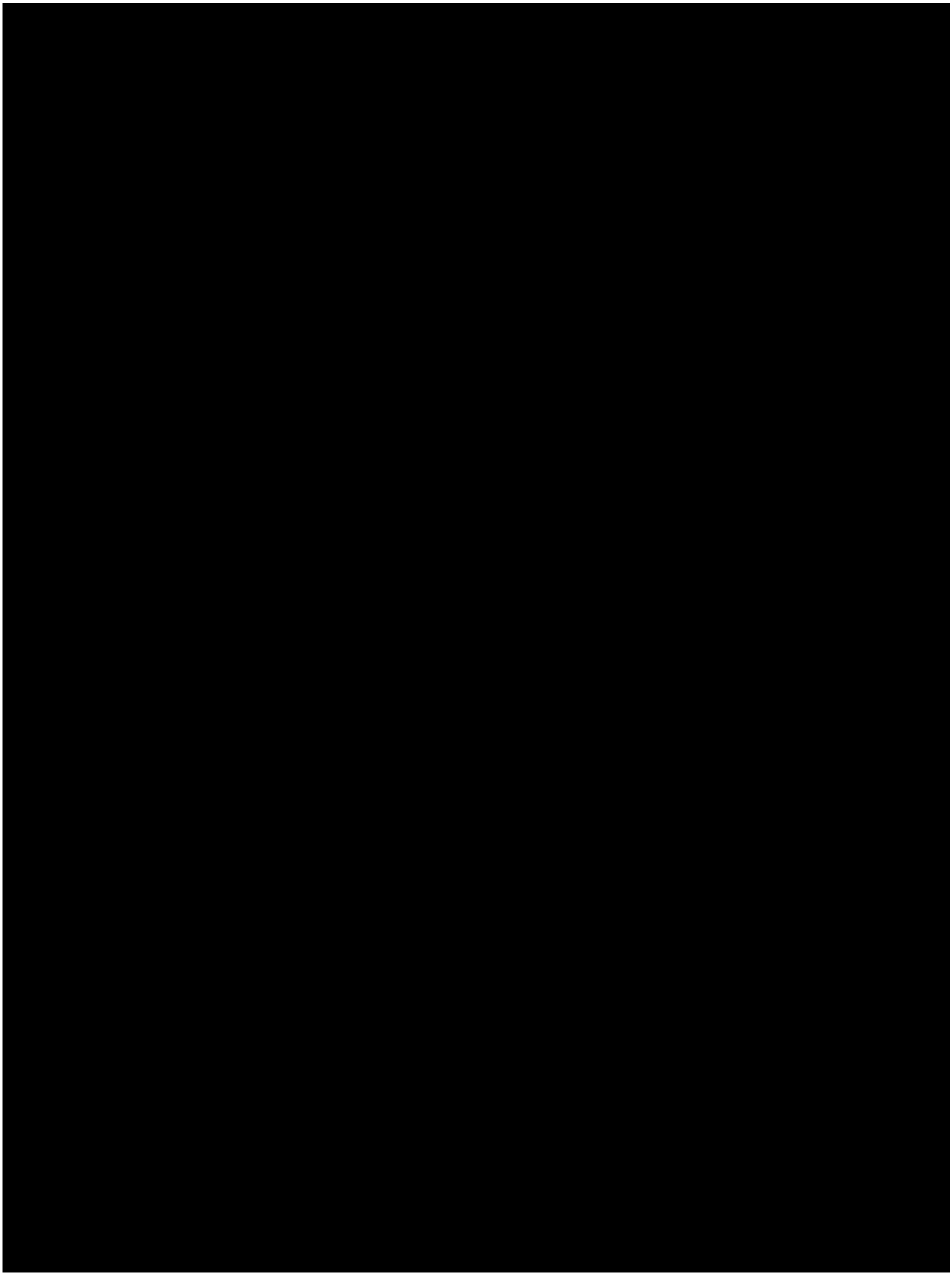
		already know that this is the place to share our emotion, I can be more aware that there might be something good or bad happened to her today.				
35	12	Personally it helps me to understand others and others' emotion because I know empathy is an important thing and we need to communicate it better with people. Because I can, you know, show my empathy easily because I know what was the emotion that she is feeling, and so it helps me to support her better. Because to be honest, sometimes it's hard for me to, you know, to understand what other feelings just by looking at them, but um, you know, by using this app at least I have the understanding about what they're feeling right now.				✓
36	14	It's really interesting for me to actually see how my emotion changed over time. It's also my first time to actually see how my friend's emotion changed over time. It's really nice and it feels like we found a new way of communicating with each other with emotion.				✓
37	14	Sharing emotion actually helps me to cope with my daily life. This app helps me to see and reflect on what happened in the past few days.				✓
38	16	The app is simple and easy to use, it's becoming like a habit for me to share my emotion				✓
39	16	It is easier for me to understand how my friend feels by looking at the size of the bubbles				✓
40	17	While it is a lot of hassle and I just felt totally confused, it gradually make me realize that emotion have a lot of spectrum and dimension to express. It takes time for me to choose and evaluate my emotion but I would like to understand more about it. I think it would be interesting to see how different a scale is perceived by a teenager and by a 40 something housewife.				✓
41	18	The app specifically raised my awareness of how my sister feels in real time. Also, the platform has simple, yet effective design and methods of usage, which was another plus point for me.				✓
42	19	I think looking at my emotion history especially helped me in terms of maintaining and controlling my mental health				✓

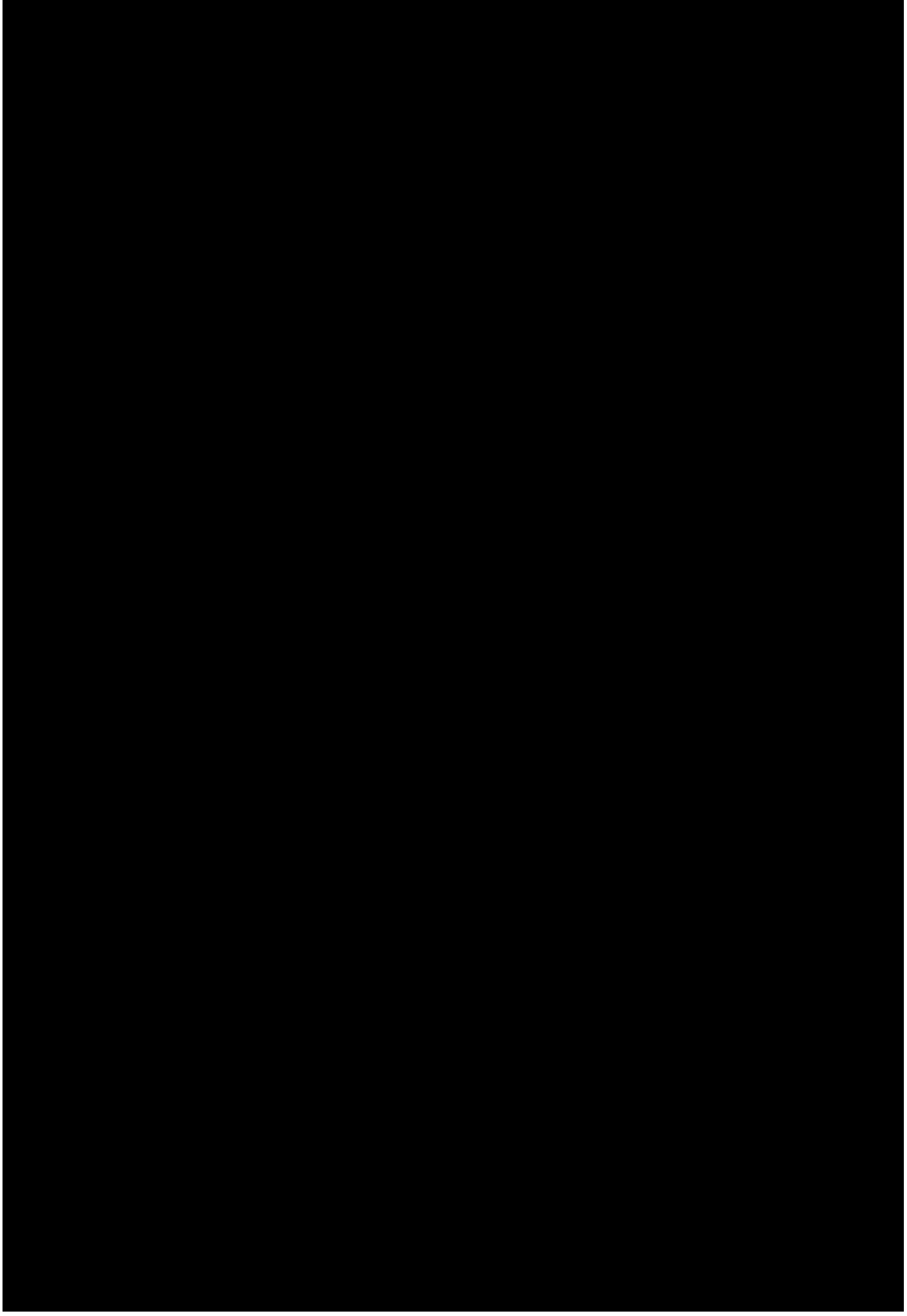
Appendix 22 : Study 3 Result – Use of Other Media for Emotion Regulation

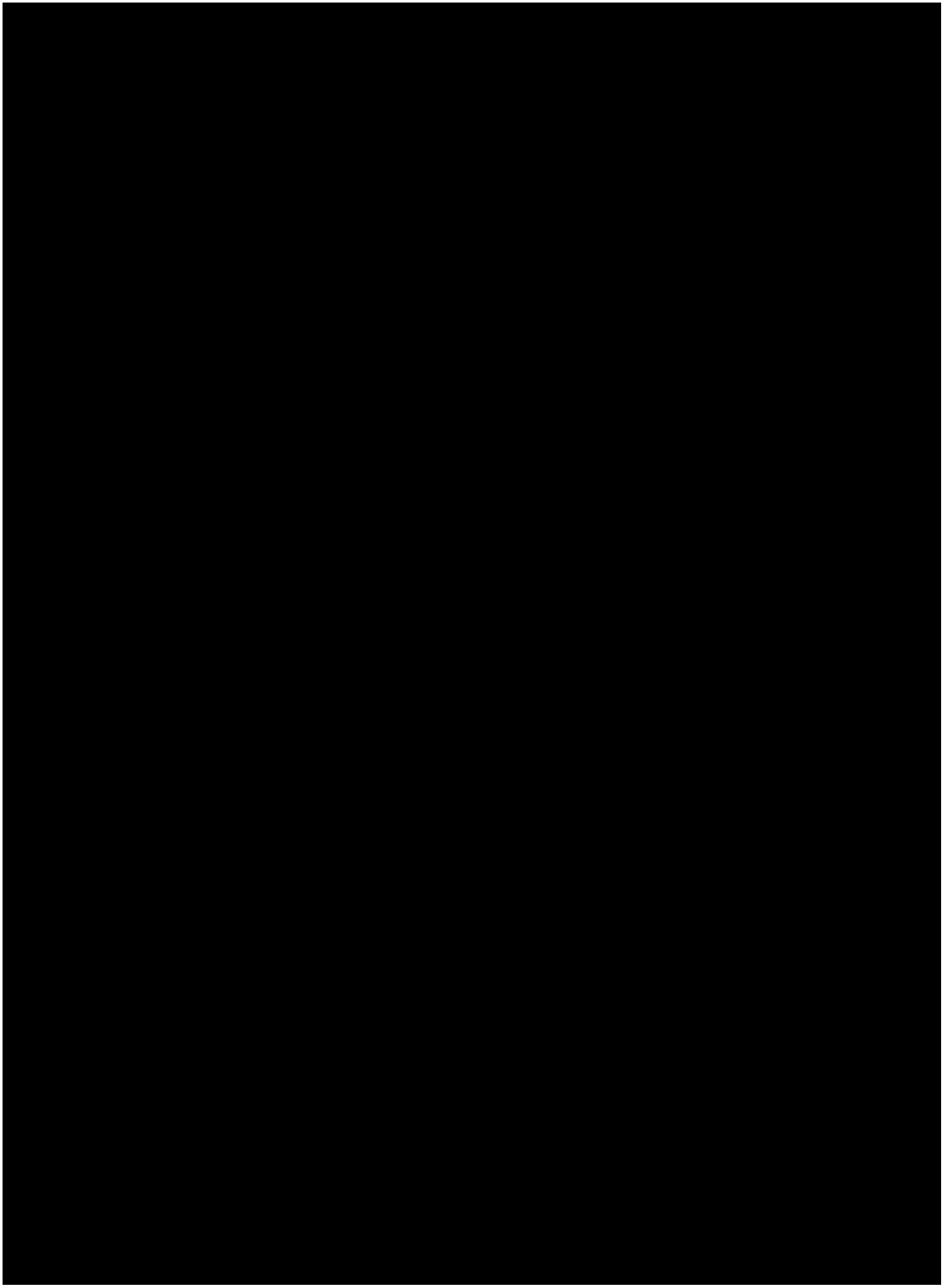
No	Parti-cipant	Content	Direct Conver-sation	Text Based	Social Media
1	10	I think it doesn't affect the direct communication, but it makes it easier for us to send support because the effort is very small, you only need a few clicks to send support and you already have the messages like "hang in there" so it's like by two, three clicks, you can send support and show your attention and show that you care about your friend. It will then lead to following up in text messages or WhatsApp, and not necessarily through meeting	✓	✓	
2	13	Before, it was only about like, something really really common, Like what do you think about this research, like a simple discussion about our life, or our common interest, or just commenting on his posts on Instagram. But after using this is this application I can say that our communication is becoming more intense.	✓		✓
3	2	i feel that the most important thing about communication in long distance relationship is seeing one each other or maybe hearing their voice so there is no misinterpretation between us.. i feel that the most important thing about communication in LDR is seeing one each other or maybe hearing their voice so there is no misinterpretation between us..	✓		
4	9	We regularly meet each other, most of the time on the weekend, so we don't really call to share something unless it's really urgent. I would probably keep it for my self and not sharing my emotion because I know that I can hang out with them on the weekend and tell everything there.	✓		
5	1	I think in my experience, it's the most efficient way to actually express my emotion because sometimes when I get angry and I want to get attention from people I tend to write like a lot of sentences , making efforts for conversation.. I need to do a lot of stuff to get attention. This app is kind of like a good digital signal that actually shows my emotion and is actually a good way to share my emotion.		✓	
6	1	I like how quick it is to signal my girlfriend. How I did that before is by posting a certain picture, change my tone on the phone, or using capital letters in chat. But as I said before, it's actually quite dangerous to type when you are actually affected with your emotion, right?		✓	
7	5	I use WhatsApp to communicate with my colleagues about work as well so anything happens in that app will be more visible to me.		✓	
8	6	When I see changes in my wife's empatchi, I will go straight and text her and try to give her support, instead of sending the support inside the app. So, you know, I will be happy if there's a direct link to facilitate talking in another app.		✓	
9	8	Okay, looking at my friends' history actually at the first time I was like, because I don't know what's going on with them, I have switch to another app to ask.. It's kinda, not difficult, but it would be more practical if we can have it in one place. We do have the section to write support and you provided some examples, but yeah, I just.. I don't know what's good to support them.. It would be good if I can text back and forth inside the app		✓	
10	9	It makes me easier to share emotion because I don't have to think about how to express it in words. Sometimes it's hard to write or think about how to express it in details when we want to share it.		✓	
11	10	So when you use text messages we need to wait for the communication to happen, so probably they need attention and then they reach out to me, and then I will reply to them. So it's more like two ways but in empatchi for me it's like one way. I show how my feelings are and then if they want to respond, good, but I mean if they don't want to respond it is fine Uh, I think it's like very voluntarily compared to text messaging because here we just show it one way and we don't need the two way communication like text messaging.		✓	
12	12	before I knew this app, I thought that um, You know, for example, whatsapp, could not facilitate (expressing) my emotion because... um, I don't know I couldn't find myself satisfied just by using whatsapp and the emoji.. but by using this app, I think I can be more expressive to express my my emotion. But you know, I know that this is just the beginning for this app and I know it's gonna be improved further but I think yeah, it's a good start.		✓	
13	16	It's a good app, but not too different to using Emojis in Whatsapp for me.		✓	
14	17	I usually use text message when we need to have further discussion		✓	
15	17	While messengers like WhatsApp work through sending words and emotion that could be perceive as a something that urgently need immediate response, Empatchi works in a calmer manner and send our emotional information as a more subtle, non-invasive message to our circle that could be followed up through phone or coffee... By using this app I can inform and release my emotional feeling promptly to my close circle.		✓	
16	18	I feel so curious. Okay. What is the reason? What is the cause of her feeling right now? So, the first thing I did when I saw the notification that she just updated his emotion, I send her a support and then I follow up using whatsapp.		✓	
17	1	Sometimes I just need to be around people when I am really really vulnerable and. When I'm really down, I actually need this kind of simple way to signal someone.. because if I post something on Facebook, I can actually talk really crazy, I can post crazy picture in instagram, when I am angry, I can get angrier in the chat, I might use harsh languages... but instead I can use this and tell my inner circle that I actually need someone, and that's without telling why and			✓

