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# CUPA: Cube Pal for Developing Children's Emotional Intelligence and Parent-Child Relationship

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## Abstract

Emotional intelligence (EI) development of children is comparatively an underexplored domain and is highly dependent on the quality of children's relationships with the adults and early care experience. Yet, the observed pattern of increasing parental employment is threatening communication and interaction between parents and children, hence affecting quality family time and parent-child relationship. In response to the aforementioned needs, this paper presents CUPA, a children companion tool that encourages EI and parent-child relationship. The two main contributions are: First, CUPA proposes a different approach to children's EI by combining '*interoception & deep breathing*' and '*emotional check-in & review*' methods to encourage emotional awareness and sensitivity, alongside various forms of interaction. Second, CUPA presents the use of ritual and routine to encourage children independence while promoting parent-child relationship, as well as healthy morning and sleep rituals. Functionality and interaction were explored with 21 participants and overall results returned positive. Additional roles and concept refinement of presented tool were discovered.

## Author Keywords

Companion; Emotional Intelligence; Social and Emotional Development; Interaction with Children;



Figure 1: Povi, cuddly storytelling buddy with updatable EI content platform [11].



Figure 2: Kimochis – plush toy & book combos for EI [7].



Figure 3: Moodsters – social and emotional toy book combos for children [10].

Parent-Child Relationship; Interoception; Mindfulness; Emotional Awareness; Ritual and Routine

### ACM Classification Keywords

H.5.2. User Interfaces: User-centered design

### Introduction

A person's success in life is very much dependent on the emotional intelligence (EI), as much as it is on the intelligence quotient (IQ). EI refers to a person's emotional awareness and competence to accurately identify and understand the feelings and emotions of oneself and others, then to regulate and express meaningful emotions that facilitate meaningful social interactions. It is a flexible skill set closely related to one of the major development areas – social and emotional development – inclusive of a collection of social and emotional skills that can be trained, acquired, and improved on [13], unlike IQ that is stable over the lifetime [6,13]. Social and emotional skills impact mental health and wellbeing directly, and shape the “fundamental element of human behavior” [6,13]. Children develop social and emotional skills from birth through social relationships and interactions with surrounding individuals within their environments [1,6]. Particularly during early childhood – a delicate time for most impactful and rapid brain development, the quality of a child's early care and relationships with others have great significance on his/her behaviors in later stage of life. Having said that, articles in recent years are increasingly reporting that parents today are becoming too busy for children, majorly by the reasons of hectic jobs and busy schedules. Yet, parent-child relationship is the most important attachment for children as far as children's growth and development are concerned. Parental detachment may potentially

cause long-term damages to children's social emotional skills due to the lack of social interactions and relationships that form essential foundation to support children in attaining social and emotional competencies [1]. It is observed that lately technology-enabled tools are being developed to aid children's development and learning mainly emphasizing on cognitive development, particularly through gamified programming education, exponentially gaining value in society. Yet, new technologies development for children's EI is underexplored as the attention society has placed on children's intellectual skills or IQ is overshadowing its significance. Currently, most relatable example is Povi (figure 1). Other EI tools currently available for children are dominantly conventional toy book combos and mobile applications (hereinafter apps).

### Related Work

Tool examples for children's EI are fundamentally based on at least one of the five widely recognized EI components developed by Daniel Goleman namely *self-awareness*, *self-management*, *motivation*, *empathy*, and *social skills* [2,3].

### Self-Awareness

Self-awareness is the basis of emotional literacy that supports the other EI elements and it starts with knowing when feelings/emotions are present, followed by acknowledging, identifying, accepting, reflecting, and predicting them [4]. To cope with emotions, one has to first be aware of the presence of the emotions. Toy book combos implement self-awareness by educating children to identify emotions through learning the visible and non-visible signs of different emotions using story/activity books and related physical toys. Physicalizing book contents caters



Figure 4: Mobile app that encourage children to reflect on present feelings and emotions.

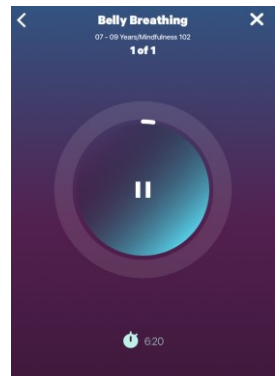


Figure 5: Mobile app – mindfulness-based audio guide.

visualization that enhances learning experience as that makes the book contents more relatable, and also encourages pretend play that helps children to develop and regulate their social and emotional skills. For instances, *Kimochis* and *Moodsters* (figure 2,3) use storybooks where the main characters are physicalized as dolls to represent different personalities/emotions, nevertheless the interactions are mainly reactive and imaginative. Apps create self-awareness using emotion recognition games, or by drawing one's attention of presence feelings/emotions and bodily physiological conditions using emotion reflection and tracking techniques. For example, *Smiling Mind* helps children to pay attention to their current state feelings and emotions using an evaluation method (figure 4) before and after audio-based mindfulness practices (figure 5). That said, the evaluations can be counterproductive given that children may not yet be capable of accurately identifying and describing emotions [5].

