

# Emotional Appraisal Kit: Diary Study on Core Relational Themes

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**HCI work on affective interfaces has focused mostly on emotional awareness, reflection, and regulation and less so on emotional appraisal which supports understanding the causes of emotional events. While emotional appraisal research has involved methods of eliciting emotions from photos, imagining scenarios/vignettes, or recalling past emotional experiences, we propose the Emotional Appraisal Kit, a novel method to explore appraisal in the wild. We present a one-week diary study with 18 participants to explore this kit and its bespoke probes whose design has been informed by Lazarus' appraisal theory. Our findings highlight the value of implementing emotional appraisal interfaces not only to support self-reflection but also, to enhance emotional awareness, understanding, appraisal and regulation.**

*Emotional appraisal. Diary study. Probes. Emotional awareness. Emotion regulation. Core relational themes*

## 1. INTRODUCTION

The increasing HCI interest in affective technologies has targeted mostly support for emotional awareness (Umair et al., 2019; Vidyarathi & Riecke, 2013; Ghandeharioun & Picard, 2017; Khut, 2016; Sas et al., 2015) as ability to appropriately perceive and recognise emotions (Lane & Smith, 2021). They also aimed at emotional regulation (Costa et al., 2016; Azevedo et al., 2017; Costa & Adams, 2016; Miri et al., 2018), and reflection (Umair et al., 2019; Sas et al., 2015; Ståhl et al., 2009; McDuff et al., 2012), as ability to manage emotions as appropriate response to particular events or goals (J. Gross, 1998), and to explore one's emotional experiences in order to understand them (Rosenberg, 1990), respectively.

While emotional awareness supports the identification of emotions, and emotion regulation supports controlling one's emotional response (Boden & Berenbaum, 2011; Boden & Thompson, 2015) limited work has focused on affective interfaces that can explicitly support people to understand their emotions, particularly their potential causes, i.e., emotional appraisal.

Such understanding is captured by appraisal theories which claim that emotions are elicited and differentiated based on the cognitive evaluation of the personal significance of emotional events (Rivera, 1977; Lazarus & Smith, 1988), and their impact on one's wellbeing (Bippus & Young; 2012; Lazarus, 1991).

A seminal appraisal theory is Lazarus' who proposed a set of core relational themes, one for each specific discrete emotions, to capture its eliciting aspects, their appraisal, and tendency to respond to the perceived harm or benefit of emotional events (Lazarus, R. S., & Folkman, 1987). For instance, core relational theme for sadness is "having experienced an irrevocable loss", and for happiness is "making reasonable progress toward realization of a goal" (Lazarus & Folkman, 1993, p.14).

Appraisal theory has been used to explore emotional experiences related to user experiences with mobile phones (Arlinghaus & Ollermann, 2021), computerized tasks (Jokinen, 2015), website design (Jokinen et al., 2018), and e-commerce (Lim & Kim, 2020). Lazarus appraisal assessment of goal congruence and coping potentials was implemented in (Jokinen, 2015) to understand the perception of computerized tasks as techno-competence or techno-frustration based on the successful fulfilment of tasks.

However, limited HCI work has explored core relational themes and their value to inform the design of affective interfaces for emotional appraisal. To address this gap, we report a diary study with 18 participants, focusing on the following research questions:

- How can users be sensitized towards emotional appraisal experiences?

- How can appraisal theory be leveraged to inform a research tool for capturing emotional appraisal?
- What is the value of such a tool, and users' perception of its ability to support emotional appraisal?

Our contribution is three-fold. Firstly, we propose a novel Emotional Appraisal Kit, a cultural probe pack designed to explore emotional appraisal in everyday life. Secondly, we report on users' nuanced appraisal experiences. Finally, we articulate design implications for affective interfaces that could support emotional appraisal.

## 2. RELATED WORK

In recent years, there has been an increasing HCI focus on affective technologies. These include technologies for emotional awareness (Umair et al., 2019; Vidyarthi & Riecke, 2013; Ghandeharioun & Picard, 2017; Khut, 2016; Sas et al., 2015), regulation (Costa et al., 2016; Azevedo et al., 2017; Costa & Adams, 2016; Miri et al., 2018), as well as reflection (Sas et al., 2015; Ståhl et al., 2009; McDuff et al., 2012; Umair et al., 2019).

For instance, AffectAura (McDuff et al., 2012) is a desktop-based interactive interface that provides feedback on users' emotional states over extended periods. The effect and the valence of the affective state are represented by bubbles and bubbles' colour, respectively, whereas arousal is mapped through the bubble's shape. The interface helps users to reflect on their daily events. Affective Health (Sanches et al., 2019) is a monitoring skin conductance-based system that combines GSR, and accelerometer sensors to visualize real-time sensed data. The system aims to conclude users' interpretations and reflections to regulate stress, improve performance, track emotions, and change behaviours.