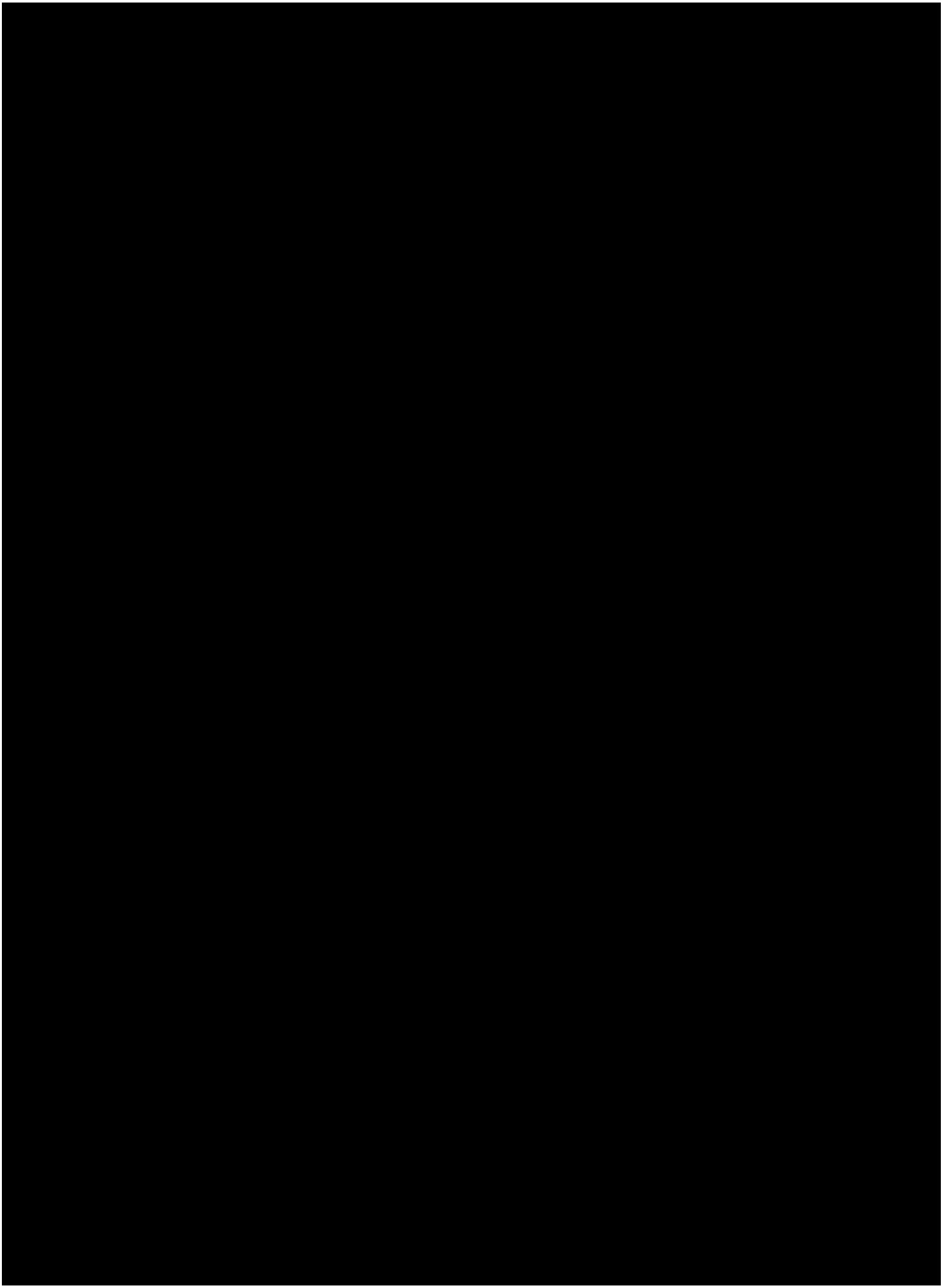
		it's actually really helpful for me. Yeah, I think that my experience so far is actually good .. it's a good app to signal someone.			
18	1	I think there's a limit of what a verbal language can do. You know looking at Trump's tweet, you know, when he got angry he tweets like, very horrible stuff, you know. When you are angry with your girlfriend, you don't chat her. It's very dangerous because you tend to make rational justification of why you are angry, and you can get mad with her reply.			✓
19	3	When people are happy, they tend to expose it to social media like Instagram because I think most of us use it to show the positive side of our life. But when we are sad, we tend to reach out to someone personally.			✓
20	3	The desire to express myself is bigger when I'm happy, I tend to share it publicly. But when I'm sad, the desire still exist but I only want to show it to few people.			✓
21	10	when I'm stuck in the traffic and then I really have a bad mood and then I can like snap a picture and then post it, so it has more details, where in empatchi is like the summary of your feeling.			✓
22	11	I use instagram stories everyday, but I don't want it to be like negative stories like complaining about traffic all the time because I feel like I'm becoming a negative person for the followers.. So I think it's more comfortable to share that to empatchi instead of to other social media.			✓
23	15	I first thought it is better to have a short status message pop up from my emotion circle to tell my friends what actually happened around me. But I also think it is better to separate my emotions and stresses from environments and me and simply focus on the feelings			✓