### Self-Management and Motivation

Self-management concerns the regulation of emotional experiences that involves self-control, conscientiousness, adaptability, openness, and integrity. Apps such as *Smiling Mind* uses mindfulness to build children's EI base [3] with pre-recorded mindfulness meditation audios to help children to keep calm, relax, and learn to gain control emotions and situations. It logs children's meditation progress and past moods in a dashboard (figure 6). *Mood Meter* app allows children to report moods and explore or create strategies to help shift and manage their moods (figure 7). It presents past moods using emotion grid based on children's logged emotion diaries. Although both apps keep track of children's progress, however motivational factors are not conspicuous and explicit enough for

children to elicit self-improvement. Also, afforded interactions are limited to screen-based interaction.

### Empathy and Social Skills

Povi (figure 1) functions to encourage children age 3 to 8 and parents to discuss emotions and feeling by sharing short stories based on everyday situations and problems [11]. The story contents come in age appropriate packages, further segregated into different EI development categories and themes. For example, development category for age 5 to 6 is empathy and corresponding theme is "school play" [11]. Contents can be downloaded by parents using Povi's app and played through Povi's internal stereo-audio device when its hand is pressed. The discussion is driven by parents and supported by guides on the app. Povi promotes communication of feelings and emotions between parents and children that teaches children perspective taking, emotion regulation, and social skills required to navigate through their lives. Also, toy book combos promote children's social skills as the toys can be used as a medium to facilitate communication of feelings and emotions. For example, *Kimochis* (figure 2) dolls have front pouches that can store small feeling plush where children can use to communicate feelings.

### System Design

To address the three major limitations (refer side bar) of related work, CUPA (figure 9) is designed to be young children's companion (age 4-8), aims to lay foundation for EI and encourage parent-child relationship by using activity scheduling and creating emotional awareness. There are 3 components: *CUPA*, parent *app*, and *child app*. There are 5 stages of interaction: *Awake*, followed by *Engage*, *Check-In*, *Review*, and lastly *Sleep*. To better illustrate the

**Limitation:**

1. *Interaction:* Lack of proactive interactions and personalized experience may compromise level of engagement and effectiveness over time.
2. *Language:* Reliance on children's language skills and abilities to correctly interpret, understand, and appropriately respond to text/audio contents.
3. *Dependency:* Foresaid limitations require adult participation and supervision in order to fully exploit the capabilities and benefits of the tools. This can be a struggle to time-poor parents.

**Interoception:** The ability to detect "signals arising from the inner organs...typically indexed using performance on a heartbeat detection task" [9]. The ability to detect heartbeats may lead to greater arousal property of one's experience of emotions.

motivation, a scenario is provided: *Lorelai, a busy working parent, schedules the next day activities for her daughter, Lucie – 5 years old, using the parent app.*

**Awake: Gentle Alarm and Sunrise Light**

*Scenario: According to the schedule, CUPA wakes Lucie up at 7:00 AM. Gentle alarm fades in and gains volume gradually as CUPA's body fades in sunrise glow. Lucie wakes up and waves at CUPA to dismiss alarm. CUPA greets Lucie and guides her through the Engage stage.*

This method reduces the disruption caused by blaring alarms therefore allow children to wake up healthily.

**Engage: Interoception and Deep Breathing**

*Scenario: Lucie holds CUPA in her hand and places her thumb on CUPA's ear (pulse sensor). As CUPA detects Lucie's heartbeat, it pulsates according to her heartbeat and guides her through sunlight breathing exercise.*

CUPA guides children through an engagement process to connect with inner self through interoception and mindful deep breathing combined to mentally prepare them for the day. First, interoception is achieved using heartbeat detection and simulation method. Research suggests that people with greater interoceptive sensitivity have greater ability to feel internal signals from body such as detecting heartbeats [9]. Good heartbeat detectors usually experience emotions with greater intensity whereas poor heartbeat detectors can be correlated to autism and alexithymia [9]. Inspired by this psychology definition, CUPA adopts such concept to increase children's self/emotional awareness, which is one of the five widely recognized components of EI developed by Daniel Goleman [2,3]. It is achieved by improving their heartbeat sensitivity,

by using a pulse sensor to detect heartbeats and giving immediate feedback using a vibration motor to simulate and amplify heartbeat sensation. Next, mindful breathing is achieved using the notion of breathing in sunlight paired with animation and sound effects of deep breathing in and out. This does not only add fun to the relaxation process, but also reduces the dependency of text or instructional audio guides. Deep breathing sound effects enable children to experience a more immersive engagement process with eyes shut.