Ripple (Howell et al., 2018) is a color-changing shirt with three thermochromic threads that change colour in response to skin conductance. The mapping between users' emotions and colour patterns is unclear since it is not evident if the display changes as a result of external heat or body heat, but the study outcomes suggest that the properties of thermochromic materials encourage emotional reflection and open interpretation of biosensing data. Affective Diary (Ståhl et al., 2009) is a system that utilizes body sensors to visually represent historical physical activities as anthropomorphic silhouettes, whose forms correspond to the level of movement, while colour represents the level of arousal. Study findings indicate that its users were able to react to visualisations, reflect on previous experiences, and even seek to adjust their behaviours.

Emotional appraisal has been explored to understand emotional responses related to user experience. For instance, an exploration of the relation between emotional appraisals of user experience and frequency of mobile phone use (Arlinghaus & Ollermann, 2021) has shown the correlation between positive emotions and frequent mobile phone users. Individuals' responses to emotional stimuli during computerized tasks were investigated to draw causal inferences regarding the cognitive appraisal process by using an emotion-related questionnaire (Jokinen, 2015). Computer-generated facial expressions were used to understand how individuals appraise artificial stimuli to determine the brain areas that are active during the appraisal process (Zhao et al., 2020).

Appraisal theory has been used to investigate the visual and emotional experiences of user interface (Jokinen et al., 2018). In this study, participants were asked to appraise website designs with affective experiential adjectives. The appraisal theory was combined with the value-creation mechanism in (Yu, 2018) where the author proposed a model that emphasized the emotional aspects of user value to both functional and non-functional criteria within the context of a library service.

Emotional appraisal was also utilized in e-commerce shoppers' value perceptions and behaviours with finding indicating that emotional intelligence had a positive influence on online shoppers' satisfaction (Lim & Kim, 2020). Appraisal theory was also used in virtual environments (Magnenat-thalmann & Kasap, 2009) to assess emotions experienced by virtual characters, by robots to determine user's emotions from their statements (Konstantopoulos et al., 2008), or in EmotiNet knowledge base to detect emotion in text (Balahur et al., 2012).

To conclude, while most HCI research on affective technologies has focused on those supporting emotional awareness or regulation, work on emotional appraisal has explored appraisal from the lens of users' interaction with technologies rather than to support people's understanding of their emotions in everyday life.

## 3. METHOD

We report a one-week diary study with 18 participants to explore how participants are sensitized and engaged in emotional appraisal through bespoke materials.

### 3.1 Participants

We recruited a convenience sample of 18 participants, 10 male and 8 female, aged between 20 to 40 years (Mean = 29.5). We specifically engaged participants without social disorders or other mental health conditions, such as social

anxiety, to ensure that the collected data accurately reflects the reliability and generalizability of our findings. The sample included 5 MSc students, 10 PhD students, and 3 researchers from a range of disciplines such as computing, management, biomedical, and marine sciences.

### 3.2 Procedure

The study aimed to explore emotional appraisal in everyday life and consisted of a one-week diary study during which participants engaged with a cultural probes pack, followed by interviews (Figure 1). Interviews focused on participants' perceptions and experiences with each probe. They lasted between 45 and 60 minutes and were audio-recorded and fully transcribed. The study received Institutional Ethics approval. The interviews were analysed and over 2100 detailed codes were generated by employing thematic coding and analysis using Atlas.ti software.



**Figure 1:** Study including the design of cultural probes, their use in a one-week diary study, and follow up interview. Icons source: Flaticon. Accessed via <https://www.flaticon.com/>

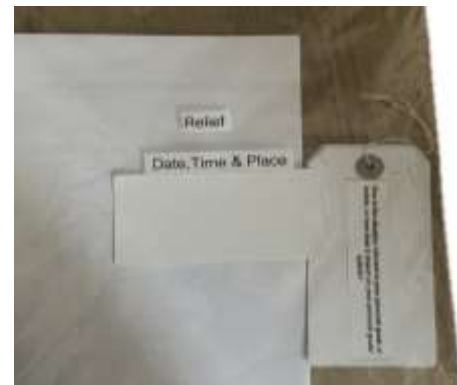
### 3.3 Materials: Emotional Appraisal Kit

Emotional appraisal suggests that emotions develop from individuals' cognitive processing of events, not from actual events (Bippus & Young, 2012). Lazarus and Folkman (Lazarus, R. S., & Folkman, 1987) defined two types of appraisals: primary, which evaluates if a stimulus affects one's well-being, and secondary, as a measure of coping ability (Smith & Lazarus, 1993). Both primary and secondary appraisals include components such as motivational relevance, motivational incongruence, accountability, problem-focused coping potential, emotion-focused coping potential, and future expectancy (Smith et al., 1993). These dimensions have a discrete set of potential values (Ellsworth & Scherer, 2003), along with core relational themes, which are summaries of cognitions that change depending on how appraisal components are combined (Lazarus, 1991a; Lazarus, 1991b). Lazarus framed emotions as mediators, influencing the relationship between cognitive reactions and coping strategies (Lazarus, 1991b) (Table A2).