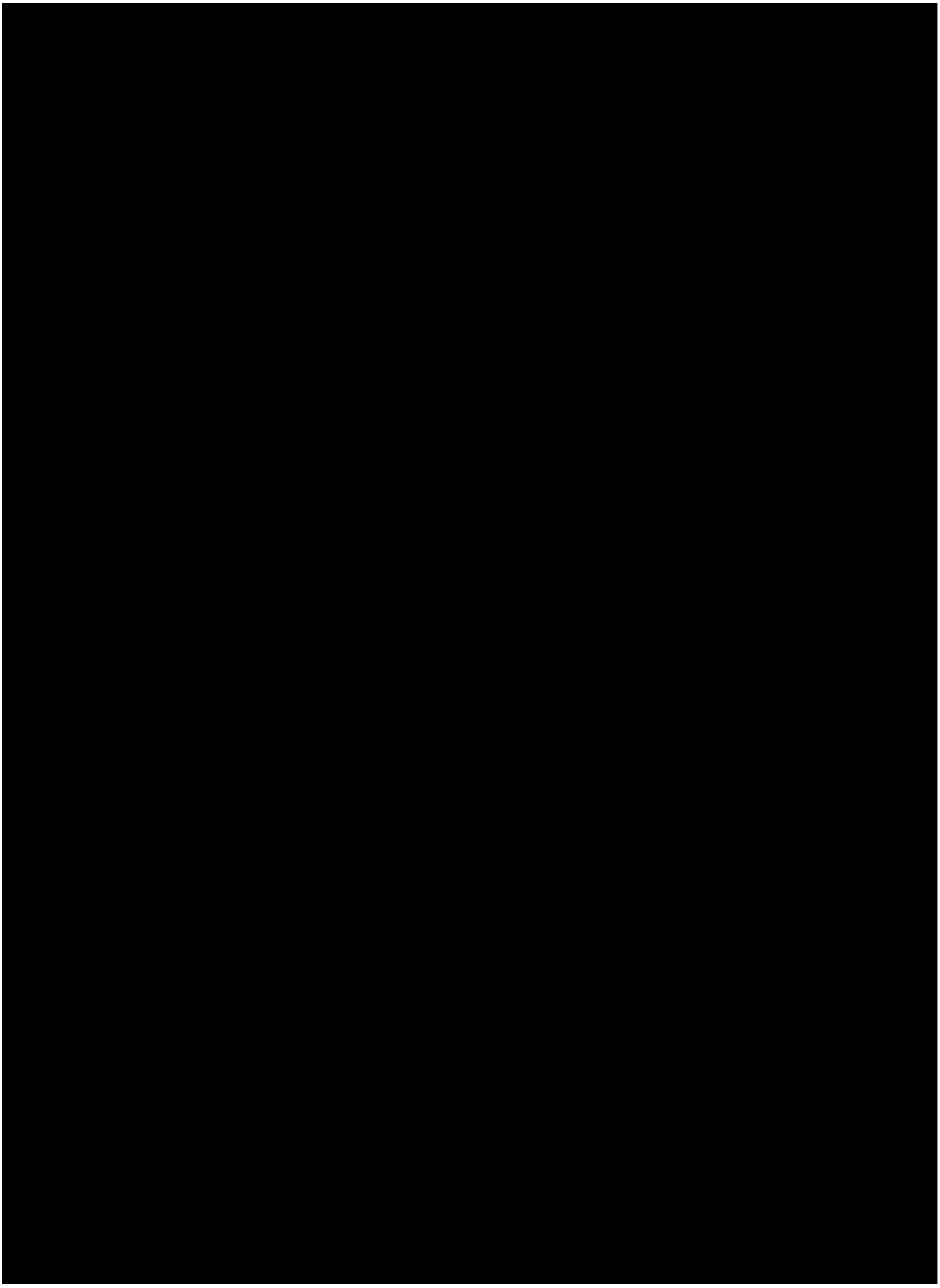
Appendix 23 : Published Paper

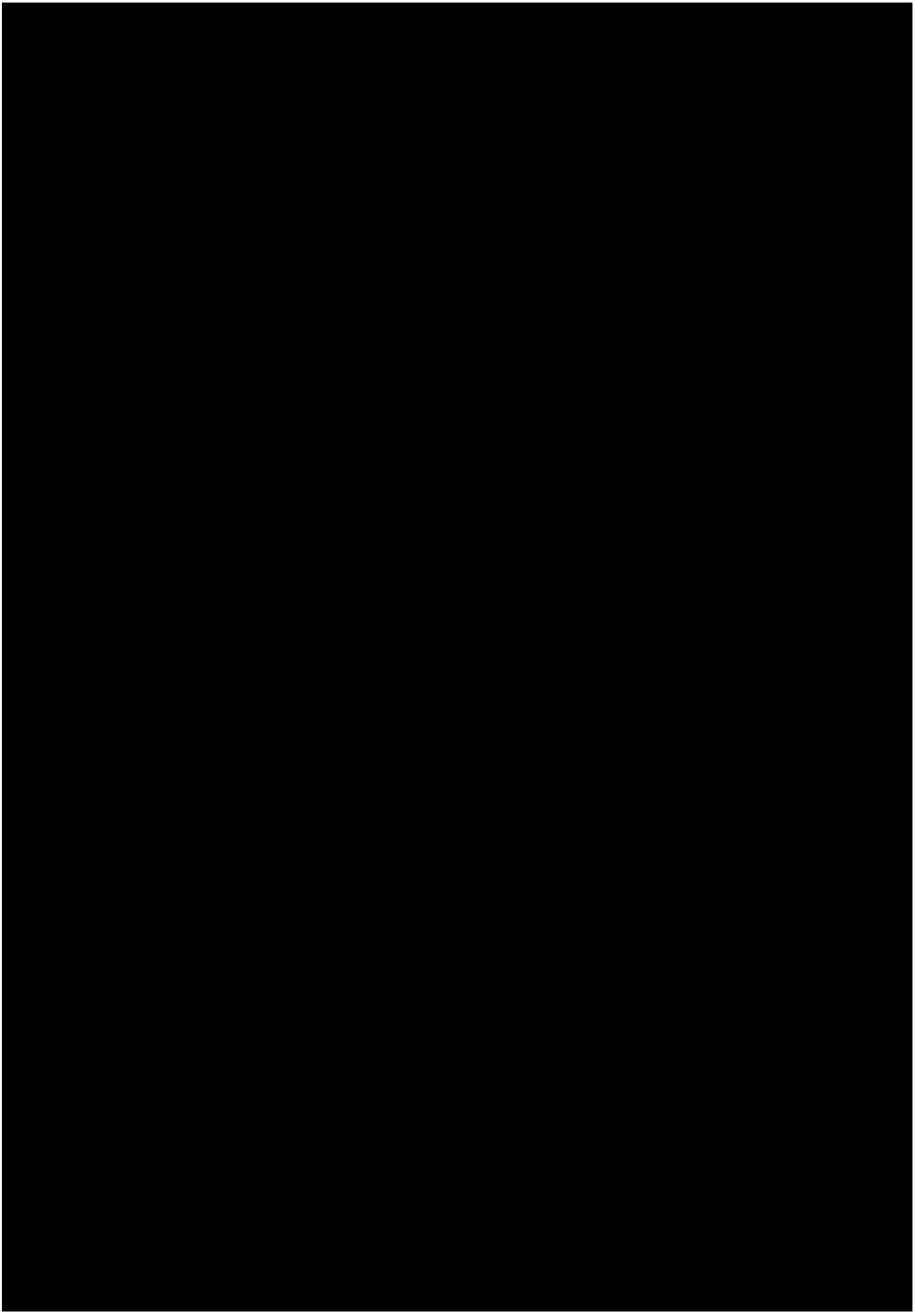


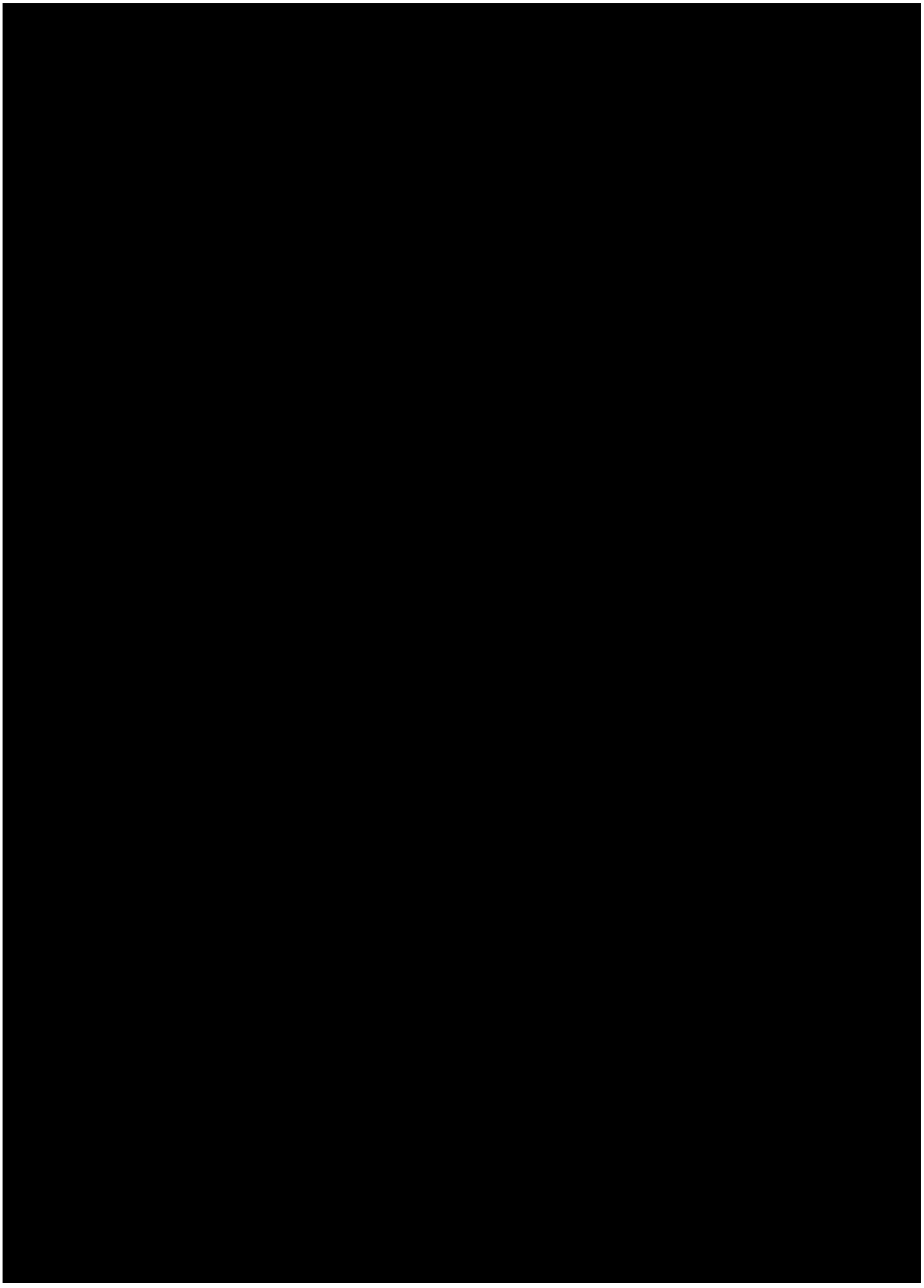


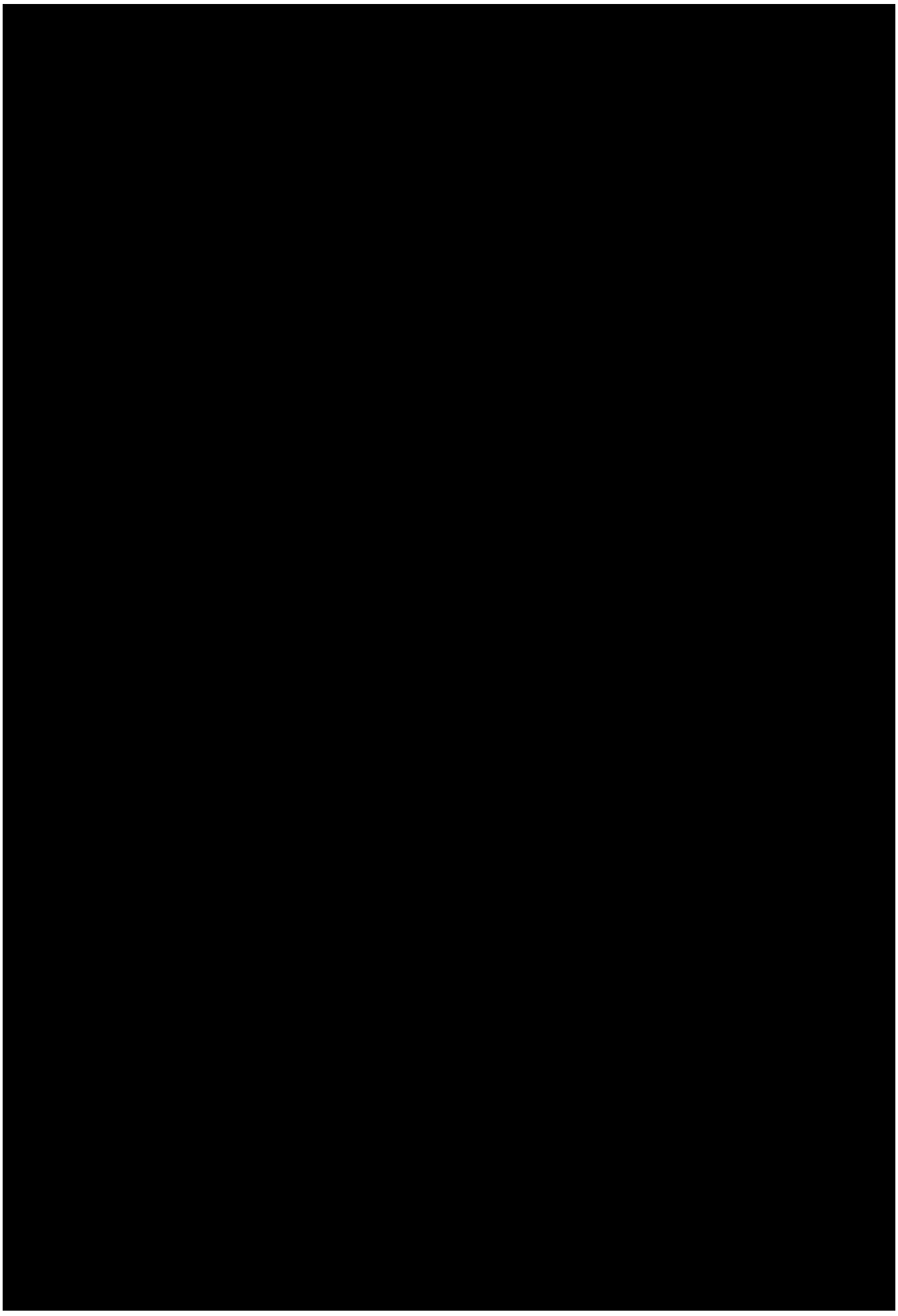


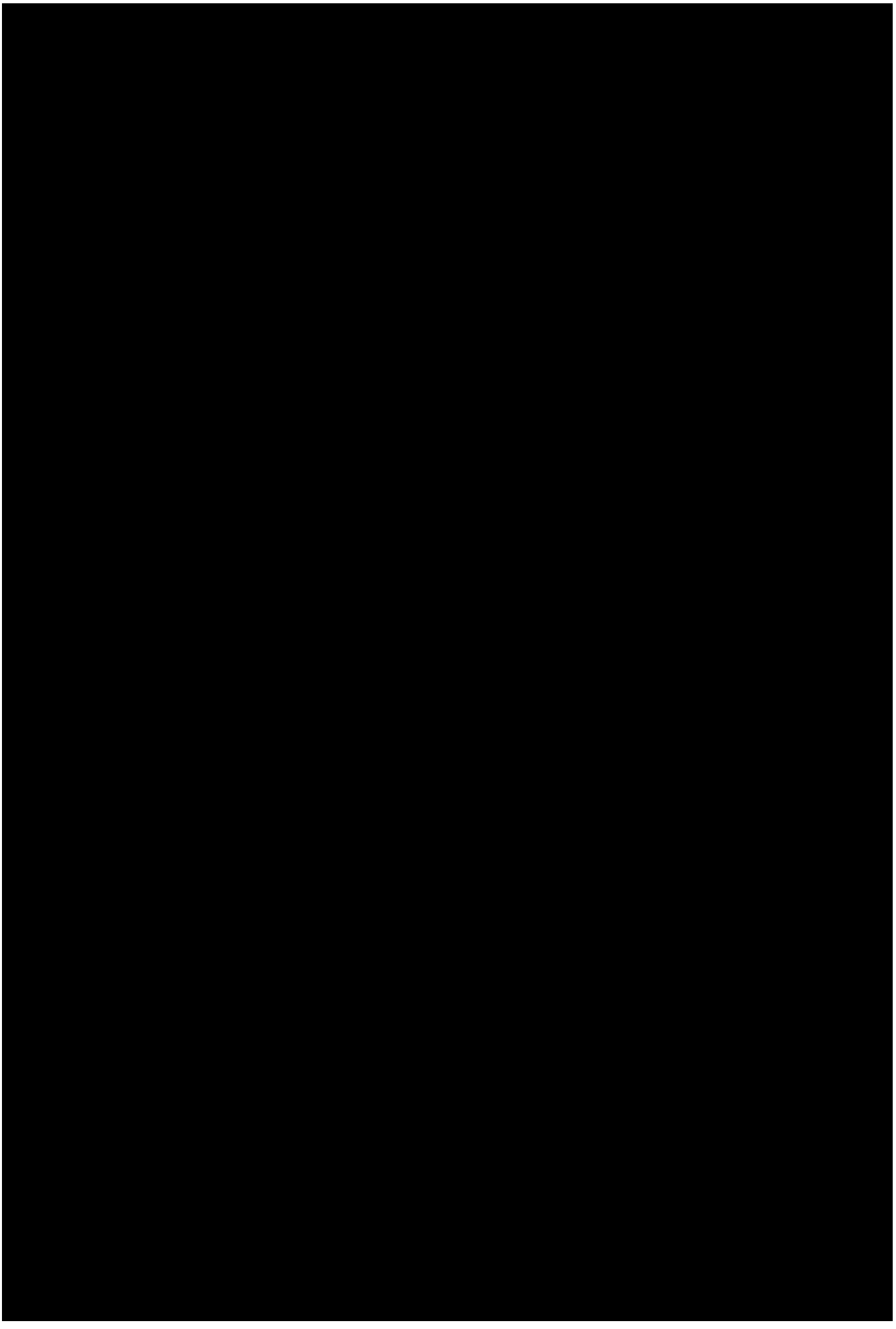


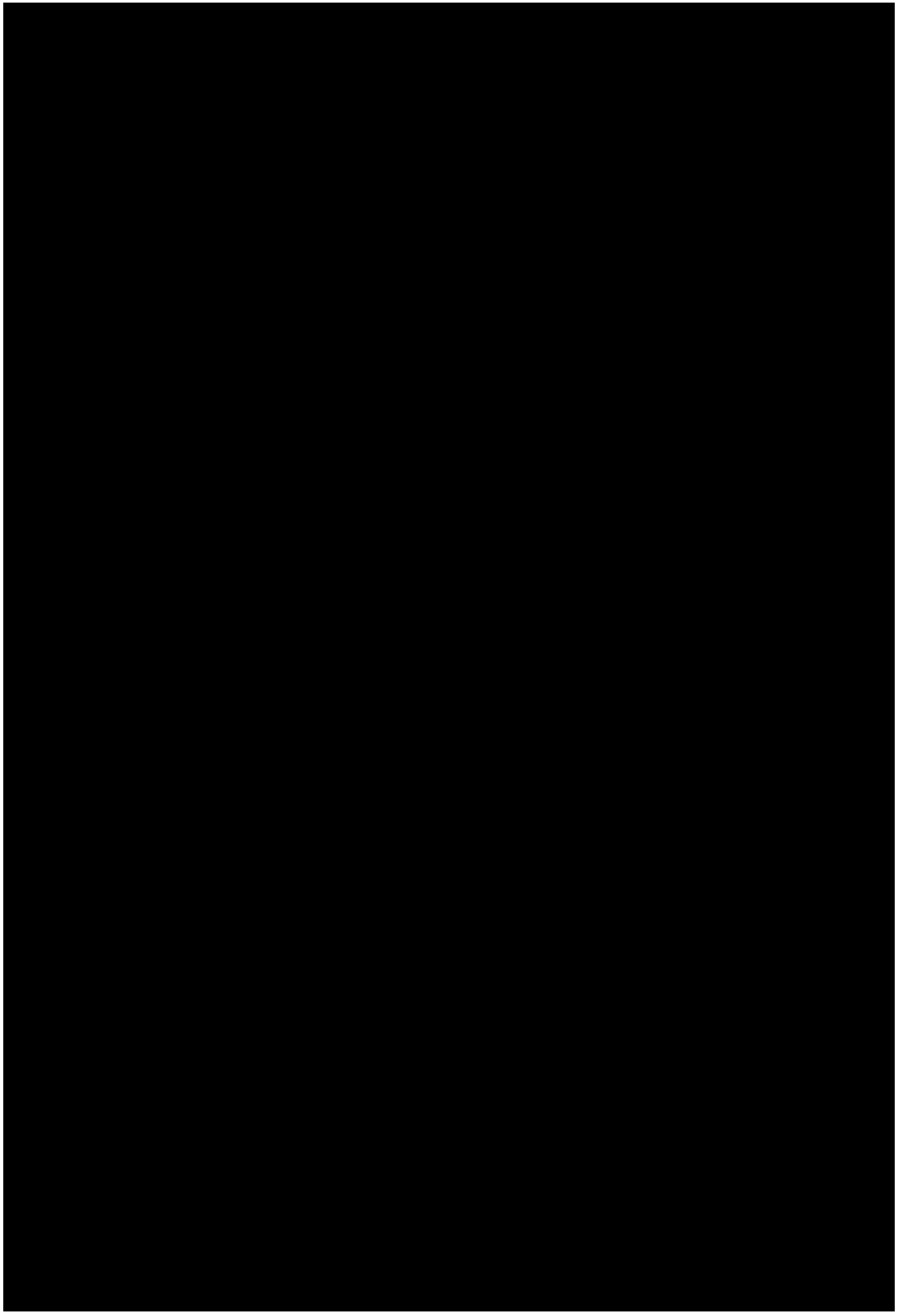


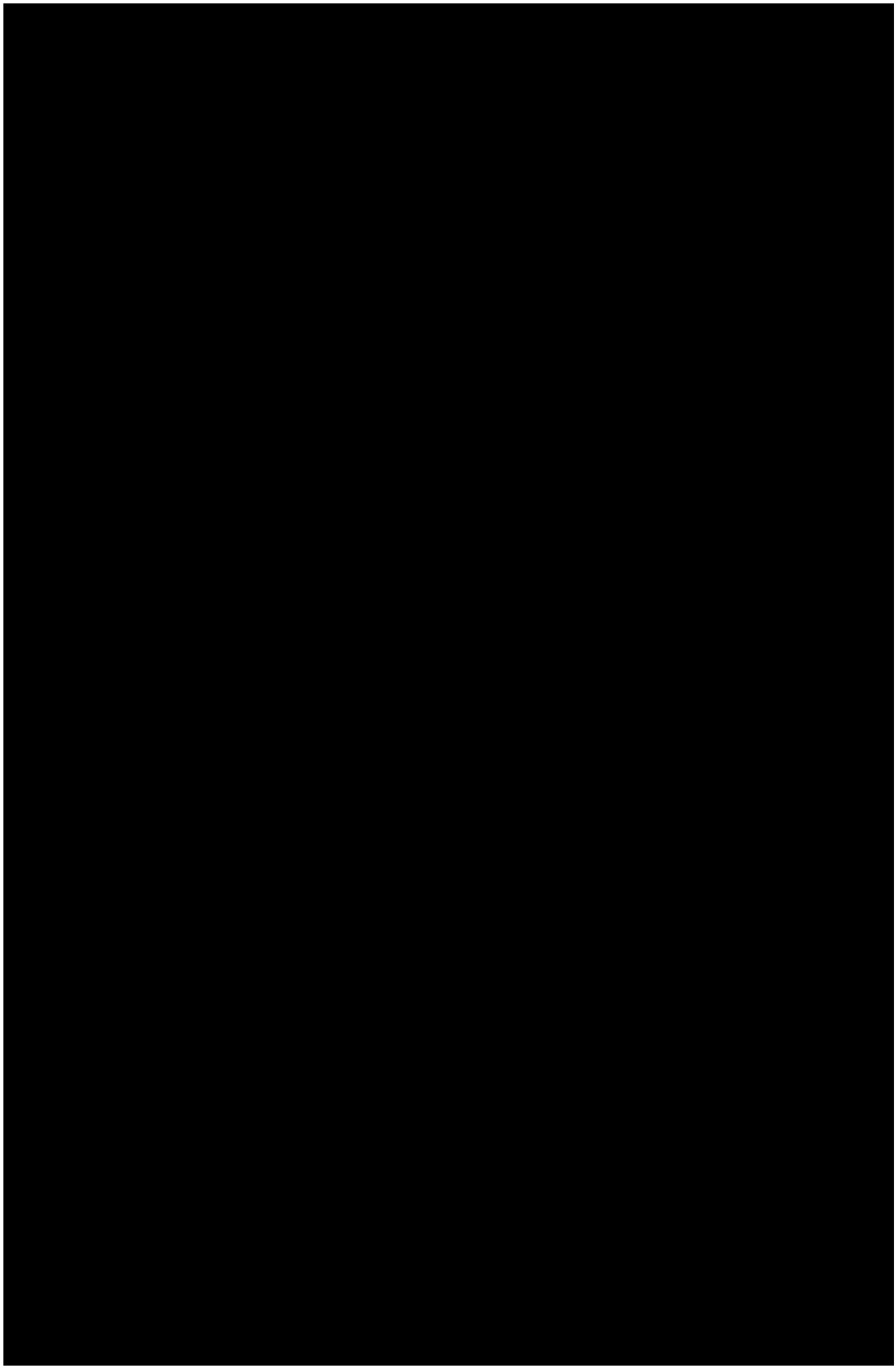


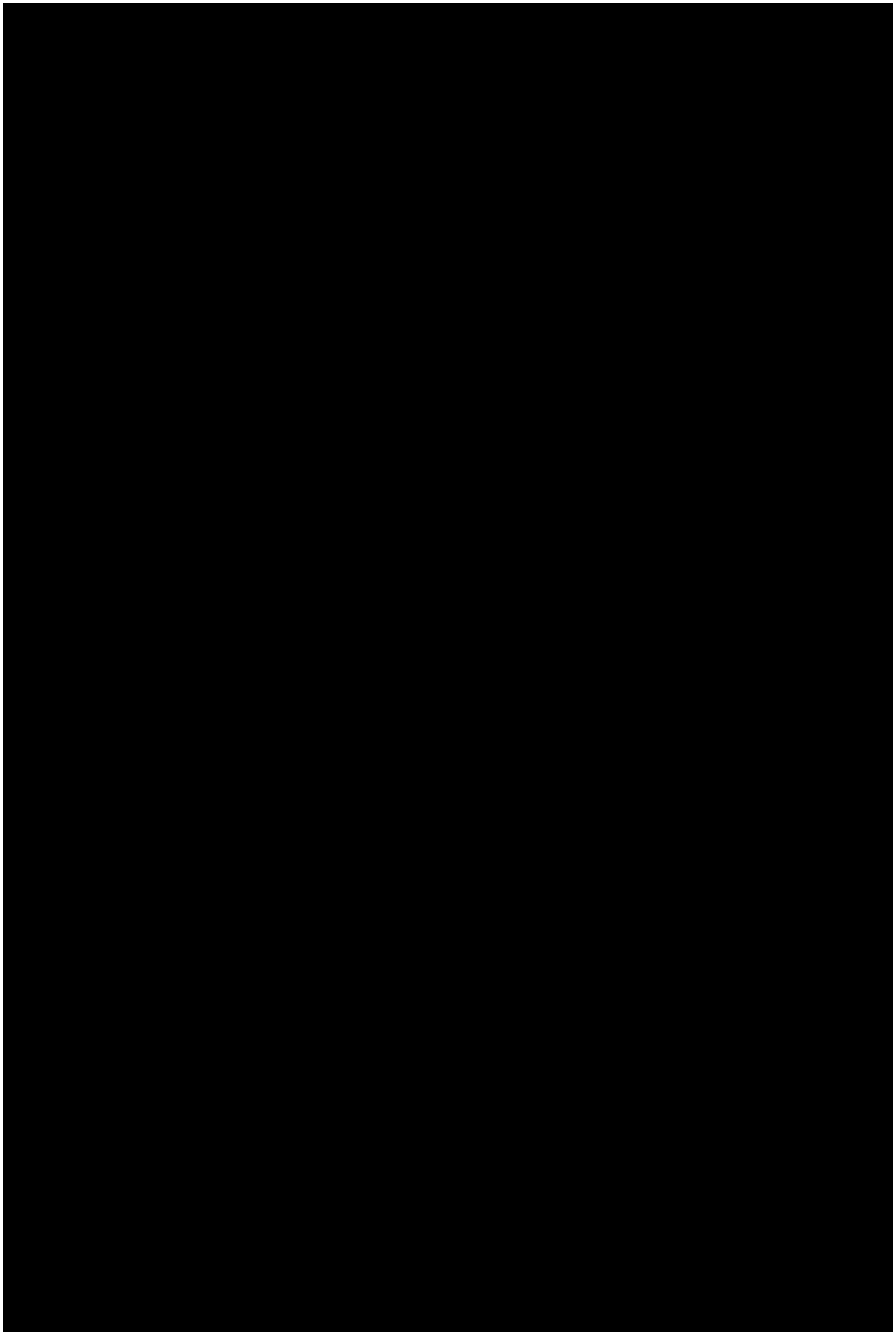


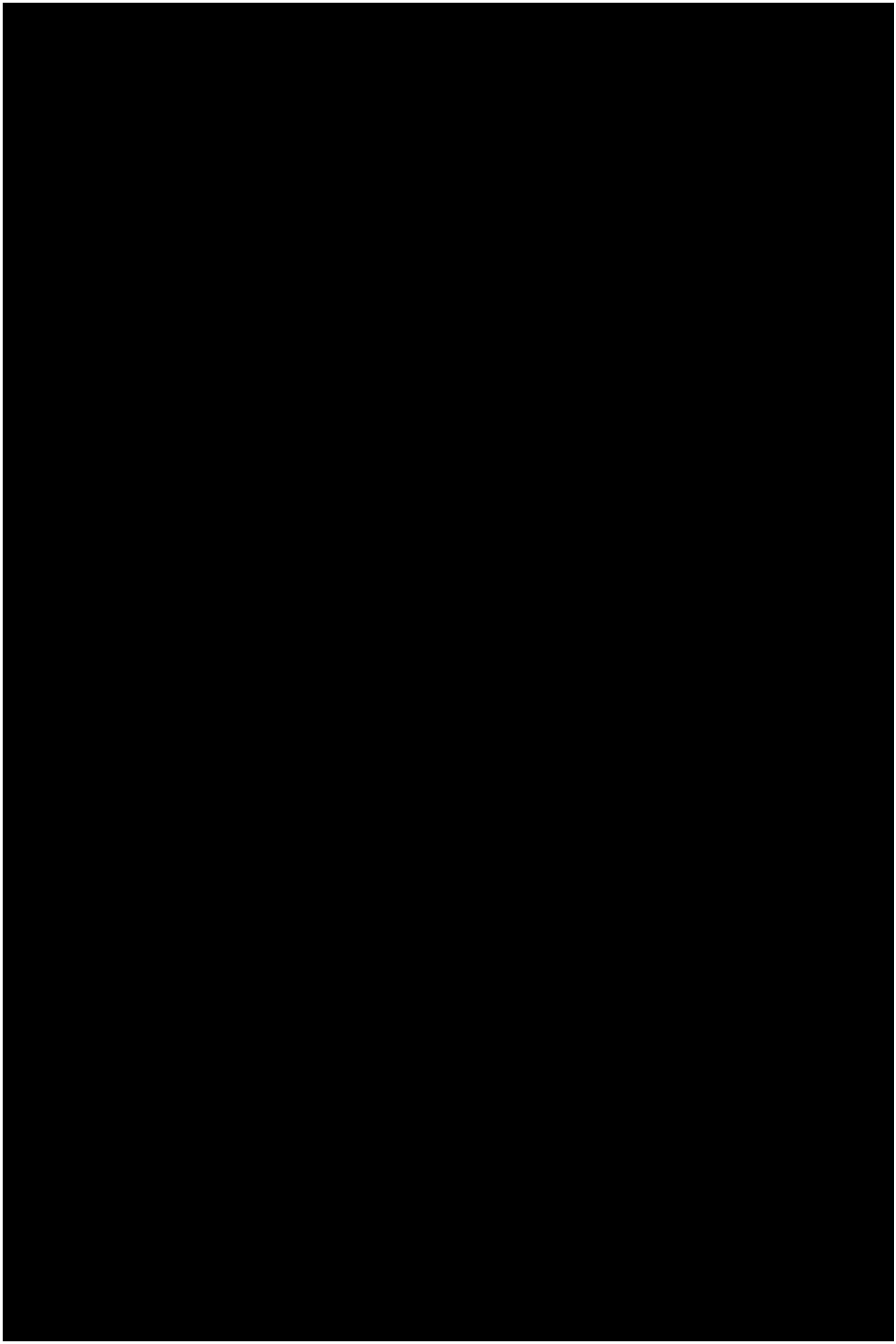


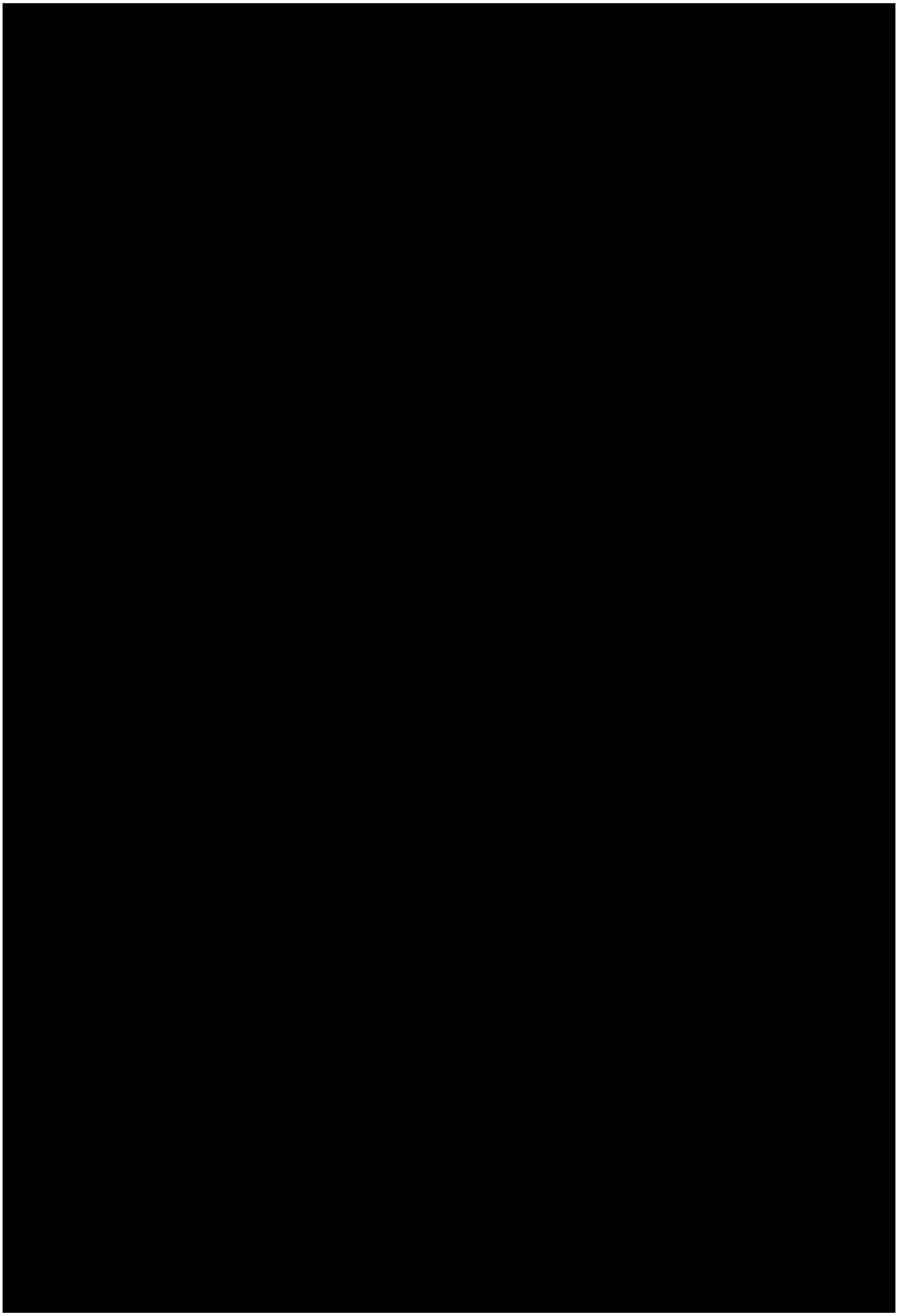


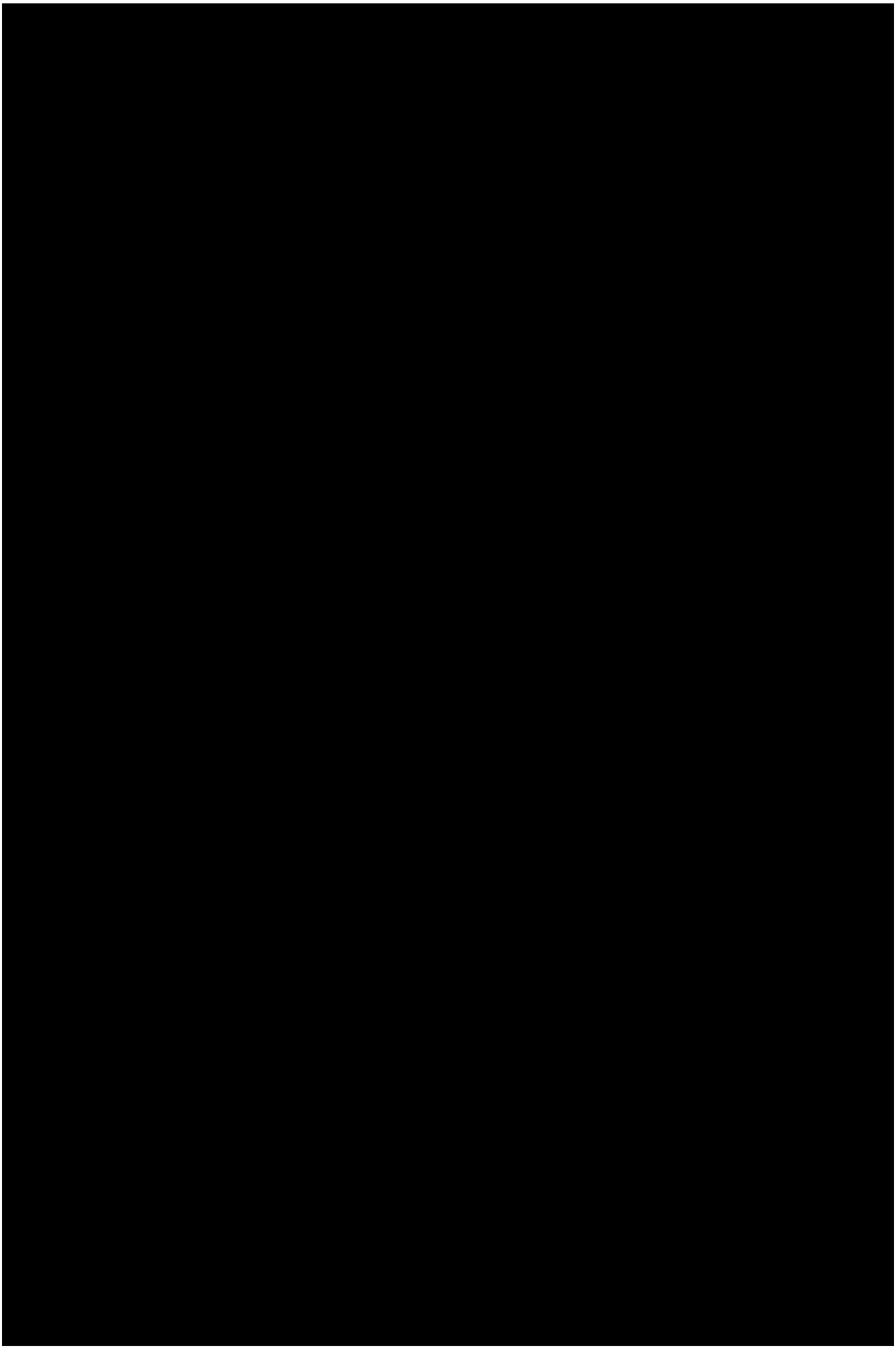


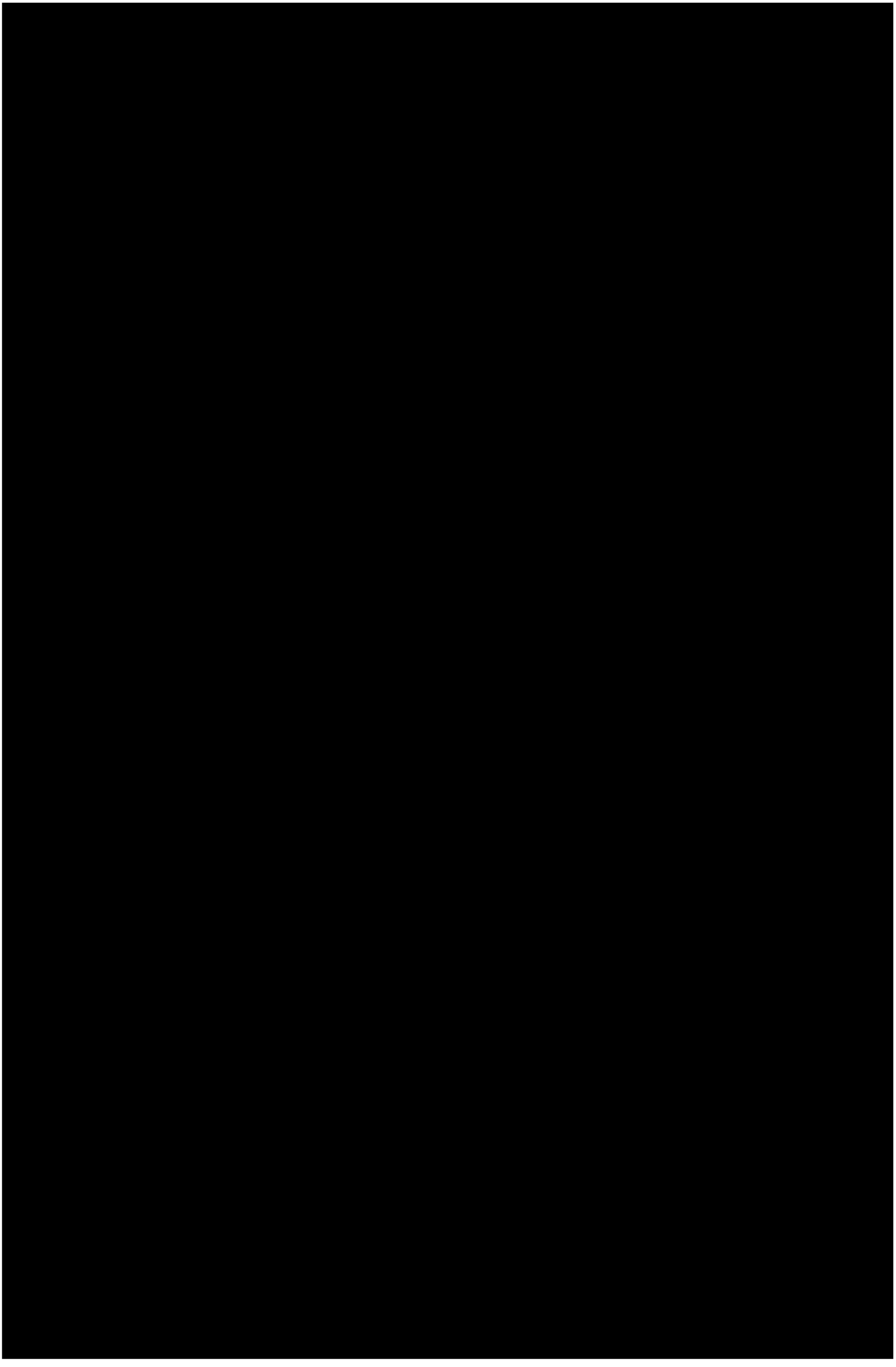


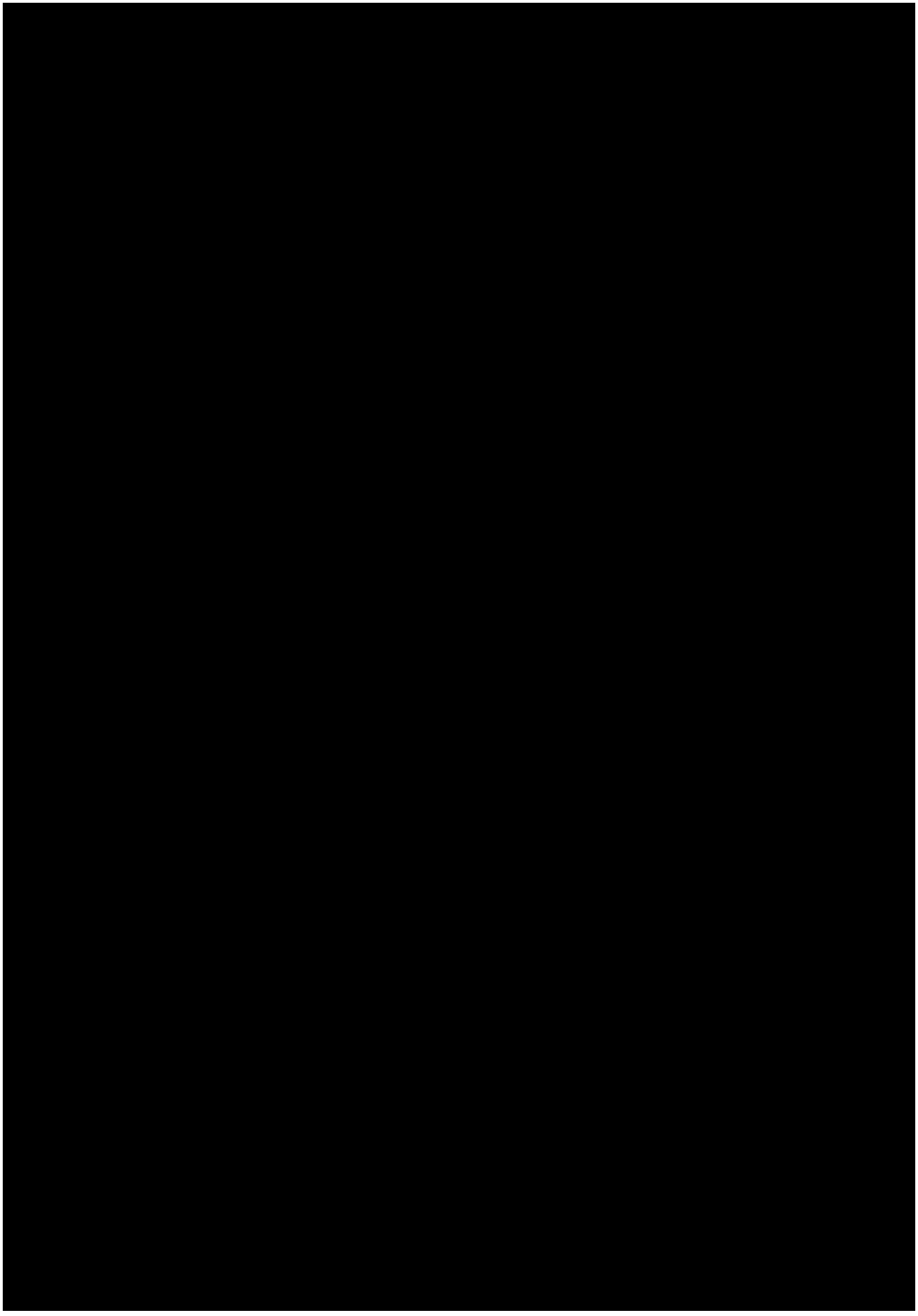


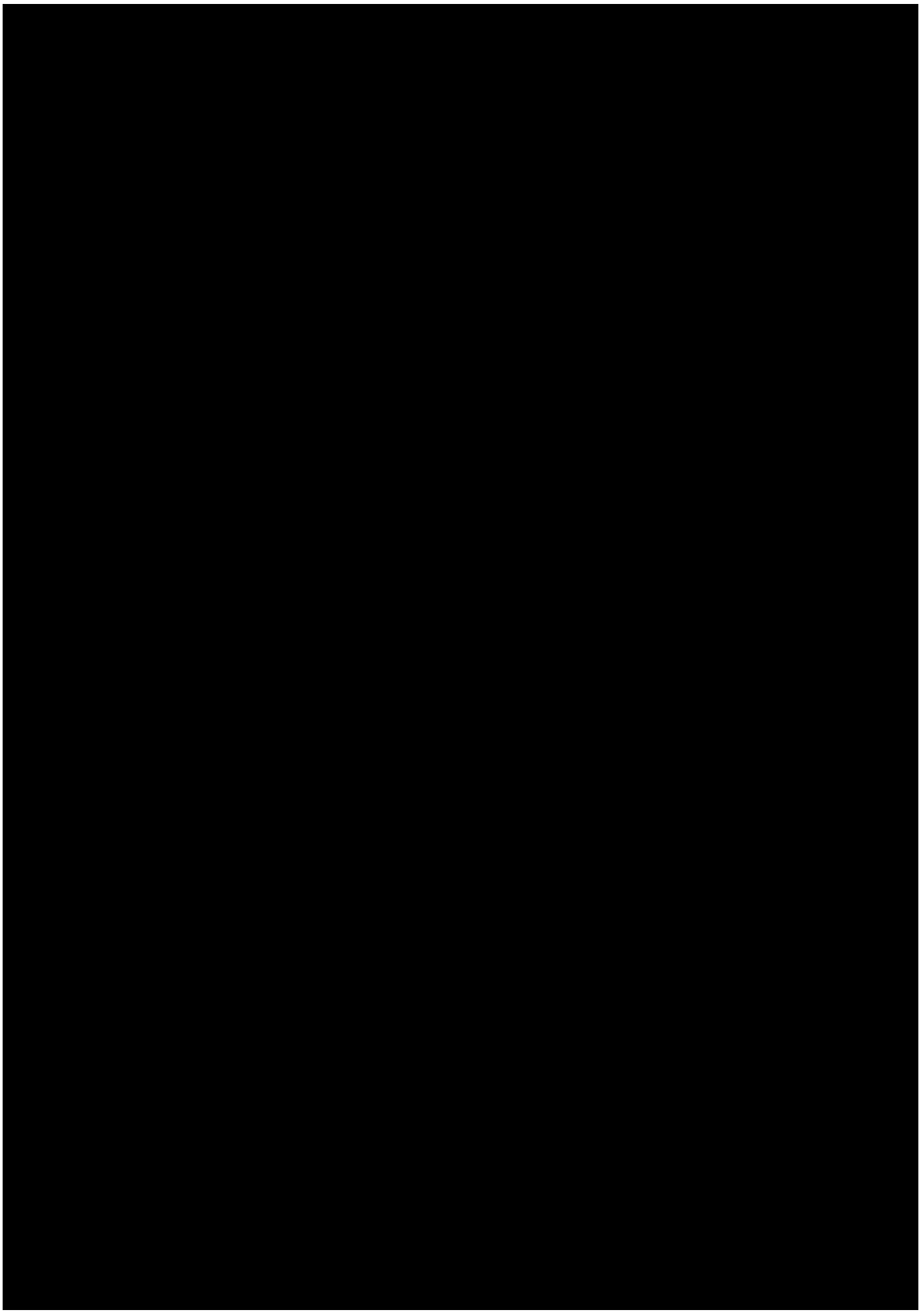


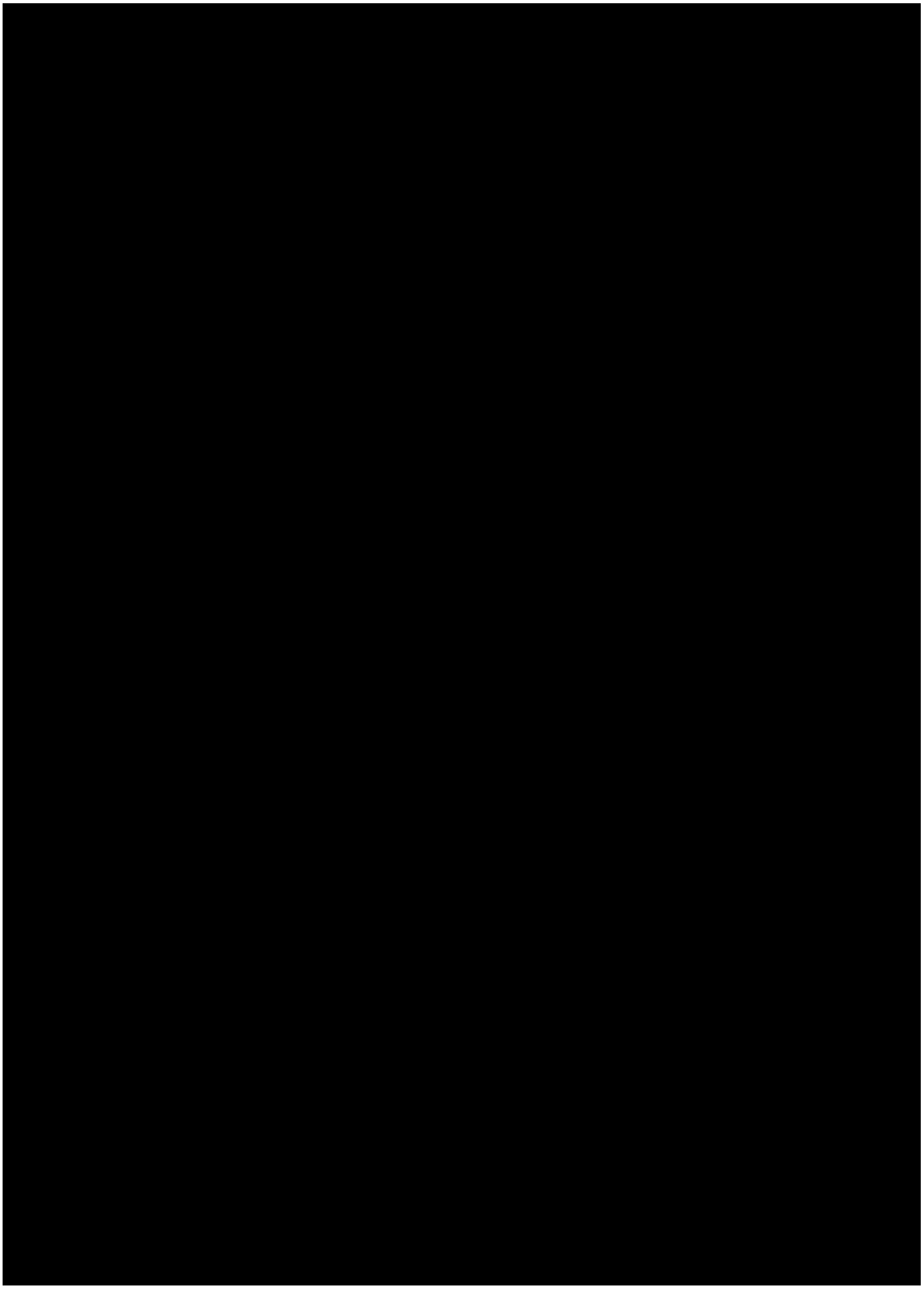


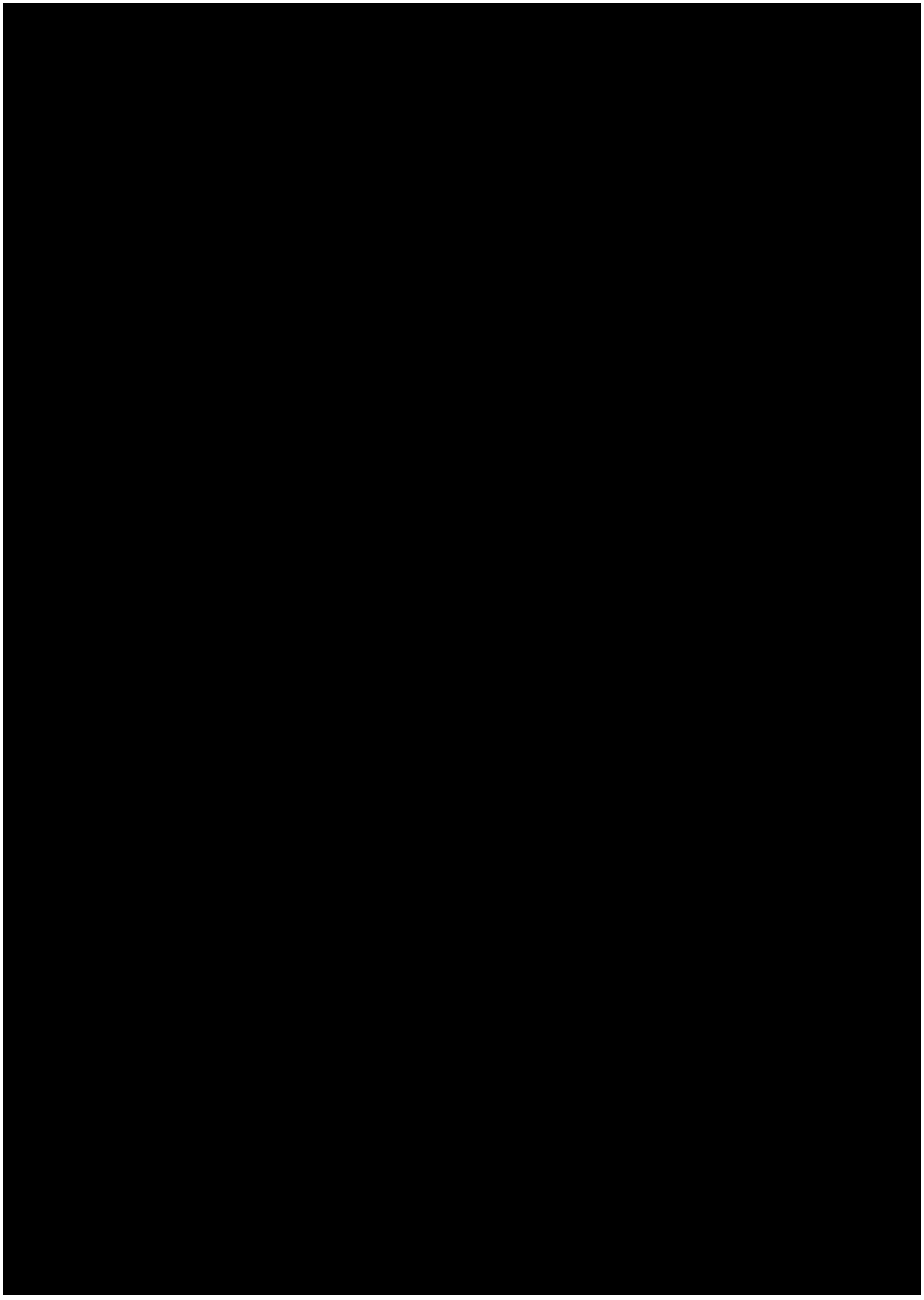


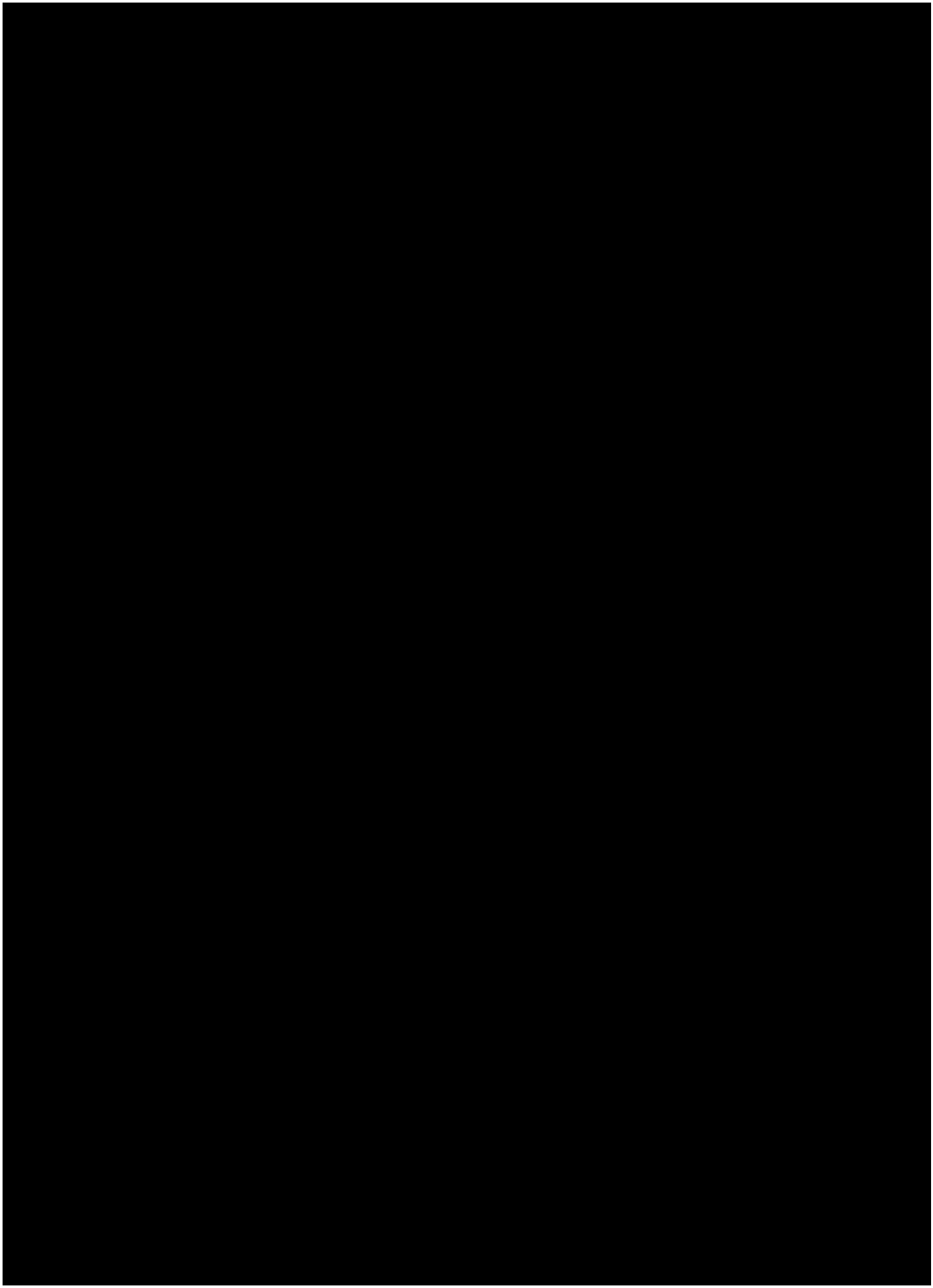


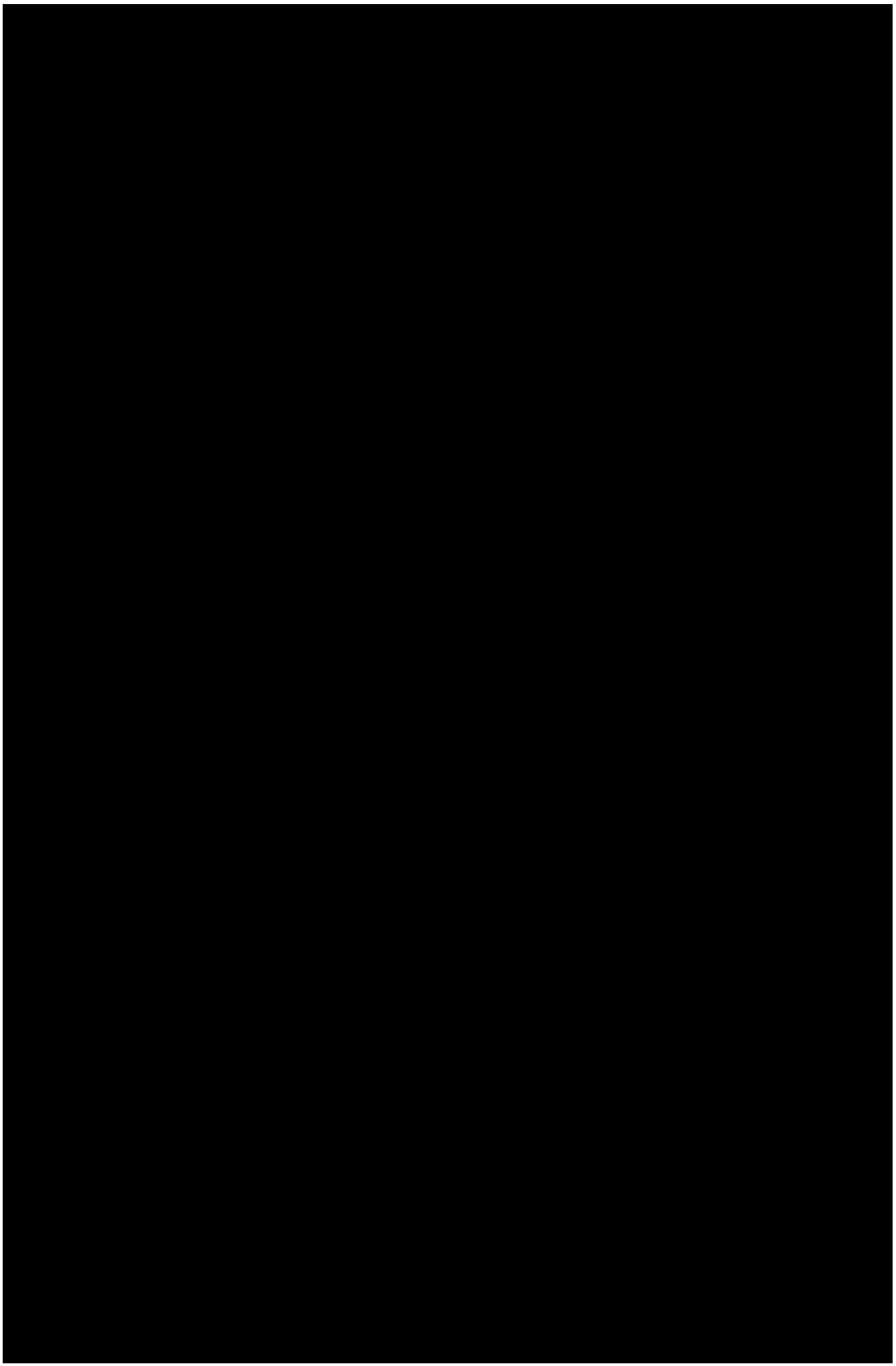


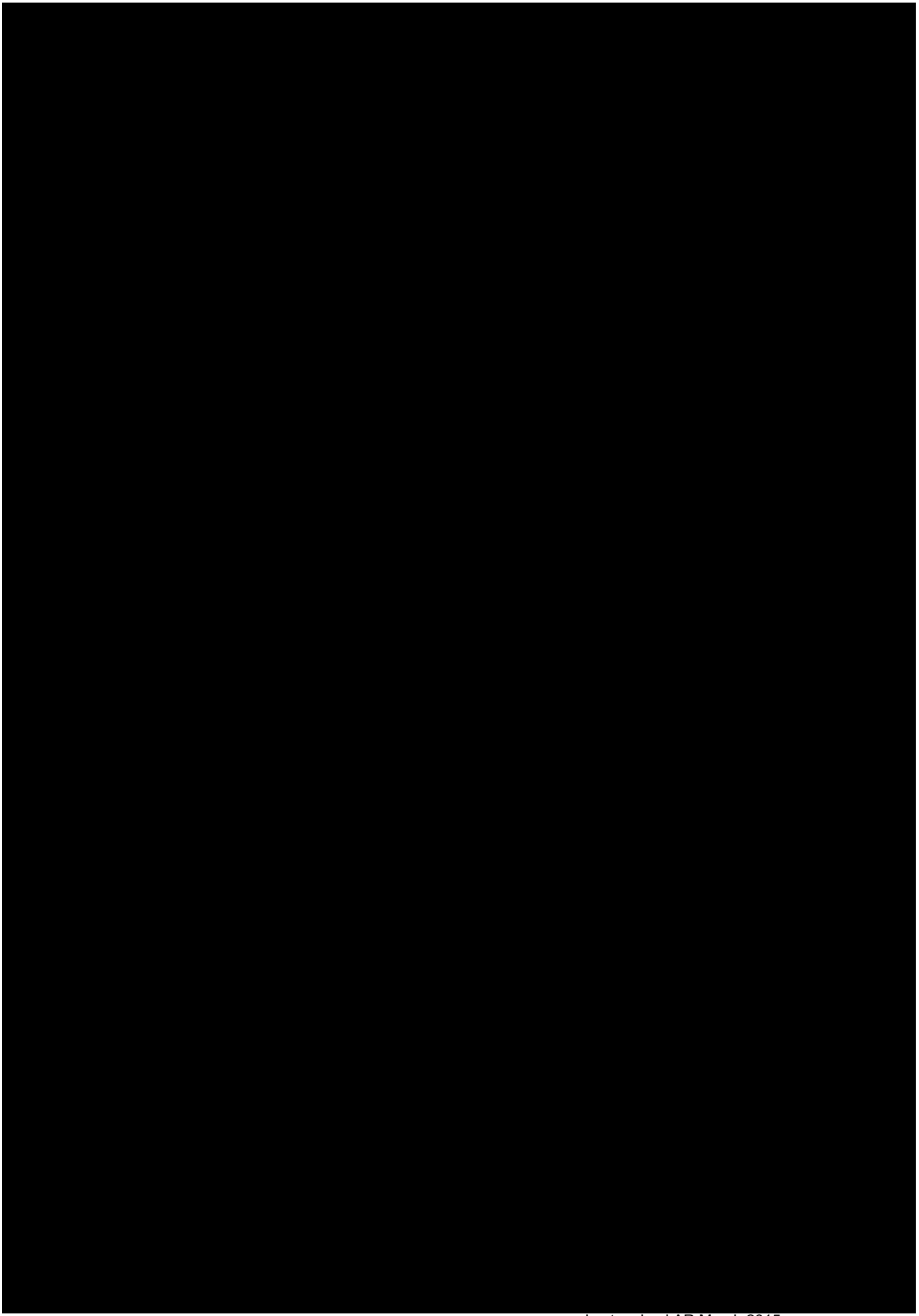


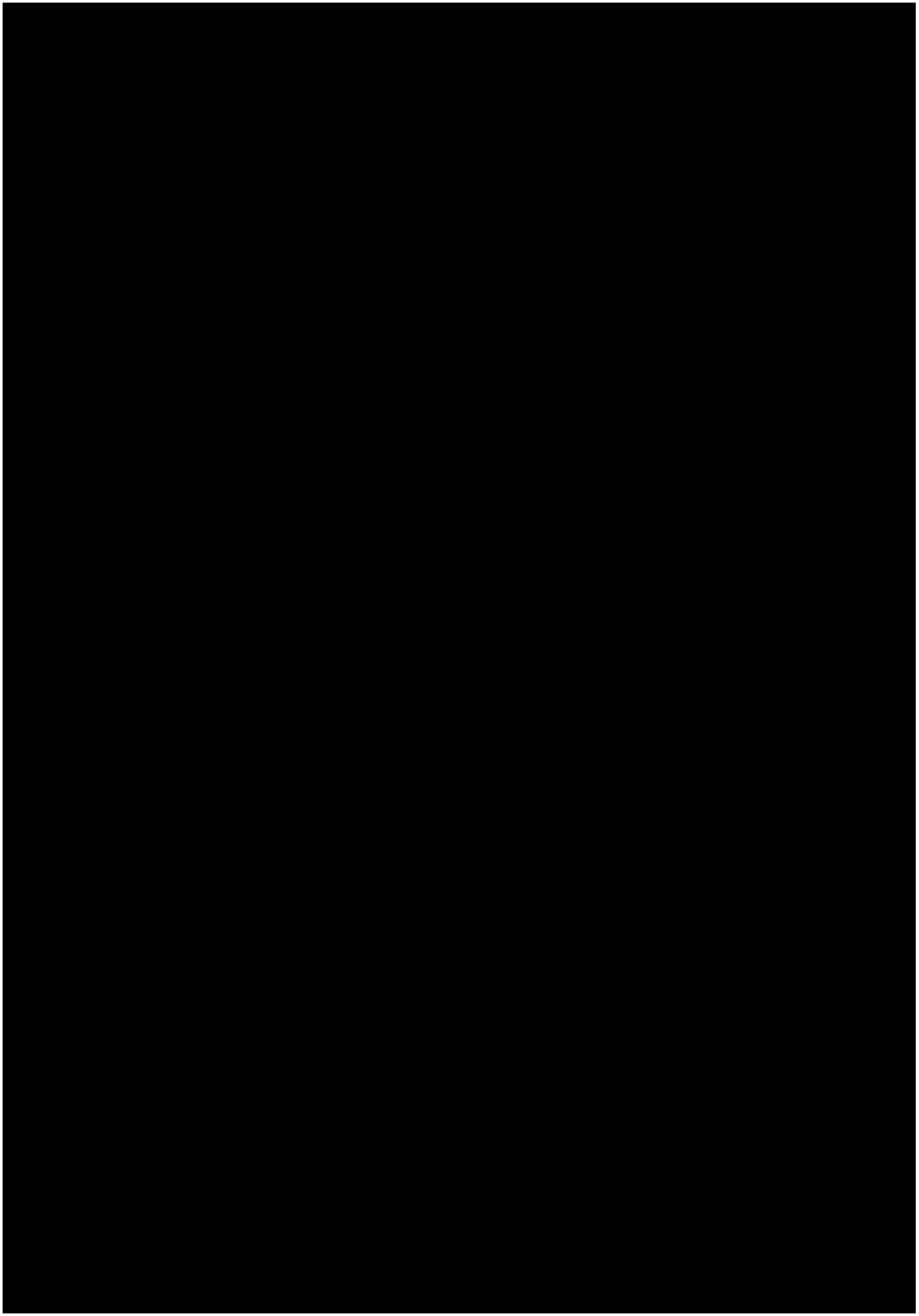


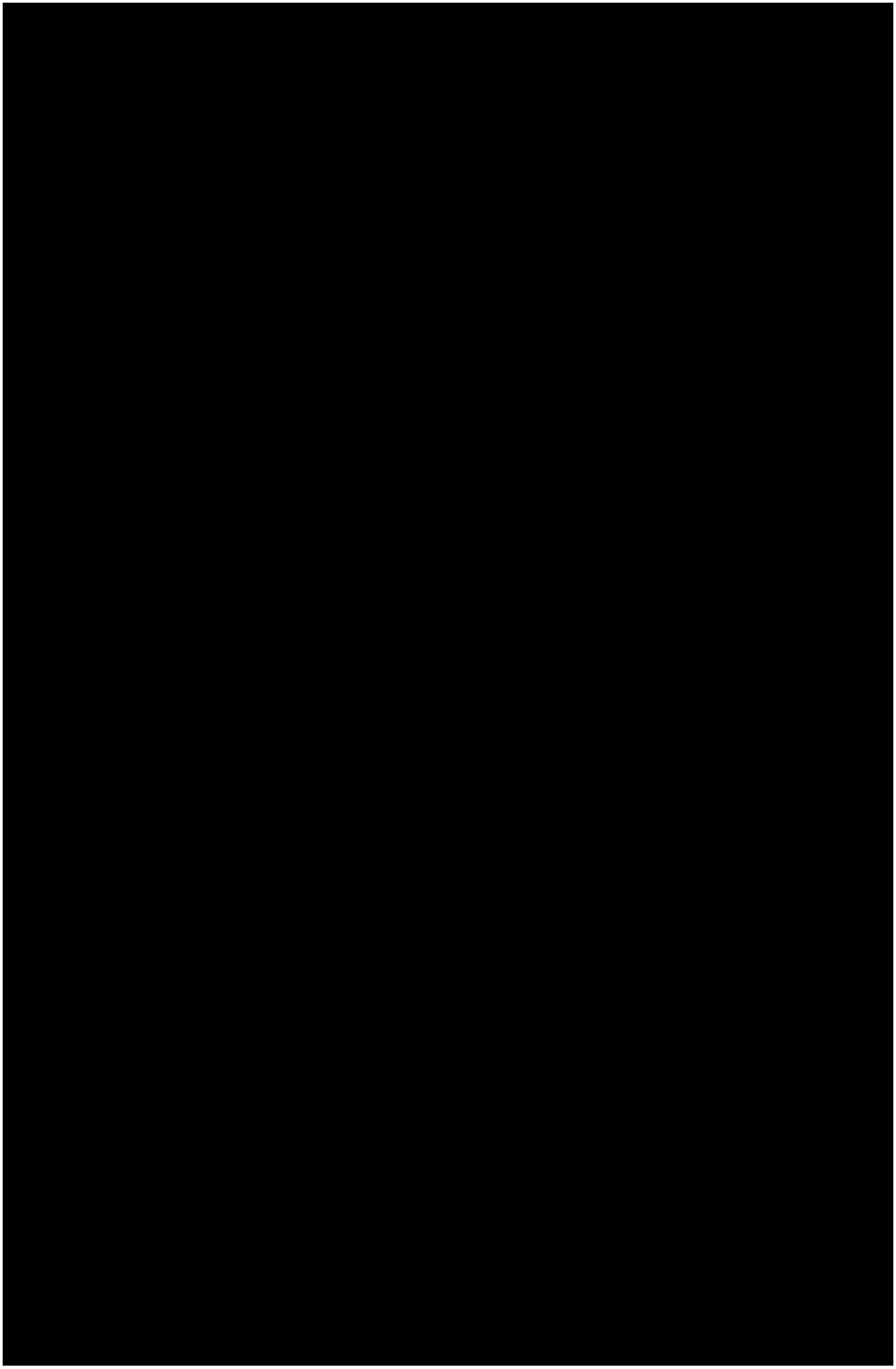












Appendix 26 : Ethics Approval Form – Study 2

Ethics Proportionate Review Application: Staff and Research Students

Computer Science Research Ethics Committee (CSREC)

Staff and research students in the Department of Computer Science undertaking research that involves human participation must apply for ethical review and approval before the research can commence. If the research is low-risk, an application can be submitted for a proportionate review using this form. Applicants are advised to read the information in the SMCSE Framework for Delegated Authority for Research Ethics prior to submitting an application.
There are two parts:
Part A: Ethics Checklist. The checklist determines whether the research is low-risk. If it is, Part B of the form should also be completed. If not, the checklist provides guidance as to where approval should be sought, but the checklist itself does not need to be submitted.
Part B: Ethics Proportionate Review Form. This part is the application for ethical approval of low-risk research and should only be completed if the answer to all questions (1 – 18) is NO.
Completed forms should be returned to the Chair of CSREC by email [redacted]

Part A: Ethics Checklist

If your answer to any of the following questions (1 – 3) is YES, you must apply to an appropriate external ethics committee for approval:		*Delete as appropriate*
1.	Does your research require approval from the National Research Ethics Service (NRES)? (E.g. because you are recruiting current NHS patients or staff? If you are unsure, please check at http://www.hra.nhs.uk/research-community/before-you-apply/determine-which-review-body-approvals-are-required/)	**No**
2.	Will you recruit any participants who fall under the auspices of the Mental Capacity Act? (Such research needs to be approved by an external ethics committee such as NRES or the Social Care Research Ethics Committee http://www.scie.org.uk/research/ethics-committee/)	**No**
3.	Will you recruit any participants who are currently under the auspices of the Criminal Justice System, for example, but not limited to, people on remand, prisoners and those on probation? (Such research needs to be authorised by the ethics approval system of the National Offender Management Service.)	**No**

If your answer to any of the following questions (4 – 11) is YES, you must apply to the Senate Research Ethics Committee for approval (unless you are applying to an external ethics committee):		*Delete as appropriate*
4.	Does your research involve participants who are unable to give informed consent, for example, but not limited to, people who may have a degree of learning disability or mental health problem, that means they are unable to make an informed decision on their own behalf?	**No**
5.	Is there a risk that your research might lead to disclosures from participants concerning their involvement in illegal activities?	**No**
6.	Is there a risk that obscene and or illegal material may need to be accessed for your research study (including online content and other material)?	**No**
7.	Does your research involve participants disclosing information about sensitive subjects?	**No**
8.	Does your research involve the researcher travelling to another country outside of the UK, where the Foreign & Commonwealth Office has issued a travel warning? (http://www.fco.gov.uk/en/)	**No**
9.	Does your research involve invasive or intrusive procedures? For example, these may include, but are not limited to, electrical stimulation, heat, cold or bruising.	**No**
10.	Does your research involve animals?	**No**
11.	Does your research involve the administration of drugs, placebos or other substances to study participants?	**No**

If your answer to any of the following questions (12 – 18) is YES, you must submit a full application to the Computer Science Research Ethics Committee (CSREC) for approval (unless you are applying to an external ethics committee or the Senate Research Ethics Committee). Your application may be referred to the Senate Research Ethics Committee.		*Delete as appropriate*
12.	Does your research involve participants who are under the age of 18?	**No**