**Check-In: Emotion Reflection**

*Scenario: Lorelai scheduled for Lucie to relax after school at 2:00 PM. At 2:00 PM, CUPA notifies Lucie of the new activity. After Lucie gestures to acknowledge, CUPA asks Lucie: "How are you feeling now?", and signals Lucie to gesture up for feeling good, or down for feeling bad. If Lucie gestures down, the sunlight she breathed in earlier will reduce on the app.*

Check-in is triggered when a new activity starts. CUPA encourages children to reflect upon their current emotional state and collects children emotion input of undifferentiated emotional state – whether generally feeling good or bad – as children may have difficulties identifying and labelling their actual feelings [5]. Reduction of sunlight collected from deep breathing when feeling sad motivates children to shift moods, indirectly encouraging creation of coping strategies.

**Review: Playback of Emotional Changes**

*Scenario: Before Sleep activity at 7:00 PM, CUPA reviews Lucie's emotional change with her from today's first to last activity on the child app. Lorelai views the playback on the parent app on her way home and realizes Lucie is overall happy but sad after school time.*

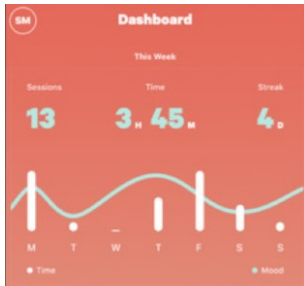


Figure 6: Emotion dashboard.

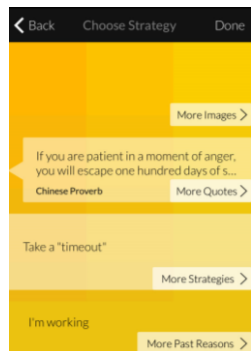


Figure 7: Children choose/create strategy to help shift mood after reporting a mood.



Figure 8: CUPA prototype first iteration.

CUPA provides insight of children's emotional wellbeing that is meaningful to both parents and children: Children gain emotional awareness; Parents gain insight to children's inner worlds, enabling them to find topics to discuss with children and to help children open up. Through discussing feelings and emotions, parent-child bond can be strengthened and children learn to identify and regulate emotions from the relationship.

### ***Sleep: Soothing Music and Night Light***

*Scenario: After reviewing, CUPA appears sleepy and Lucie flips its face down. CUPA wishes her goodnight and eases her into sleep by playing soothing music and glows for 15 minutes before fading out. CUPA glows in her favorite blue color since she is overall happy today. The next day, Lolerai makes time to talk to Lucie about what happened at school yesterday that made her sad.*

Glow color is dependent on the sunlight remained – more than 50% (most preferred color) or less than 50% (second preferred color). This feature can also be used as emergency night light for children by flipping CUPA up or mood light indicator for parents (figure 10).

## **Significance**

### ***New Approach to Children's EI***

This paper presents a unique approach to children's EI development by making basic mindfulness practice and emotional awareness a ritual and routine in daily life: Heartbeat detection and simulation enhance children's interoceptive sensitivity; Deep breathing teaches children the most basic form of mindfulness practice for calmness and relaxation; Emotional check-in and review heighten children's sensitivity towards the presence of their feelings and emotions and strengthen parent-child relationship.

## **Ritual and Routine**

**Activity Scheduling:** Routine gives children a sense of mastery, comfort, and security, and also nurtures relationships [8,12]. Predictable routine facilitates independence and telling time for children who do not yet know how to tell time [12]. It also encourages participation of time-poor parents in children's daily life with minimal disruption to their other responsibilities. **Healthy Morning & Sleep Ritual:** The interaction stages promote healthy morning and sleep rituals that ease transition of events for children and support their emotional self-regulation [8].