For the exploration of emotional appraisal, we took inspiration from previous methods involving vignettes (Robinson & Clore, 2001), images (Stella

et al., 2022), or emotional words (Carbia et al., 2020), and adapted the much-used HCI method of cultural probes (Gaver, et al., 1999; Riekhoff, 2008) into our Emotional Appraisal Kit.

We iteratively designed our kit, focusing on 15 common discrete emotions of anger, happiness, sadness, shame, guilt, anxiety, hope, pride, love, fright, disgust, relief, jealousy, envy, and compassion (Lazarus, 1993). For each of these emotions, we had a different pack (15 in total), and participants were asked to complete at least two emotion packs per day so that by the end of the week, they had the chance to complete the pack for each of 15 emotions. Each emotion pack was provided in a transparent folder, labelled with the name of the emotion, and empty label space for participants to write the date, time, and place of the emotional event associated with that emotion, i.e., relief emotion pack (Figure 2). Kit also contained a multi-color pen: black, blue, red, and green.



**Figure 2:** Emotion pack for Relief emotion and six tokens for capturing appraisal components

Participants were instructed that when experiencing a specific emotion, they may choose the emotional pack for that emotion and complete it with situational details, appraisal components, bodily experiences associated with that specific emotion, and its core relational theme. To capture primary and secondary appraisal components, we drew from appraisal theory (Lazarus, R. S., & Folkman, 1987; Smith & Lazarus, 1993), and designed six tokens, each representing one of the appraisal components (Smith et al., 1993). These six components were articulated as questions inspired by previous work (Matos et al., 2022).

Table 1 shows each component and the associated questions captured in each token. Participants were asked to write one to three sentences on the reverse side of each token in response to each question.

After evaluating each emotional experience through its six appraisal components, participants were instructed to examine the next set of probes: 15 cards reflecting core relational themes, one for each emotion (Lazarus, 1993) (Figure 3). We asked them to choose the card that matched the experienced

emotion which they have just captured, by placing this appropriate card in the respective emotion pack. This activity was intended to sensitize participants to core relational themes and how they may relate to specific discrete emotions. Each card was meant to be chosen once, so participants were prohibited from reusing the card after it was inserted into an emotion pack.



**Figure 3:** Set of 15 cards representing core relational themes

In addition to tokens and cards, we also included body maps in our kit, given their potential to express emotional experiences in nonverbal more embodied ways. In HCI, body maps have been leveraged to represent complex bodily sensations and to express feelings (Núñez-pacheco & Loke, 2016). We provided gender-customized body maps including both front and back views of the body (Figure 4). We instructed participants to complete them for each reported emotion, by colouring with their chosen colour the areas on the body where they experienced that emotion while providing also textual descriptions.



**Figure 4:** Blank body map with a female body illustration, intended for female participants

#### 4. FINDINGS

Participants were instructed to complete 15 emotions. However, only four participants were able to complete all 15 within one week, while others ranged from a minimum of 7 to 14 emotions. Out of the 18 participants, 17 completed happiness and relief, while 16 completed sadness. 15 participants completed anger, anxiety, and hope. 13 participants completed guilt and disgust, while 12 completed compassion and love. Whereas, 11 completed pride

and envy, 10 completed fright, and the least completed emotions were jealousy and shame as just 8 participants completed them. They provided reasons for not completing all the emotions including: too many emotions in a short time (n=4); daily routines with fewer social emotional interactions (n=8); less experience of challenging emotions such as envy or disgust (n=1); and rarely experienced emotions such as jealousy (n=1).

To assess participants' grasp of the study's core concept of emotional appraisal, they were asked to elaborate on their understanding of the study's main purpose. For instance, a participant identified the concept to include emotional awareness, understanding, reflection, and regulation:

*"this experience helped me to be aware and understand deeply what I am feeling exactly because sometimes I do not know what I am feeling or its reason, but once I sit down and analyse it, I see that maybe I should not react that much or maybe it is not exactly anger but at that moment I confused it with another emotion"* [P2].

Moreover, they noticed improvements in recognizing emotions and reflecting on them: *"it helped me to recognise and differentiate the emotions"* [P3]. On a similar note, another participant also mentioned: *"I have never thought deeply and analysed situations and how I felt about them, but this task helped me improve my reflection"* [P5].