13.	Does your research involve adults who are vulnerable because of their social, psychological or medical circumstances (vulnerable adults)? This includes adults with cognitive and / or learning disabilities, adults with physical disabilities and older people.	**No**
14.	Does your research involve participants who are recruited because they are staff or students of City, University of London? For example, students studying on a particular course or module. (If yes, approval is also required from the Head of Department or Programme Director.)	**No**
15.	Does your research involve intentional deception of participants?	**No**

16.	Does your research involve participants taking part without their informed consent?	**No**
17.	Does your research pose a risk to participants greater than that in normal working life?	**No**
18.	Does your research pose a risk to you, the researcher(s), greater than that in normal working life?	**No**

You must make a proportionate review application to the CSREC if your research involves human participation and you are not submitting any other ethics application (i.e. your answer to all questions 1 – 18 is "NO").

Part B: Ethics Proportionate Review Form

If you answered NO to all questions 1 – 18, you may use this part of the form to submit an application for a proportionate ethics review of your research. The form must be accompanied by all relevant information sheets, consent forms and interview/questionnaire schedules. Note that all research participants should be fully informed about: the purpose of the research; the procedures affecting them or affecting any information collected about them, including information about what they will be asked to do, what data will be collected, how the data will be used, to whom it will be disclosed, and how long it will be kept; the fact that they can withdraw at any time without penalty.

Background Information	
Name:	[redacted]
[redacted]	[redacted]

Your Research Project	
Title:	Evaluating "Empatchi" as a Technology to Support Interpersonal Emotion Regulation
Start date:	**01/05/2017**
End date:	**31/05/2018**

Sharing our feelings in response to events helps us clarify and resolve the emotions we experience about those events: a process of interpersonal emotion regulation that allows others to provide empathy, validation, and support. Research suggests that technology could be used to facilitate interpersonal emotion regulation using light-weight means.

In the first study we conducted, we established design implications for a system to support interpersonal emotion regulation: (1) Provide lightweight signal exchange, (2) Show caring/cheering gestures from a trusted intimate circle, (3) Provide 'gift-giving' experiences by associating the response and feedback received with the notion of a 'gift', (4) Function as a bridge to establish the possibility of further conversation. These implications have been integrated into an app called "Empatchi", and has been implemented as an iOS app which will be evaluated in the second study. This app enables users to share their emotional valence and arousal with their trusted circle and allow them to send support/positive reinforcement through lightweight interactions within the app. These interactions are designed facilitate interpersonal emotion regulation.

The following research questions were established for this study:

RQ1. What kind of signals are exchanged when using "Empatchi" for interpersonal emotion regulation, and how are these signals exchanged?

RQ2. How can the 4 design implications (1. Provide lightweight interaction and signal exchange, 2. Show caring/cheering gestures from a trusted intimate circle, 3. Provide 'gift-giving' experiences, 4. Establish the possibility of further conversation) that are implemented in "Empatchi" help in regulating emotion?

RQ3. How does "Empatchi" lead to other face to face contact between members of the group of trusted circle?

This study focuses on daily emotional ups and downs and will exclude extreme case of stress or depression (for example when someone loses their job or when their loved one passes away).

Aim:

A formative study will evaluate the Empatchi app as a technology to help people cope with daily ups and downs by sharing their emotions with their trusted circle (people with whom they have strong connections) and receiving feedback from them. We are interested in finding out how people use our app to share their emotions and to give and receive appreciation and support. We want to investigate if our app can support the interpersonal emotion regulation process.

Participants:

Inclusion Criteria :

- This study will be conducted with groups of people above 18 years old with a regular routine of work or study across the week. The groups will have a minimum of 2 people and a maximum of 6 people.
- Participants will be recruited as groups of people who have strong-tie connections (Howard et al. 2006, Huszti et al. 2013). In the literature, strong-tie connections are defined as as: Family ties, (close) relatives, intimate friends with frequent/daily contacts