Therefore, participants' main responses regarding emotional appraisal, and the probes impact on them, ranged from including and improving emotional awareness (n=13), to understanding (n=9), regulation (n=4), and reflection on emotions (n=7). One participant defined it closer to the actual meaning of the cognitive process behind emotional appraisal, *"it is a tool that helps me think more about the emotions I feel as a process in terms of how they link to me and other aspects of my life, such as goals or how these emotions might influence other parts of my life in that day"* [P14].

All responses showed that they were well aware of the study's focus on emotional appraisal. However, they could not recognize all its six components. When asked about them, their responses highlighted mostly goal relevance (n=13), accountability (n=7), and coping potential (n=5), whereas goal congruent/incongruent, and future expectancy were not mentioned explicitly. However, they are implicitly mentioned. For instance, future expectancy was mentioned as how an event can influence what happens in the future: *"emotional component is risk in my future, whether it is going to affect my health, habits, sleeping or other factors"* [P1], and as anticipation of an event: *"sometimes it depends on me, what I am assuming that what should happen with this scenario. So, my expectation and assumption are also a factor"* [P7].

In addition, goal congruent/incongruent was implicitly mentioned like in the following quote: *“the appraisal component is looking whether the situation is negative or positive [which could] affect response to a situation”* [P9].

Coping potentials have two types, emotion and problem copings, albeit participants often coupled them together, rather than separately addressing each one.

**Table 1:** Appraisal components and articulated tokens

Appraisal components	Explanation of components (Smith & Lazarus, 1993; Smith et al., 1993; Blons, 2000)	Tokens questions
Motivational relevance	The degree to which the event is associated with personal goals or concerns.	How is the situation relevant to your personal goals or beliefs, or how does it impact your personal goals/ beliefs?
Motivational incongruence / congruence	The degree to which the event aligns or deviates from personal goals or desires.	How are your goals or beliefs impacted or changed by the situation? Is this impact harmful or beneficial?
Accountability	Identification of who or what is to credit, in cases of motivational congruence, or blame, in cases of motivational incongruence, for the event.	In this situation, who is controlling the event, in another word accountable/responsible for satisfying or for unsatisfying your goals/beliefs? Is it you or others to take credit or blame?
Problem-focused coping potential	Personal capacities to change the event to align or maintain it according to personal desires.	How much control do you have to change or improve the current situation to better support your goals/beliefs?
Emotion-focused coping potential	The perceived probability of emotional adaptation to the event through changing personal interpretations, desires, or beliefs.	Are you able to adapt to the situation by changing your interpretation/ beliefs/desires of the situation? How much ability to adapt do you have?
Future expectancy	Possibilities for changes in the event, actually or emotionally, that could affect the perception of the encounter as less or more motivational congruence.	How could you either change the situation or adapt your interpretation of the situation so that it is better aligned to your goals or less aligned to your goals?

#### 4.1 Engagement with Probes

Participants appreciated the packaging of the kit, and in particular the transparency of the clear plastic container, which some participants metaphorically associated with increase access to their hidden emotions, and acceptance of both positive and negative ones:

*“when I have transparent packets, I can see them. Even though those packets contain both negative and positive emotions, I try to acknowledge and accept the negative emotions rather than ignore*

*them. This is because transparency allows me to admit that it is natural to experience these negative emotions as well. Now I am trying to understand them, to be more transparent with those emotions, and to acknowledge exactly what I'm feeling”* [P4].

This is an important outcome and quality of the probes, that future work in this space could leverage.

#### 4.2 Tokens: Appraisal Components

Most participants (n=16) agreed that tokens had a powerful impact on emotional awareness, understanding, and regulation compared to all other materials in the kit. Table A1 shows a summary of the collected data on tokens.

For awareness, tokens 1, 2, and 6 (goal relevancy, congruence/incongruence, future expectancy) played an important role in increasing awareness, even the impact was to change the emotion itself:

*“I was sad about something, and I answered token 1 as it's not relevant, that was a great point to question my emotion itself. Then there was a different outcome, so that is a good awareness”* [P1]. This highlights that by evaluating situational events, it becomes apparent how accurately identifying and understanding the correct emotion impacts our perception and response.

Tokens not only increased awareness of emotions but also supported emotional understanding (n=18). For example, they helped P7 not only become aware of common negative emotions, but also understand their reasons:

*“I am facing anxiety regularly, I never noticed because I am habituated to it. After answering tokens, I gained awareness of anxiety and understood its reasons”.*

Token 3 (accountability) impacted the understanding of emotions as it prompts reflection on who is accountable for them. Understanding triggers of emotional situations was a new perspective:

*“token 3 helps me identify the person who is interrupting my life. I had never thought about this, but now I started to think of people who are the source of negative emotions to avoid them”* [P18].

Tokens 4 and 5 (problem and emotion copings) supported regulating emotions, instead of ignoring them: *“previously, I was going blindly, so I used to ignore my feelings. But now I think I should overcome this problem”* [P10]. Also, tokens 4 and 5 helped with regulating the level of emotions for P4 *“they helped me to decide the level of my reactions and balance my emotions”*. Therefore, tokens 4 and 5 encouraged thinking about how to control emotional events by setting solutions and regulating reactions to them.

In addition, tokens facilitated an understanding of emotional reactions, exemplified by P16's response, *"I got angry because someone was not looking after me during training and I did not react with the same kind of disrespect. I was being professional and then I think answering tokens made me realize what caused me to react this way"*.

Two participants found a limited impact of tokens because of a pre-existing level of awareness: *"I was already quite aware of my emotions beforehand"* [P12], or specific views of emotions: *"I look at emotions as the different concentrations of different hormones in my body, it was hard to fit my feelings in tokens"* [P13]. The latter participant however, found body maps to be an interesting tool.

Finally, participants' answers to tokens matched Lazarus' theoretical model of emotions (Table A2) for all the listed emotions except for token 3 (accountability) for anger, token 5 (emotion coping) for anxiety, and token 2 (motivationally incongruent) for hope. Emotions like anger and self-blame can be influenced by how individuals evaluate the situations they encounter, as participants in (Parkinson, 1999) reported experiencing unreasonable anger with specific appraisal profiles that were different from those associated with reasonable anger but similar to those associated with unreasonable guilt.

For emotion coping potential related to anxiety, participants indicated that they had a high ability to cope, which does not align with Lazarus model. Previous findings indicated that greater fear and anxiety can drive individuals towards seeking information and taking actions that help them better understand and address potential threats, leading to different ways of coping (So et al., 2016). Hope, being a positive emotion, was found to positively influence participants' goals and beliefs, aligning motivationally with their experiences in hopeful situations.

The main challenges with tokens appear to relate to their questions, as participants found some of them similar or repetitive so that they could not discriminate the fine nuances of these different questions, or prefer to couple them: For instance, P9 could not differentiate between two coping potentials namely problem, and emotions, and even though they were aware that tokens were different, they answered them similarly:

*"I catch myself answering tokens 4 and 5 the same way. I see there are some sort of differences, but very naturally when I was answering one token, I already wrote the answer for the next one"*.

Another issue was tokens being complex questions with multiple parts. Thus, tokens need to be articulated in a manner that makes it clearer the differences between similar components.

Furthermore, not every token corresponded with every emotion, particularly in positive situations, tokens 4 and 5 (coping potentials) did not match well, and this was noticed by most participants. For example, P3 stated: *"I felt like some types of tokens are more specific to one type of emotion; for example, pride, I accomplished something, I don't know what I can do better"*. This is true because we did not design tokens to mirror Lazarus's model. Instead, we aimed to see if participants could identify and differentiate components for each emotion without being guided by putting tokens that just reflect components of specific emotion. This aspect however could be made clearer in future iterations of the tokens.

### 4.3 Body Map

Body map was the only probe that received exclusively positive comments. as participants found it easy, enjoyable, and expressive experience.

In the body maps participants provided various descriptions for the 15 emotions, which differed between physical signals, facial expressions, internal, and external states. They gained awareness of specific emotional sensations and awareness of internal states, including emotional and physiological. For example, body maps acted as interoceptive data for P6, helping her become aware of bodily reactions to different emotions:

*"it is interoceptive data that makes me aware of my reactions to different emotions and I find which parts of my body are impacted"*.

Furthermore, body maps helped P15 notice bodily sensations related to positive emotions, *"I feel heart sensations with happiness and with love it is kind of a tingling sensation in the fingertips"*.

Bodily sensations are sometimes described using metaphorical expressions which previous work has shown that signal high awareness (Citron, F. M., & Goldberg, 2014). Table 2 shows body maps data on how each discrete emotion is commonly experienced in the body.

**Table 2:** Body map data matching emotions to body parts and bodily sensations

Emotions	Body locations	Bodily sensations
Happiness	head, heart, face specifically mouth	full heart/ warmth feeling through the body/ light and happy mind/ heart celebrating with sprinkles of hope/ having a sense that life matters
Relief	head, chest, shoulders	floating steadily in water with a swim ring around the waist, not completely out of the water but not in danger either/ weight had been lifted from the chest/ free mind
Sadness	head, chest/shoulders, eyes	sadness trickling through the body like coldness/ aching heart