- Total number of participants will be minimum of 10 people and maximum of 15 people.
    - For example, we can have five groups: One group of 6 people, one group of 3 people, and 3 groups of 2 people
- All group members use smartphone (iOS) on a regular basis.
- Everyone in the group knows each other and is willing to share emotion data with each other.
- Do not live together / Work or study in different places if living together i.e. conduct their main daily activities in different places.
-

Exclusion Criteria:

- People categorised as vulnerable adults (because of their social, psychological or medical circumstances)
- People with depression, or any other mental health issues
- People with serious health issues or under serious medical treatment

Recruitment:

- Posters displayed at City, University of London
- Convenience sampling through personal contacts

Procedure:

Participants will be recruited as groups with strong-tie connections (explained in the previous section). They will be asked to interact with the app on their smartphone and share their emotions with the group using the SAM (Self-Assessment Manikin) and to send

support to other members. Every group member will be notified when any of the members share an emotion. Participants will be asked to interact with the app over a two-week indirect observation period. They will also need to answer few short questions at the end of the day which will be explained in the later section. This indirect observation period will be followed with an open interview, which will give participants opportunity to explain, clarify, and expand upon the responses they had collected.

Details about the interactions within the app are as follows:

Sharing Emotions

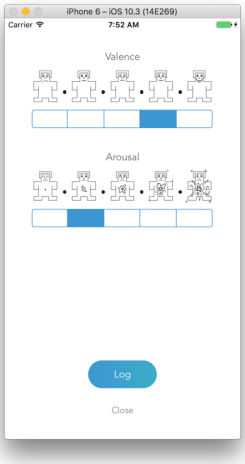


Figure 1. Sharing Emotion Screen

Participants can self-report their emotion on the emotion log screen, using the SAM (Self-Assessment Manikin) that has been widely used in research. Participants report their emotional state by selecting the valence and arousal level on a five-point scale. There will be a confirmation screen indicating that the emotional state has been successfully recorded. When this happens, the app will notify everyone in their group so that they can then send appropriate support.

Lightweight Signal Exchanges



Figure 2. Trusted Circle Screen

Participants can quickly understand the affective state of people in their intimate circle by viewing the main screen of the app (See Figure 2: left image) . The opacity on each avatar shows how recently they logged an emotion, as it fades out as time passes. The colour around the circle represents the valence of the last recorded emotional state of that person, visualised in a gradient ranging from red for negative emotions to green for positive emotions. The size of the circle represents the arousal of the last recorded emotional state of that person. The bigger the size of the circle, the higher their arousal.

When users tap on an avatar, they enter another screen where can interact with that person by sending them emotional support to help them regulate their emotion (See Figure 2: right image). We can see different status icons on this screen, which will reduce its opacity over time. The icons above the avatar (from left-to-right) represent the valence, arousal level, and how recent this person has interacted with us using the app (e.g. looked at our profile, or sent us a support.

Caring/Cheering Messages

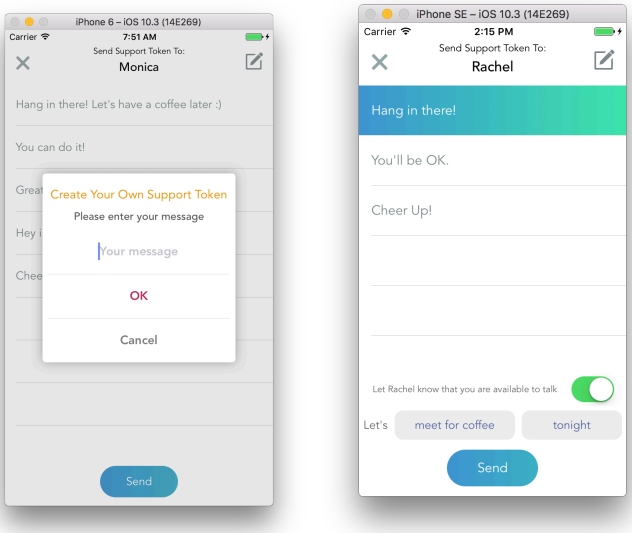


Figure 3. Sending Caring/Cheering Message Screen

Participants can send supportive caring/cheering messages by selecting from the pre-defined list of short support message or setting up their own message inside the app (See Figure 3: Left). Users also have options to include message to let the recepient know that they are available to talk further (for example: through a phone call or face-to-face meeting) (See Figure 3: Right). This feature is designed to lead the lightweight interaction inside the app to further face to face/real time interaction.

Gift Giving Experience by exchanging Support Tokens

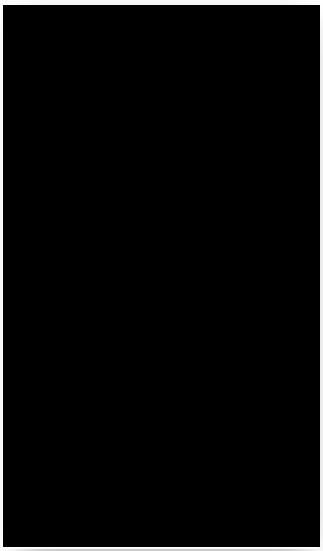


Figure 4. Support Tokens Screen

The support received will be shown as a 'support token', which is provided to bring the conception of 'gift-giving' in exchanging support messages. We want to see how using the app leads to interpersonal emotional regulation process through actual conversation and shared experience, either by having conversation within the same physical space, or via telephone or video call. This will be measured by analysing qualitative data that will be acquired from short daily questionnaire and follow-up interview. In these scenarios, the gift sender is 'gifting' his/her time, as a gesture of care and support for the receiver. The notification screen allows the receiver to see the support token content, and to send feedback to the gift sender as a gesture of gratitude and as an acknowledgement that the gift has been received. After the feedback is given, and the user has recorded/updated his/her emotional state, the gift sender can see how the emotional state of the receiver improves after receiving the gift.