Anxiety/ Fright	head, heart, limbs	brain in precision
Anger	head, face, limbs' muscle activation specifically hands	hand/leg muscles were activating, they wanted to do something/ wanting to rip things/ flash, and flare of heat
Hope	head, heart/chest, mouth	foggy target/ a lot of ideas flowing with the generated hope
Pride	heart, face, specifically mouth	sweet feeling, as an energized drink that increases adrenaline,
Compassion	heart, chest, head	heart touching, heartbreaking
Love	heart, hands, mouth	warmth spread through my whole body,
Envy	chest, head, face	feeling drowned due to the weight that I must hold/ feeling small/ internal feeling of unfairness
Jealousy	heart, chest, head	sour vibration and throbbing penetrating feeling through chest/heart
Shame	face, limbs, head	wanting to hide/ hands and legs are tied, I cannot escape from this feeling
Guilt	head, stomach, hands	cloudy feeling in the stomach and head
Disgust	face specifically mouth, stomach, hands	swallow what was happening

All participants appreciated linking bodily sensations with emotions and how this may increase their awareness of the impact of emotions on their bodies.

Another interesting finding is the prevalence of specific body parts being associated to specific emotions, for instance, anger with the head and muscle activation, while love was connected to the heart and hands. Chest and shoulders were associated with relief, whereas jealousy was connected to the heart and chest, and envy to sensations in the head and chest. Here it is an illustrating quote: *"I could see the connection between bodily sensations and emotions; for example, when it is guilt, I feel heaviness in the chest"* [P17]. These are interesting findings indicating the value of such research tools to articulate bodily data which can be positioned within the growing HCI research agenda (Gayler et al., 2021; Sas et al., 2020; Roquet & Sas, 2020) to inform design with and for the body (Alfaras et al., 2020; Roquet & Sas, 2021).

#### 4.4 Cards: Core Relational Themes

Three of the 18 participants matched the completed emotions to the correct cards (core relational themes), while two participants incorrectly matched all the completed emotions. The remaining 13 participants had mixed results, matching some cards correctly while mismatching others. Based on

data shown in Table 3, the average percentage of correct match of core relational theme cards to their respective emotions is 53.4%, ranging from 82 to 13%. The high percentages of correctly matched core relational themes are for emotions of envy, happiness, anger, relief (82%-71%), followed by pride, disgust, fright, compassion, love, jealousy (64-50%), anxiety, hope, sadness (47-44%), guilt (23%), and shame (13%). The p-value of 0.041 from conducting a chi-square test, indicates that there is a significant association between how participants matched emotions with core relational themes, implying it is not random chance.

Two participants highlighted an increasing awareness of recognizing and differentiating similar and rarely used emotions, such as envy and jealousy:

*"I became more aware of these two emotions. I am now differentiating them; from my perspective, I think of jealousy as having a more negative impact on me. On the other hand, envy is more about desire than negative emotions"* [P11].

Aside from the impact of envy and jealousy cards, the card that represented love increased the awareness of the emotion for P1, it was comforting to him to know that love emotion usually but not necessarily reciprocated:

*"love card was participating in affection, usually but it's not necessary to get it back. So that clarification was so satisfying to me when I saw that. Then I got to know I do love a lot of things like that"*.

While some participants found matching cards to emotions an easy task, the match however was not always correct. For instance, the pride card reflected pride in oneself but for P14 the emotion was completed for being proud of someone else *"I think pride, the card related more to pride in myself, whereas the pride I was feeling was for someone else"*.

Other participants perceive the cards' description as not capturing their own feelings: *"they didn't always encapsulate how I felt with that particular emotion sometimes they seemed a bit more exaggerated, for instance, sadness"* [P8].

Cards' impact on emotional awareness and understanding varied but was limited compared to tokens. This was mostly due to the brevity of the interaction with them. Participants also encountered challenges in matching the cards, due to language barriers, as they found the cards written in a psychologically informed manner. However, two of the three participants who correctly matched all the completed emotions spoke English as a second language. While some individuals vocalized their struggles with the task, one participant perceived it as straightforward but inaccurately matched all the emotions.

Additionally, several participants mismatched positive emotions with negative cards, and vice versa, highlighting that the cards were articulated using negatively oriented language. Furthermore, in a few instances, two participants assigned two cards to one emotion, interpreting the emotion as belonging to a set of cards rather than one. Future work on the cards may need to benefit from supporting also emotional literacy.

**Table 3:** Result of matching the core relational theme cards to relevant emotions (N = number of participants who completed each emotion)

Emotion	N	Correct matches	Incorrect matches	Mismatch with
Happiness	17	13	4	pride = 2, love = 1, relief = 1
Relief	17	12	5	compassion, guilt, happiness, love, and pride
Sadness	16	7	9	anxiety=2, hope=2, relief=2 love=1, fright=1 two participants also added compassion card
Anger	15	11	4	shame= 3, fright = 1 one participant also added jealousy card
Anxiety	15	7	8	shame=3, hope=2, anger=1, guilt=1, sadness=1 one participant also added hope card
Hope	15	7	8	disgust, envy, happiness, pride, shame, and compassion
Guilt	13	3	10	shame=4, sadness=1, jealousy=1, hope=1, anger=1, anxiety=1 compassion=1
Disgust	13	8	5	shame=2, pride=1, fright=1, one participant matched 2 cards= hope and love
Compassion	12	6	6	disgust, envy, jealousy, love, sadness
Love	12	6	6	compassion, envy, guilt, pride, and relief one participant used no card
Pride	11	7	4	disgust =2, love=1, relief=1
Envy	11	9	2	love and hope
Fright	10	6	4	anxiety=2, anger=1, shame=1
Jealousy	8	4	4	envy=2, love=1, sadness=1
Shame	8	1	7	guilt=3, compassion=1, jealousy=1, pride=1, relief=1

## 5. DISCUSSION

Now, we will address the original research questions and discuss the significance of our results and their key contributions to affective awareness, understanding, regulation, and appraisal.

### 5.1 Supporting Emotional Awareness, Regulation, Reflection and Appraisal

Findings indicate that most participants mentioned the study's main purpose as increasing emotional awareness (n=13) by categorizing and distinguishing between 15 emotions. This implied abilities to identify and distinguish emotions which mainly refers to emotional awareness (Boden & Berenbaum, 2011). While emotional awareness is necessary, it is insufficient for successful emotional processing (Öhman & Soares, 1994). However, including emotional appraisal provoked an accurate evaluation of emotional events. Participants' responses to tokens aligned with the Lazarus model (Table A2), except for the three instances discussed in section 4.1. This suggests that participants not only demonstrated awareness of events but also accurate appraisal of some of them. The second type of awareness is the identification of the source of emotion which refers to emotional understanding (Boden & Berenbaum, 2011). Nine participants noted that token 3 (accountability) raised awareness of who is responsible for receiving either credit or blame for emotional events.

Token 4, problem-focused coping, is known as situation modification strategies (J. Gross, 1998), participants' responses to this token and token 5, emotion coping potentials, indicate that they employed regulation strategies to cope with specific emotional events.

Reflection allows people to use cognitive abilities to understand and evaluate their thoughts, feelings, and behaviours (Rosenberg, 1990). The results suggest that the kit supports self-reflection. Participants described engaging in the study activities as a form of self-reflection (n=7). The concept of cognitive appraisal has been associated with reflective appraisal by Lazarus and it can be occurred unconsciously as well as consciously (Kappas, 2006).

According to Lazarus (Smith & Lazarus, 1993), primary appraisal is the evaluation process that includes reflecting on whether events are relevant to goals, beliefs, or values and assessing the impacts of events on well-being whereas secondary appraisal is the reflection on individual coping abilities. Those types of reflections were included in tokens. Reflecting on embodiment was supported by using body maps, as participants were reflecting on sensations and physical experiences. Therefore, engaging with probes supported emotional reflection, awareness, understanding, and regulation. This indicates the valuable role of such a tool in supporting emotional appraisal.



## 5.2 Theoretically Informed Emotional Appraisal Probes

The application of emotional appraisal theory to the design of our Emotional Appraisal Kit was not trivial. Previous work has leveraged methods of eliciting emotions from images (Stella et al., 2022), recalled experiences (Losh & Capps, 2006), emotional words (Carbia et al., 2020), or videos (Lindgren et al., 2018). In contrast, our kit aimed to support the appraisal of daily emotional events, while drawing from a cognitive theory of emotional appraisal (Smith & Lazarus, 1993; Lazarus & Smith, 1988) and material centred-design (Wiberg, 2014).

To address the first and second research questions, we initially identified the key components of emotional appraisal theory. Then, these components were articulated in different formats with the usage of simple materials that participants could touch and interact with, as moving beyond digital representations toward more traditional tools can support rich engagement (Kuznetsov et al., 2014). While some of these materials were easier to understand and engage with, others such as appraisal components could benefit from future work to address the identified challenges.

## 6. CONCLUSION

This paper reports on a diary study that supports emotional appraisal experiences through engaging with bespoke probes based on Lazarus' theory. These probes successfully sensitized participants towards appraising their emotional experiences for 15 emotions. Findings indicate the efficiency of these probes in strengthening emotional awareness, understanding, reflection, and regulation. This highlights the value of such tools to support appraisal processes for everyday emotional events.