Data Recorded and App Permissions

All the interactions within the app will be recorded (buttons pressed, timestamp, sender ID, receiver ID, and types of interaction (which feature of the app used, what kind of messages being exchanged)), and will be automatically sent to a secure database hosted using SSL (Secure Sockets Layer). The logged emotions will only be shared between a closed group with strong-tie connections and that have all agreed to share their information with each other.

The app will also send users notifications:

- Emotion sharers will be prompted 1 hour after receiving emotional support to log their emotional response change
- They will also be prompted to answer few questions at the end of the day.

Daily Short Questionnaire and Follow-Up Interview

Users will be prompted to answer few questions at the end of the day. A notification will be sent at 9 PM every day during the indirect observation period to remind participants to fill the questionnaire. The questions will focus around their interactions with each other for interpersonal emotion regulation and will also investigate whether they reach out to each using communication technologies other than the app

- [Listing all the received support during the day] Which of the following support messages helped you the most to cope with your daily ups and downs?
- Did you communicate with any member of your trusted circle using a technology other than the app? If yes, how?
- What kind of support outside the app helped you the most to cope with daily ups and downs?

The study will be conducted over a period of two weeks. After the data gathering period is finished, a follow-up interview with each participant will be conducted, which will give participants the opportunity to explain, clarify, and expand upon their responses. This session will be audiotaped and last about 45 minutes. The interview is a reflective discussion based on the responses collected from the participants. Their responses during the observation period are the starting point for the conversation between the researcher and participants, and will focus on their interactions with the app. Participants will also be asked if they have any feedback on or suggestions about the app.

- Interview topic guide/ example questions:
  - Tell me about your experience on sharing emotions with your strong tie connection group (with or without technology), prior to using the app
  - Tell me about your experience of using the app. How did it change the way you communicate your emotions and receive feedback with your strong tie connection group?
  - Tell me about the times when the app helped you the most to cope with your daily ups and downs
  - Did you ever find the app confusing?
  - Did the app ever hinder the way you communicate with each other
  - Tell me about the times when you communicated with each other outside the app
  - Tell me what you liked the most about the app
  - Tell me what you liked the least about the app

Expenses and Payments

- Rewards – 10 GBP iTunes gift voucher

Data collected/ results:

- Emotion log for each participant (Participant's ID, Timestamp, Emotion Valence, Emotion Arousal)
- Support tokens sent (From ID, To ID, Content, Timestamp, Reference to a certain emotion (being sent in response to which emotion))
- How the system was used (time spent on the app, how many times a function was used)
- Diaries/answers from daily prompted questions
- Interview data

Data Analysis:

- Emotion log: SAM (Changes in valence/arousal after sending/receiving feedback), changes in valence/arousal visualisation in xy axis (Valence in x axis and Arousal in y axis), statistical analysis with SAM data
- Qualitative data: Thematic analysis. The log data will be supported by responses from daily questionnaire and follow up interview, which will be thematically analysed by coding the responses to identify major themes, ideas and concepts that developed from participants' responses.
- Categorise what kind of signals sent between participants
- What do they like about the experience? What do they don't like?
- What else would help the interpersonal emotion regulation process?

These results will be used to improve the app which will be evaluated for the final study.

Attachments (these must be provided if applicable):	*Delete as appropriate*
Participant information sheet(s)	**Yes**
Consent form(s)	**Yes**
Questionnaire(s)	**Yes (included in the form)**
Topic guide(s) for interviews and focus groups	**Yes (included in the form)**
Permission from external organisations (e.g. for recruitment of participants)	**Not applicable**

Templates

The University provides templates which should be used as the basis for your participant information sheets and consent forms. These are available from the links below but **must** be adapted according to the needs of your project before they are submitted for consideration.

Adult information sheet:

http://www.city.ac.uk/__data/assets/word_doc/0018/153441/TEMPLATE-FOR-PARTICIAPNT-INFORMATION-SHEET.doc

Adult consent form:

http://www.city.ac.uk/__data/assets/word_doc/0004/153418/TEMPLATE-FOR-CONSENT-FORM.doc

PARTICIPANT INFORMATION SHEET

Title of study

Evaluating "Empatchi: The Human *Tamagotchi*" as a Technology to Support Interpersonal Emotion Regulation

We would like to invite you to take part in a research study. Before you decide whether you would like to take part it is important that you understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

What is the purpose of the study?

We would like to do an evaluation of an app to help people cope with daily ups and downs by sharing their emotions and receiving feedback from their trusted circle (for example, close friends or family). We are interested in finding out how people in trusted circles use our system to share emotions, as well as giving and receiving support. We want to investigate if our designed system is useful to fulfil these needs.

Why have I been invited?

We are interested in involving people above 18 years old with regular work or study routines in this study. There will be several groups of participants, with a minimum of 2 people and a maximum of 6 people per group. Each of the participants in a group will be asked to interact with the app for two weeks.

You are part of a group that knows each other and is willing to share emotion data with each other. All group members use iPhones (iOS minimum 9.0, recommended 10.0 or above) on a regular basis. You are usually in contact on a regular basis but typically do not live together, or you work or study in different places if you do live together.

If you are currently suffering from depression, or have any other mental health issues, or have a serious health issue or are currently under serious medical treatment, you will not be able to participate in this study.

Do I have to take part?

Participation in the project is voluntary, and you can choose not to participate in part or all of the project. It is up to you to decide whether or not to take part. If you do decide to take part, you will be asked to sign a consent form. If you decide to take part, you are still free to withdraw at any time and without giving a reason. You can withdraw at any stage of the project without being penalised or disadvantaged.

What do I have to do?

- You will need to install the app on your iPhone. You can remove the app after the study finishes.
- You will be asked to use the app for two weeks.
- You will be able to share your emotions with your trusted circle. The app allows you to log your emotions, see your intimate circle's emotions, and send and receive support within this trusted circle. We will log your interactions with the app for later analysis.
- You will share your emotion based on two parameters:

  Valence: Pleasantness/unpleasantness of the experience, ranging from very unpleasant to very pleasant, and Arousal: Activation generated by the experience, ranging from very relaxed/calm to very stimulated/excited.
- The data that have been shared inside the app are strictly confidential. You are not allowed to share or talk to other people about the emotions that any members of your group have shared inside the app.
- After you finish your daily activities, you will be prompted with questions by the system. These questions are provided to provoke reflection, for clarifying your interactions with your trusted circle within or outside the system. This task will last not more than 5 minutes. A notification will be sent at 9 PM every day during the two weeks period to remind you to fill the questionnaire
- These data will be securely encrypted and only the main investigator and their PhD supervisors will be able to access them.
- The app does not have any other access or permission to access data on your iPhone. You will only need to allow the app to send you notifications.
- An individual follow-up interview session will be held in the week after you've interacted with the app for two weeks (at the time convenient for you). The interview will be a reflective discussion based on the responses collected. This session will be audiotaped. This session will last about 45 minutes and will be conducted individually for each participant.
- The responses collected will be analysed and will be used to improve the system which will be evaluated for the final study.

What are the possible disadvantages and risks of taking part?

- The app may be a small distraction during your daily activities. At the end of each day you will be asked to spend time reflecting on and recording in the app communications given and received and why these were meaningful in providing encouragement or support during the study period.
- If you feel you are not getting enough emotional support, or your health circumstances change, please contact me.

Expenses and Payments

- You will receive a reward of a 10 GBP iTunes Gift Card after completing the study.

What are the possible benefits of taking part?

We will provide you with the result and analysis of the study upon request. When we publish an academic paper based on the result, we will also provide you access to the paper upon your request. Your participation will be really helpful in designing and developing a new interactive technology to support interpersonal emotion regulation.

What will happen when the research study stops?

The collected data will be securely stored and will be completely destroyed after a period of 10 years.

Will my taking part in the study be kept confidential?

Any identifying data collected will be anonymised. Participant names will not be associated with the data, and will not appear on any reports or presentations. All data will be password protected and stored securely. Only myself and my supervisors will have access to the data. Participants have the right to withdraw from the study at any time, and I will destroy all of their collected data when they decide to do so.

What will happen to results of the research study?

The results of this study will be analysed and will be a part of my PhD thesis.

What will happen if I don't want to carry on with the study?

You are free to withdraw from the study without an explanation or penalty at any time. If one of the people in a group withdraws, the whole group will also be withdrawn from the study and all the data that the group have provided up to that point will be destroyed.

What if there is a problem?

If you have any problems, concerns or questions about this study, you should ask to speak to me as a lead researcher of this project. If you remain unhappy and wish to complain formally, you can do this through City, University of London complaints procedure. To complain about the study, you need to phone [redacted]. You can then ask to speak to the Secretary to Senate Research Ethics Committee and inform them that the name of the project is: **Evaluating "Empatchi: The Human *Tamagotchi*" as a Technology to Support Interpersonal Emotion Regulation**

You could also write to the Secretary at:

[redacted]
Secretary to Senate Research Ethics Committee
Research Office, E214
City, University of London
Northampton Square, London, EC1V 0HB
Email: [redacted]

City, University of London holds insurance policies which apply to this study. If you feel you have been harmed or injured by taking part in this study you may be eligible to claim compensation. This does not affect your legal rights to seek compensation. If you are harmed due to someone's negligence, then you may have grounds for legal action.

The following are the contact information of the researcher (PhD student) and his PhD supervisors.

[redacted]

Who has reviewed the study?

This study has been approved by City, University of London Computer Science Research Ethics Committee

CONSENT FORM

Title of Study: **Evaluating "Empatchi: The Human *Tamagotchi*" as a Technology to Support Interpersonal Emotion Regulation**

Please initial box

1.	I agree to take part in the above City, University of London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records. I understand this will involve: • Use my smart phone to use the app • Access to logged data by the researcher • Be interviewed by the researcher • Allow the interview to be audiotaped • Allow the researcher to use quotes from my interview. My name will not be associated with the data, and will not appear on any reports or presentations	
2.	This information will be held and processed for the following purpose(s): PhD Thesis on Phatic Communication for Emotion Regulation Scientific Research Article related to this study that may be published I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published. The identifiable data will not be shared with any other organisation.	
3.	I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in any way.	
4.	I agree to City, University of London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on City, University of London complying with its duties and obligations under the Data Protection Act 1998.	
5.	I agree to take part in the above study.	

_____	_____	_____
Name of Participant	Signature	Date
_____	_____	_____
Name of Researcher	Signature	Date

When completed, 1 copy for participant; 1 copy for researcher file

Groups Wanted

for Research in
Using Technology to Support
Sharing Emotion and Receiving Feedback

We are looking for **groups (of 2 to 6 people) of volunteers above 18 years old** to take part in a study on using technology to support sharing emotions and receiving feedback.

To participate in this study, you will need to ask your trusted circle (close friends or family) to sign up together as a group, with a minimum of 2 people and a maximum of 6 people per group. Each person in the group needs to:

- Use iPhone on regular basis.
- Everyone in the group knows each other and is willing to share emotions with each other
- Are usually in contact on a regular basis

As a participant in this study, you will use our app on your **iPhone (iOS 9 and above)**. This app will allow you to share **your emotion with your trusted circle and receive feedback from them**. All the data shared inside the app are strictly confidential.

You will be **interacting with the app for two weeks**. After that, we will conduct a **45 minutes interview session** with each participant.

In appreciation of your cooperation and time, you will receive **£10 in iTunes voucher.**

For more information about this study, please contact:
Gilang Andi Pradana - [redacted]
Department of Computer Science, City, University of London

This study has been reviewed and cleared by the Computer Science Research Ethics Committee of City, University of London. If you would like to complain about any aspect of the study, please contact the Secretary to the University's Senate Research Ethics Committee on [redacted] or via email: [redacted]

[redacted]

Researcher's checklist for compliance with the Data Protection Act, 1998

This checklist is for use alongside the *Guidance notes on Research and the Data Protection Act 1998*. Please refer to the notes for a full explanation of the requirements.

You may choose to keep this form with your research project documentation so that you can prove that you have taken into account the requirements of the Data Protection Act.

	REQUIREMENT	✓	
A	***Meeting the conditions for the research exemptions:***		
1	The information is being used *exclusively* for research purposes.		Mandatory
2	You are not using the information to support measures or decisions relating to *any* identifiable living individual.		Mandatory
3	You are not using the data in a way that will cause, or is likely to cause, substantial damage or substantial distress to any data subject.		Mandatory
4	You will not make the result of your research, or any resulting statistics, available in a form that identifies the data subject.		Mandatory
B	***Meeting the conditions of the First Data Protection Principle:***		
1	You have fulfilled one of the conditions for using personal data, e.g. you have obtained consent from the data subject. Indicate which condition you have fulfilled here: _____ _____		Mandatory
2	If you will be using sensitive personal data you have fulfilled one of the conditions for using sensitive personal data, e.g. you have obtained explicit consent from the data subject. Indicate which condition you have fulfilled here: _____ _____		Mandatory if using sensitive data
3	You have informed data subjects of: iv. What you are doing with the data; v. Who will hold the data, usually City, University of London; vi. Who will have access to or receive copies of the data.		Mandatory unless B4 applies
4	You are excused from fulfilling B3 only if all of the following conditions apply: iv. The data has been obtained from a third party; v. Provision of the information would involve disproportionate effort; vi. You record the reasons for believing that disproportionate effort applies, please also give brief details here: _____ _____ _____ N.B. Please see the guidelines above when assessing disproportionate effort.		Required only when claiming disproportionate effort
C	***Meeting the conditions of the Third Data Protection Principle:***		
1	You have designed the project to collect as much information as you need for your research but not more information than you need.		Mandatory
D	***Meeting the conditions of the Fourth Data Protection Principle:***		
1	You will take reasonable measures to ensure that the information you collect is accurate.		Mandatory
2	Where necessary you have put processes in place to keep the information up to date.		Mandatory

E	***Meeting the conditions of the Sixth Data Protection Principle:***		
1	You have made arrangements to comply with the rights of the data subject. In particular you have made arrangements to: v. Inform the data subject that you are going to use their personal data. vi. Stop using an individual's data if it is likely to cause unwarranted substantial damage or substantial distress to the data subject or another. vii. Ensure that no decision, which significantly affects a data subject, is based solely on the automatic processing of their data. viii. Stop, rectify, erase or destroy the personal data of an individual, if necessary. Please give brief details of the measures you intend to take here: _____ _____ _____ _____		Mandatory

Appendix 27 : Ethics Approval Form – Study 3

Ethics Proportionate Review Application: Staff and Research Students

Computer Science Research Ethics Committee (CSREC)

Staff and research students in the Department of Computer Science undertaking research that involves human participation must apply for ethical review and approval before the research can commence. If the research is low-risk, an application can be submitted for a proportionate review using this form. Applicants are advised to read the information in the SMCSE Framework for Delegated Authority for Research Ethics prior to submitting an application.
There are two parts:
Part A: Ethics Checklist. The checklist determines whether the research is low-risk. If it is, Part B of the form should also be completed. If not, the checklist provides guidance as to where approval should be sought, but the checklist itself does not need to be submitted.
Part B: Ethics Proportionate Review Form. This part is the application for ethical approval of low-risk research and should only be completed if the answer to all questions (1 – 18) is NO.
Completed forms should be returned to the Chair of CSREC by email [redacted].

Part A: Ethics Checklist

If your answer to any of the following questions (1 – 3) is YES, you must apply to an appropriate external ethics committee for approval:		*Delete as appropriate*
1.	Does your research require approval from the National Research Ethics Service (NRES)? (E.g. because you are recruiting current NHS patients or staff? If you are unsure, please check at http://www.hra.nhs.uk/research-community/before-you-apply/determine-which-review-body-approvals-are-required/)	**No**
2.	Will you recruit any participants who fall under the auspices of the Mental Capacity Act? (Such research needs to be approved by an external ethics committee such as NRES or the Social Care Research Ethics Committee http://www.scie.org.uk/research/ethics-committee/)	**No**
3.	Will you recruit any participants who are currently under the auspices of the Criminal Justice System, for example, but not limited to, people on remand, prisoners and those on probation? (Such research needs to be authorised by the ethics approval system of the National Offender Management Service.)	**No**

If your answer to any of the following questions (4 – 11) is YES, you must apply to the Senate Research Ethics Committee for approval (unless you are applying to an external ethics committee):		*Delete as appropriate*
4.	Does your research involve participants who are unable to give informed consent, for example, but not limited to, people who may have a degree of learning disability or mental health problem, that means they are unable to make an informed decision on their own behalf?	**No**
5.	Is there a risk that your research might lead to disclosures from participants concerning their involvement in illegal activities?	**No**
6.	Is there a risk that obscene and or illegal material may need to be accessed for your research study (including online content and other material)?	**No**
7.	Does your research involve participants disclosing information about sensitive subjects?	**No**
8.	Does your research involve the researcher travelling to another country outside of the UK, where the Foreign & Commonwealth Office has issued a travel warning? (http://www.fco.gov.uk/en/)	**No**
9.	Does your research involve invasive or intrusive procedures? For example, these may include, but are not limited to, electrical stimulation, heat, cold or bruising.	**No**
10.	Does your research involve animals?	**No**
11.	Does your research involve the administration of drugs, placebos or other substances to study participants?	**No**

If your answer to any of the following questions (12 – 18) is YES, you must submit a full application to the Computer Science Research Ethics Committee (CSREC) for approval (unless you are applying to an external ethics committee or the Senate Research Ethics Committee). Your application may be referred to the Senate Research Ethics Committee.		*Delete as appropriate*
12.	Does your research involve participants who are under the age of 18?	**No**
13.	Does your research involve adults who are vulnerable because of their social, psychological or medical circumstances (vulnerable adults)? This includes adults with cognitive and / or learning disabilities, adults with physical disabilities and older people.	**No**
14.	Does your research involve participants who are recruited because they are staff or students of City, University of London? For example, students studying on a particular course or module. (If yes, approval is also required from the Head of Department or Programme Director.)	**No**
15.	Does your research involve intentional deception of participants?	**No**

16.	Does your research involve participants taking part without their informed consent?	**No**
17.	Does your research pose a risk to participants greater than that in normal working life?	**No**
18.	Does your research pose a risk to you, the researcher(s), greater than that in normal working life?	**No**

You must make a proportionate review application to the CSREC if your research involves human participation and you are not submitting any other ethics application (i.e. your answer to all questions 1 – 18 is "NO").

Part B: Ethics Proportionate Review Form

If you answered NO to all questions 1 – 18, you may use this part of the form to submit an application for a proportionate ethics review of your research. The form must be accompanied by all relevant information sheets, consent forms and interview/questionnaire schedules. Note that all research participants should be fully informed about: the purpose of the research; the procedures affecting them or affecting any information collected about them, including information about what they will be asked to do, what data will be collected, how the data will be used, to whom it will be disclosed, and how long it will be kept; the fact that they can withdraw at any time without penalty.

Background Information	
[redacted]	[redacted]

[redacted] **Research Project**	
Title:	Investigating the Self-Reflection Process in "Empatchi 2.0: The Human *Tamagotchi*" in Supporting Interpersonal Emotion Regulation.
Start date:	**01/11/2017**
End date:	**31/05/2018**

Sharing our feelings in response to events helps us clarify and resolve the emotions we experience about those events: a process of interpersonal emotion regulation that allows others to provide empathy, validation, and support. Research suggests that technology could be used to facilitate interpersonal emotion regulation using light-weight means.

Our previous study evaluated the Empatchi system as a technology to support people to cope with daily ups and downs by sharing their emotions with their trusted circle (strong-tie connections). We investigated how people use our system to share emotions, as well as giving and receiving feedback of appreciation and support.

The results of the study have shown that Empatchi was used as a medium to vent emotion, to signal others and to let them know about users' current emotional states, especially when they could not or did not want to articulate the emotion. The lightweight signals that were exchanged in Empatchi also made participants more aware of the emotional states of the people they care about the most, as well as encouraging them to support each other.

Other results from the study have also shown that the system encouraged them to be more self-aware about their own emotional states, a process of self-reflection which is a part of intrapersonal emotion regulation. However, many of them struggled to use the SAM (Self-Assessment Manikin) as a method of reporting their own emotions. The final study will focus on investigating the process of self-reflection, how it solves the challenge of using the SAM method that they were facing in the previous study, and study its role in helping individuals to understand, manage or regulate their own emotions.

The following research questions will be investigated in this study.

RQ1. Does giving people insight into their emotional states over time in Empatchi increase their emotional literacy and change how they interact with their trusted circle?

RQ2. How does improved emotional literacy make people understand the SAM (Self-Assessment Manikin) better?

RQ3. How does the self-reflection process help in the Interpersonal Emotion Regulation process?

We will be using the Empatchi system, with the added functionality of individuals being able to view their emotional states over time, as a prototype to evaluate and answer our research questions that focus on the self-reflection process.

Participants:

Inclusion Criteria :

- This study will be conducted with groups of people above 18 years old with a regular routine of work or study across the week. The groups will have a minimum of 2 people and a maximum of 6 people.
- Participants will be recruited as groups of people who have strong-tie connections (Howard et al. 2006, Huszti et al. 2013). In the literature, strong-tie connections are defined as as: family ties, (close) relatives and intimate friends with frequent/daily contacts.
- The total number of participants will be minimum of 10 people and maximum of 15 people.
    - For example, we can have five groups: One group of 6 people, one group of 3 people, and 3 groups of 2 people
- All group members use Apple smartphones (iOS) on a regular basis.
- Everyone in the group knows each other and is willing to share emotion data with each other.
- They do not live together OR if they do live together, they have to work or study in different places (i.e. conduct their main daily activities in different places).

Exclusion Criteria:

- People categorised as vulnerable adults (because of their social, psychological or medical circumstances).
- People with depression, or any other mental health issues.
- People with serious health issues or under serious medical treatment.

Recruitment:

- Posters displayed at City, University of London
- Convenience sampling through personal contacts
- Posting advertisements on Social Media

Procedure:

Participants will be recruited as groups with strong-tie connections (explained in the previous section). They will be given a tutorial about the study and will be asked to interact with the app on their smartphone and share their emotions with the group using the SAM (Self-Assessment Manikin) and to send support to other members.
Every group member will be notified when any of the members share an emotion. Every participant can see how their reported emotional states change over time. Every participant can also see the history of support exchanges between each trusted circle member.
Participants will be asked to interact with the app over a two-week indirect observation period. They will also need to answer a few short questions at the end of each day which will be explained in the later section. This indirect observation period will be followed with an open interview, which will give participants the opportunity to explain, clarify, and expand upon the responses they recorded each day.
Details about the interactions within the app are as follows:
Sharing Emotions

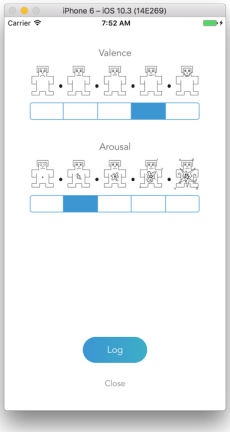


Figure 1. Sharing Emotion Screen

Participants can self-report their emotions on the emotion log screen, using the SAM (Self-Assessment Manikin) that has been widely used in research. Participants report their emotional state by selecting the valence and arousal level on a five-point scale. There is a confirmation screen indicating that the emotional state has been successfully recorded. When this happens, the app notifies everyone in their group so that they can then send appropriate support.
Lightweight Signal Exchanges



Figure 2. Trusted Circle Screen

Participants can quickly understand the affective states of people in their intimate circle by viewing the main screen of the app (See Figure 2: left image) . The opacity on each avatar shows how recently that person logged an emotion, as it fades out as time passes. The colour around the circle represents the valence of the last recorded emotional state of that person, visualised in a gradient ranging from red for negative emotions to green for positive emotions. The size of the circle represents the arousal of the last recorded emotional state of that person. The bigger the size of the circle, the higher their arousal.
When users tap on an avatar, they enter another screen where they can interact with that person by sending them emotional support to help them regulate their emotion (See Figure 2: right image). We can see different status icons on this screen, which will reduce their opacity over time. The icons above the avatar (from left-to-right) represent the valence, arousal level, and how recent this person has interacted with us using the app, for example, looked at our profile, or sent us a support.