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Emotional Appraisal Kit

Alsubhi • Sas

APPENDIX A

Table A1: Summary of collected qualitative data on tokens

Emotion	N	Token1: Motivational Relevance	Token2: Motivationally Congruent /Incongruent	Token3: Accountability	Token4: Problem Coping Potential	Token5: Emotion Coping Potential	Token6: Future Expectations
Happiness	n=17	relevant (n=15) not relevant (n=3)	congruent (n=17)	other-credit (n=3) self-credit (n=12) self and other (n=2)	no need to cope (n=10) high (n=7)	no need to cope (n=10) high (n=7)	high (n=17)
Relief	n=17	relevant (n= 15) not relevant (n=2)	congruent (n=17)	self-credit (n=11) other-credit (n=6)	high (n=11) moderate (n=2) low (n=4)	high (n=13) low (n=4)	high (n=17)
Sadness	n=16	relevant (n=15) not relevant (n=1)	incongruent (n=16)	self-blame (n=5) other-blame (n= 3) self and other (n=3) uncontrollable (n=5)	high (n=2) low (n=14)	low (n=5) high (n=11)	low (n=12) high (n=4)
Anger	n=15	relevant (n=12) not relevant (n=3)	incongruent (n=15)	other-blame (n=8) self-blame (n=7)	high (n=10) low (n=5)	high (n=9) low (n=6)	high (n=13) low (n=2)
Anxiety	n=15	relevant (n=14) not relevant (n=1)	incongruent (n=10) partly congruent (n=5)	self-blame (n=9) other-blame (n=6)	low (n=5) high (n=7) moderate (n=3)	low (n=2) high (n=13)	low (n=5) high (n=10)
Hope	n=15	relevant (n=15)	congruent (n=15)	self-credit (n=11) other-credit (n=4)	high (n=12) low (n=3)	low (n=3) high (n=12)	high (n=15)
Guilt	n=13	relevant (n=11) not relevant (n=2)	incongruent (n=11) partly congruence (n=2)	self-blame (n=11) other-blame(n=2)	no coping (n=4) high (n=9)	low (n=5) high (n=8)	high (n=13)
Disgust	n=13	relevant (n=9) not relevant (n=4)	incongruent (n=13)	other-blame (n=10) self-blame (n=3)	low (n= 5) high (n=8)	no need to cope (n=6) low (n=5) high (n=2)	high (n=8) low (n=5)
Compassion	n=12	relevant (n=12)	congruent (n=6) incongruent(n=4) no impact or change (n=2)	self-credit (n=4) other-credit (n=9)	low (n=9) high (n=3)	no need to cope (n= 6) high (n=6)	high (n=8) low (n=4)
Love	n=12	relevant (n=12)	congruent (n=12)	other-credit (n=4) self and other (n=8)	no need to cope (n=3) high (n=9)	no need (n=8) high (n=5)	high (n=12)
Pride	n=11	relevant (n=11)	congruent (n=11)	self-credit (n=9) other-credit (n=3)	no need to cope (n=2) high (n=9)	no need (n=4, high (n=6)	high (n=11)
Envy	n=11	relevant (n=11)	incongruent (n=8) neutral (n=3)	self-blame (n=9) other-blame (n=2)	high (n=7) low (n=4)	high (n=11)	high (n=10) low (n=1)
Fright	n=10	relevant (n=7) not relevant (n=3)	incongruent (n=10)	other-blame (n=3) self-blame (n=3) external factor (n=4)	no need (n=4) high (n=6)	no need to cope (n=4) high (n=6)	low (n= 2) high (n=8)
Jealousy	n=8	relevant (n=7) not relevant (n=1)	incongruent (n=4) congruent (n=4)	other and self-blame (n=8)	high (n=5) low (n=3)	high (n=6) low (n=2)	high (n=8)
Shame	n=8	relevant (n=8)	incongruent (n=8)	self-blame (n=8)	high (n=5) low (n=3)	high (n=7) no need (n=1)	high (n=8)

**Table A2:** *Appraisal components and core relational themes associated with 8 emotions informed by Lazarus' model (Smith et al., 1993; Blons, 2000)*

<b>Emotions</b>	<b>Appraisal components</b>	<b>Core relational themes</b>
Anger	Motivationally relevant Motivationally incongruent Other-accountability	Other-blame
Guilt	Motivationally relevant Motivationally incongruent Self-accountability	Self-blame
Fear/Anxiety	Motivationally relevant Motivationally incongruent Low/Uncertain (emotion-focused) coping potential	Danger-Threat
Sadness	Motivationally relevant Motivationally incongruent Low (problem-focused) coping potential Low future-expectancy	Irrevocable loss, Helplessness
Happiness/Joy	Motivationally Relevant Motivationally Congruent	Success
Hope	Motivationally Relevant Motivationally Incongruent (high) problem-focused Coping Potential (positive) future expectations	Effortful optimism
Relief	Motivationally Relevant Motivationally Congruent	Easing of threat
Pride	Motivationally Relevant Motivationally Congruent Self-Accountability	Valued achievement