Caring/Cheering Messages

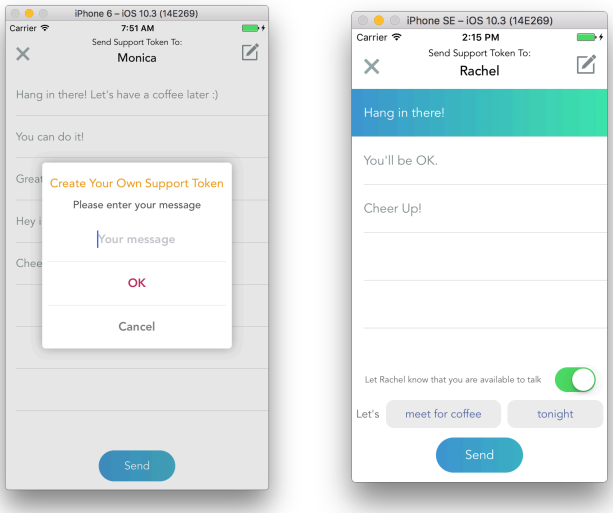


Figure 3. Sending Caring/Cheering Message Screen

Participants can send supportive caring/cheering messages by selecting from the pre-defined list of short support message or setting up their own message inside the app (See Figure 3: Left). Users also have options to include a message to let the recepient know that they are available to talk further (for example, through a phone call or face-to-face meeting) (See Figure 3: Right). This feature is designed so that the lightweight interactions inside the app can lead to further face to face/real time interaction.

Gift Giving Experience by exchanging Support Tokens

Figure 4. Support Tokens Screen

The support received is shown as a 'support token', a feature which is provided so that the exchange of support messages is a form of 'gift giving'. We want to see whether using the app leads to interpersonal emotional regulation through actual conversations and shared experiences, either by having conversations within the same physical space, or via telephone or video calls. This will be measured by analysing qualitative data that will be acquired from the short daily questionnaire and follow-up interviews. In these scenarios, the gift sender is 'gifting' his/her time, as a gesture of care and support for the receiver. The notification screen allows the receiver to see the support token content, and to send feedback to the gift sender as a gesture of gratitude and as an acknowledgement that the gift has been received. After the feedback is given, and the user has recorded/updated his/her emotional state, the gift sender can see how the emotional state of the receiver changes after receiving the gift.

Self-Reflection Process: Insights on how participant's emotion change over time

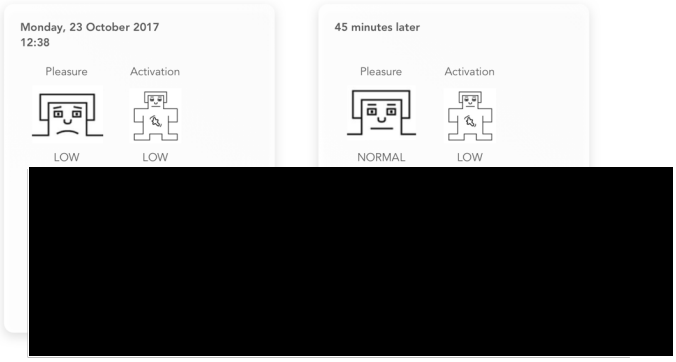


Figure 5. Self-Reflection Screen

This feature allows a participant to see how his/her emotional state changes over time. This feature is intended to support the self-reflection process, our main focus for this study, and also to solve the challenge of using SAM to report emotions. This feature will show how a recorded emotion is related to previously recorded emotions, based on the timestamps. The information will be shown in cards, showing the valence, arousal, timestamp (relative to the previous emotion), and support given in response to that emotion.

App Permission: User Notification

The app will send users notifications to remind them to use Empatchi (every day at 9 AM during observation period) and also to answer the questionnaire at the end of the day (every day at 9 PM during observation period). Users will also get notifications when they get support messages from his/her trusted circle, and also when any member of their trusted circle shares an emotion.

Data Recorded

(1) Log Data

All the interactions within the app will be recorded (buttons pressed, timestamp, sender ID, receiver ID, and types of interaction: which feature of the app is used, what kind of messages are exchanged), and will be automatically sent to a secure database hosted using SSL (Secure Sockets Layer). The logged emotions will only be shared between the closed group with strong-tie connections and all of whose members have agreed to share their information with each other.

(2) Daily Short Questionnaire

Users will be prompted to answer a few questions at the end of every day. A notification will be sent at 9 PM every day during the indirect observation period to remind participants to fill in the questionnaire. The questions will focus on their interactions with the app, in particular, the usage of the SAM method for recording emotional states and the self-reflection process.

- How easy was it to use the SAM to report your emotional state today? (Likert scale)
- How easy was it to record the valence using the SAM method? (Likert scale)
- How easy was it to record the arousal using the SAM method? (Likert scale)
- Have you gained any insight into how your emotional state changes over time?
- Does looking at your emotional state over time help you to share your emotions with your trusted circle?

(3) Follow-up Interview

The study will be conducted over a period of two weeks. After the data gathering period is finished, a follow-up interview with each participant will be conducted, which will give participants the opportunity to explain, clarify, and expand upon their responses to the daily questions. This session will be audiotaped and last no longer than 45 minutes. The interview is a reflective discussion based on the responses collected from the participants. Their responses during the observation period are the starting point for the conversation between the researcher and participants, and will focus on their interactions with the app. Participants will also be asked if they have any feedback about or suggestions for the app.

- Interview topic guide/ example questions:
  - Tell me about your experience of using the app. How did it change the way you communicate your emotions and receive feedback with your strong tie connection group?
  - Tell me about the times when the app helped you the most to cope with your daily ups and downs
  - How do you feel about the SAM method to record emotional states?
  - Did your view of using the SAM method to record emotional states change over the study period?
  - Do you think reflecting on how your emotional states changed over time help you in sharing your emotions with others?
  - Did you ever find the app confusing?
  - Did the app influence the way you communicate with other people in your trusted circle?
  - Tell me about the times when you communicated with each other outside the app
  - Tell me what you liked the most about the app
  - Tell me what you liked the least about the app

Expenses and Payments

- Rewards – 10 GBP equivalent iTunes or Amazon voucher or Paypal

Data Analysis:

- Emotion log: Descriptive statistics and statistical analysis with the SAM data
  - Log data will be analysed to understand system usage, for example, how often it was used, how many emotions were shared, at what time of day participants shared more emotions. These data will be used along with the qualitative data to understand how the system was used to support the emotion regulation process.
- Qualitative data: Thematic analysis

- Daily short questionnaire responses and interview data will be thematically analysed by looking at the common patterns and themes, specifically to answer the research questions for this study. For example, the Likert scale responses in the questionnaire and the interview questions about the SAM can be used to answer RQ1 and RQ2, while other data from the log and the interview questions on the interaction with others can be used to answer RQ3, to understand the effect of the self-reflection process on the interaction between participants inside a trusted circle.

Attachments (these must be provided if applicable):	*Delete as appropriate*
Participant information sheet(s)	**Yes**
Consent form(s)	**Yes**
Questionnaire(s)	**Yes (included in the form)**
Topic guide(s) for interviews and focus groups	**Yes (included in the form)**
Permission from external organisations (e.g. for recruitment of participants)	**Not applicable**

Templates

The University provides templates which should be used as the basis for your participant information sheets and consent forms. These are available from the links below but **must** be adapted according to the needs of your project before they are submitted for consideration.

Adult information sheet:

http://www.city.ac.uk/__data/assets/word_doc/0018/153441/TEMPLATE-FOR-PARTICIAPNT-INFORMATION-SHEET.doc

Adult consent form:

http://www.city.ac.uk/__data/assets/word_doc/0004/153418/TEMPLATE-FOR-CONSENT-FORM.doc

PARTICIPANT INFORMATION SHEET

Title of study

Investigating the Self-Reflection Process in "Empatchi 2.0: The Human *Tamagotchi*" in Supporting Interpersonal Emotion Regulation

We would like to invite you to take part in a research study. Before you decide whether you would like to take part it is important that you understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

What is the purpose of the study?

We would like to do an evaluation of an app to help people cope with daily ups and downs by sharing their emotions and receiving feedback from their trusted circle (for example, close friends or family). We are interested in finding out how people in trusted circles use our system to share emotions, as well as giving and receiving support. Previous research has found that the self-reflection process in understanding one's own emotion can play a role in helping to manage or regulate emotions. We want to investigate if our designed system is useful to fulfil these needs.

Why have I been invited?

We are interested in involving people above 18 years old with regular work or study routines in this study. There will be several groups of participants, with a minimum of 2 people and a maximum of 6 people per group. Each of the participants in a group will be asked to interact with the app for two weeks.

You are part of a group that knows each other and is willing to share emotion data with each other. All group members use iPhones (iOS minimum 9.0, recommended 10.0 or above) on a regular basis. You are usually in contact on a regular basis. You do not live together OR if you do live together, you have to work or study in different places (i.e. conduct your main daily activities in different places from the other members of the group).

If you are currently suffering from depression, or have any other mental health issues, or have a serious health issue or are currently under serious medical treatment, you will not be able to participate in this study. Please withdraw from participating in this study if you have this issue.

Do I have to take part?

Participation in the project is voluntary, and you can choose not to participate in part or all of the project. It is up to you to decide whether or not to take part. If you do decide to take part, you will be asked to sign a consent form. If you decide to take part, you are still free to withdraw at any time and without giving a reason. You can withdraw at any stage of the project without being penalised or disadvantaged.

What do I have to do?

- You will need to install the app on your iPhone. You can remove the app after the study finishes.
- You will be able to share your emotions with your trusted circle. The app allows you to log your emotions, see your intimate circle's emotions, and send and receive support within this trusted circle. We will log your interactions with the app for later analysis.
- You will be able to see how your emotional states your record in the app change over time.
- You will be able to see the history of support exchanges between you and each trusted circle member.
- You will share your emotion based on two parameters:

  Valence: Pleasantness/unpleasantness of the experience, ranging from very unpleasant to very pleasant; and Arousal: Activation generated by the experience, ranging from very relaxed/calm to very stimulated/excited.
- The data that have been shared inside the app are strictly confidential. You are not allowed to share or talk to other people about the emotions that any members of your group have shared inside the app.
- After you finish your daily activities, you will be prompted with questions by the system. These questions are provided to provoke reflection and for clarifying your interactions with your trusted circle within or outside the system. This task will last not more than 5 minutes. A notification will be sent at 9 PM every day during the two week study period to remind you to fill in the questionnaire
- These data will be securely encrypted and only the main investigator and their PhD supervisors will be able to access them.
- The app cannot access data on your iPhone. You will only need to allow the app to send you notifications.

- An individual follow-up interview session will be held in the week after you've completed the two week study (at a time convenient for you). The interview will be a reflective discussion based on the responses collected. This session will be audiotaped. This session will last no longer than 45 minutes and will be conducted individually for each participant.
- The responses collected will be analysed and will be used to improve the system.

What are the possible disadvantages and risks of taking part?

- The app may be a small distraction during your daily activities. At the end of each day you will be asked to spend time reflecting on and recording in the app communications given and received and why these were meaningful in providing encouragement or support during the study period.
- If you feel you are not getting enough emotional support, or your health circumstances change, please contact me.

Expenses and Payments

- You will receive a reward of a 10 GBP equivalent of Amazon/iTunes Gift Card/Paypal after completing the study.

What are the possible benefits of taking part?

We will provide you with the result and analysis of the study upon request. When we publish an academic paper based on the results, we will also provide you access to the paper upon your request. Your participation will be really helpful in designing and developing a new interactive technology to support interpersonal emotion regulation.

What will happen when the research study stops?

The collected data will be securely stored and will be completely destroyed after a period of 10 years after the data collection period.

Will my taking part in the study be kept confidential?

Participant names are de-identified and will not be associated with the data, and will not appear on any public reports or presentations. Only myself and my supervisors will have access to the raw data. I will remove items from the data that could identify you, replacing them with codes or pseudonyms. All data will be password protected and stored securely. Participants have the right to withdraw from the study at any time, and I will destroy all of their collected data if they decide to do so.

What will happen to results of the research study?

The results of this study will be analysed and will be a part of my PhD thesis.

What will happen if I don't want to carry on with the study?

You are free to withdraw from the study without an explanation or penalty at any time. If one of the people in a group withdraws, the whole group will also be withdrawn from the study and all the data that the group have provided up to that point will be destroyed.

What if there is a problem?

If you have any problems, concerns or questions about this study, you should speak to me as the lead researcher of this project. If you remain unhappy and wish to complain formally, you can do this through the City, University of London complaints procedure. To complain about the study, you need to phone [redacted]. You can then ask to speak to the Secretary to Senate Research Ethics Committee and inform them that the name of the project is: **Investigating the Self-Reflection Process in "Empatchi 2.0: The Human *Tamagotchi*" in Supporting Interpersonal Emotion Regulation**

You could also write to the Secretary at:

[redacted]
Secretary to Senate Research Ethics Committee
Research Office, E214
City, University of London
Northampton Square, London, EC1V 0HB
Email: [redacted]

City, University of London holds insurance policies which apply to this study. If you feel you have been harmed or injured by taking part in this study you may be eligible to claim compensation. This does not affect your legal rights to seek compensation. If you are harmed due to someone's negligence, then you may have grounds for legal action.

The following are the contact information of the researcher (PhD student) and his PhD supervisors.

[redacted]

Who has reviewed the study?

This study has been approved by City, University of London Computer Science Research Ethics Committee

CITY
UNIVERSITY OF LONDON
EST 1894

CONSENT FORM

Title of Study: **Investigating the Self-Reflection Process in "Empatchi 2.0: The Human *Tamagotchi*" in Supporting Interpersonal Emotion Regulation**

Please initial box

1.	I agree to take part in the above City, University of London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records. I understand this will involve: • Using my smart phone to use the app • Logging my emotional state data, which will be accessed and analysed only by the researchers • Being interviewed by the researcher • Allowing the interview to be audiotaped • Allowing the researcher to use quotes from my interview. My name will not be associated with the data, and will not appear on any reports or presentations	
2.	This information will be held and processed for the following purpose(s): PhD Thesis on Phatic Communication for Emotion Regulation Scientific Research Article related to this study that may be published. I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published. The identifiable data will not be shared with any other organisation.	
3.	I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in any way.	
4.	I agree to City, University of London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on City, University of London complying with its duties and obligations under the Data Protection Act 1998.	
5.	I agree to take part in the above study.	

_____	_____	_____
Name of Participant	Signature	Date
_____	_____	_____
Name of Researcher	Signature	Date

When completed, 1 copy for participant; 1 copy for researcher file

[redacted]

Groups Wanted

for Research in
Using Technology to Support Self-Reflec
Sharing Emotion, and Receiving Feedb

We are looking for **groups (of 2 to 6 people) of volunteers above 18 years old** to take part in a study on using technology to support sharing emotions and receiving feedback.

To participate in this study, you will need to ask your trusted circle (close friends or family) to sign up together as a group, with a minimum of 2 people and a maximum of 6 people per group. Each person in the group needs to:

- Use iPhone on regular basis.
- Everyone in the group knows each other and is willing to share emotions with each other
- Are usually in contact on a regular basis

As a participant in this study, you will use our app on your **iPhone (iOS 10 and above)**. This app will allow you to see the **change of your emotional state over time** and **share your emotion with your trusted circle and receive feedback from them**. All the data shared inside the app are strictly confidential.

You will be **interacting with the app for two weeks**. After that, we will conduct a **45 minutes interview session** with each participant.

In appreciation of your cooperation and time, every participant will receive **£10 in iTunes/Amazon voucher.**

For more information about this study, please contact:
Gilang Andi Pradana [redacted]
Department of Computer Science, City, University of London

This study has been reviewed and cleared by the Computer Science Research Ethics Committee of City, University of London. If you would like to complain about any aspect of the study, please contact the Secretary to the University's Senate Research Ethics Committee on [redacted] or via email: [redacted]

[redacted]

Researcher's checklist for compliance with the Data Protection Act, 1998

This checklist is for use alongside the *Guidance notes on Research and the Data Protection Act 1998*. Please refer to the notes for a full explanation of the requirements.

You may choose to keep this form with your research project documentation so that you can prove that you have taken into account the requirements of the Data Protection Act.

	REQUIREMENT	✓	
A	***Meeting the conditions for the research exemptions:***		
1	The information is being used *exclusively* for research purposes.		Mandatory
2	You are not using the information to support measures or decisions relating to *any* identifiable living individual.		Mandatory
3	You are not using the data in a way that will cause, or is likely to cause, substantial damage or substantial distress to any data subject.		Mandatory
4	You will not make the result of your research, or any resulting statistics, available in a form that identifies the data subject.		Mandatory
B	***Meeting the conditions of the First Data Protection Principle:***		
1	You have fulfilled one of the conditions for using personal data, e.g. you have obtained consent from the data subject. Indicate which condition you have fulfilled here: _____ _____		Mandatory
2	If you will be using sensitive personal data you have fulfilled one of the conditions for using sensitive personal data, e.g. you have obtained explicit consent from the data subject. Indicate which condition you have fulfilled here: _____ _____		Mandatory if using sensitive data
3	You have informed data subjects of: vii. What you are doing with the data; viii. Who will hold the data, usually City, University of London; ix. Who will have access to or receive copies of the data.		Mandatory unless B4 applies
4	You are excused from fulfilling B3 only if all of the following conditions apply: vii. The data has been obtained from a third party; viii. Provision of the information would involve disproportionate effort; ix. You record the reasons for believing that disproportionate effort applies, please also give brief details here: _____ _____ _____ N.B. Please see the guidelines above when assessing disproportionate effort.		Required only when claiming disproportionate effort
C	***Meeting the conditions of the Third Data Protection Principle:***		
1	You have designed the project to collect as much information as you need for your research but not more information than you need.		Mandatory
D	***Meeting the conditions of the Fourth Data Protection Principle:***		
1	You will take reasonable measures to ensure that the information you collect is accurate.		Mandatory
2	Where necessary you have put processes in place to keep the information up to date.		Mandatory

E	***Meeting the conditions of the Sixth Data Protection Principle:***		
1	You have made arrangements to comply with the rights of the data subject. In particular you have made arrangements to: ix. Inform the data subject that you are going to use their personal data. x. Stop using an individual's data if it is likely to cause unwarranted substantial damage or substantial distress to the data subject or another. xi. Ensure that no decision, which significantly affects a data subject, is based solely on the automatic processing of their data. xii. Stop, rectify, erase or destroy the personal data of an individual, if necessary. Please give brief details of the measures you intend to take here: _____ _____ _____ _____		Mandatory