## **Results**

The ideation process has undergone two iterations of refinement and prototype development (figure 8,9). The latest prototypes of CUPA and the child app were presented to the public for testing during a graduation exhibition (figure 11) whereby feedbacks from 21 people who tested the prototype, including psychologists, designers, developers, students, parents, and a child, are collected. As the parent app prototype has not been fully developed, sample schedules were fabricated for testing. Almost all feedbacks are positive. 15% suggested to incorporate extra functionalities, mostly speech capabilities, followed by computer vision and alternative ways for emotion monitoring; whereas another 15% suggested for more activities such as those that encourage physical activities, mindfulness-based games, and activities between parents and children. Also, most commented that they felt more connected internally during the Engage stage.

## **Refinement and Future Work**

First refinement is interaction enhancement by refining interactive elements. Emotion recognition can be

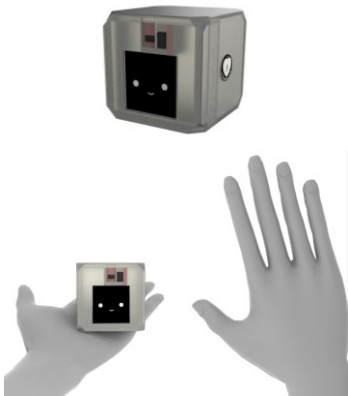


Figure 9: CUPA prototype second iteration. Gesture as main form of interaction.

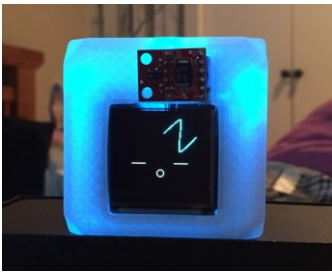


Figure 10: CUPA at Sleep stage.



Figure 11: Prototype testing.

explored as an emotion monitoring alternative for better accuracy and efficiency, and to allow for feature such as educating children to express specific emotions. Also, addition of socially-supportive features for parents, as well as responses from test participants and other interaction forms (e.g., voice interaction) will be taken into consideration for next iteration. Second refinement is conducting user test with parents and children using complete and proper settings and procedures to yield more holistic, relevant, and accurate results. Although current prototype is able to convey the main concept and interactions, however, parent app has not been tested together with the other components. Future research development in addition to refinement can tap into the application for children with limited expressive language skills to communicate feelings and emotions with parents/caregivers.

## References

1. Centre for Community Child Health. 2016. Community Paediatric Review: Current issues in children's health and development. Retrieved November 23, 2016 from <http://www.rch.org.au/uploadedFiles/Main/Content/ccchdev/CPR-Vol24-No2-full-issue.pdf>.
2. Daniel Goleman. 2006. Emotional Intelligence: Why It Can Matter More Than IQ. 10<sup>th</sup> Anniversary Edition, Bantam Books, New York, USA.
3. Diane Bardol and Bridget Connor. 2013. Peace Making and Emotional Intelligence. In *The International Journal of Pedagogy and Curriculum* 9, ISSN Pending.
4. EQI.org. n.d. Emotional Awareness. Retrieved December 01, 2016 from <http://eqi.org/aware.htm#Levels%20of%20Emotional%20Awareness>.
5. Kendra Moyses. 2013. Help young children identify and express emotions. Retrieved December 02, 2016 from [http://msue.anr.msu.edu/news/help\\_young\\_children\\_identify\\_and\\_express\\_emotions](http://msue.anr.msu.edu/news/help_young_children_identify_and_express_emotions).
6. KidsMatter. 2014. Developing children's social and emotional skills. E-Book. Retrieved November 23, 2016 from [http://www.kidsmatter.edu.au/sites/default/files/public/KM%20Linking%20resources%20C2%20Book\\_web\\_final.pdf](http://www.kidsmatter.edu.au/sites/default/files/public/KM%20Linking%20resources%20C2%20Book_web_final.pdf).
7. Kimochis. n.d. Kimochis – toys with feelings inside. Retrieved November 24, 2016 from <http://www.kimochis.com.au/?PCID=16171>.
8. Linda Gillespie and Sandra Petersen. 2012. Rituals and Routines: Supporting Infants and Toddlers and Their Families. Retrieved December 03, 2016 from [https://www.naeyc.org/yc/files/yc/file/201209/Rock-n-Roll\\_YC0912.pdf](https://www.naeyc.org/yc/files/yc/file/201209/Rock-n-Roll_YC0912.pdf).
9. Lisa Feldman Barrett et al. 2005. Interoceptive Sensitivity and Self-Reports of Emotional Experience. In *J Pers Soc Psychol* 87, 5: 684-697.
10. Moodsters. 2016. Social-Emotional Development Toys for Children. Retrieved November 27, 2016 from <http://themoodsters.com/>.
11. Povi.me. 2016. Povi: Endless Stories to Boost Kids' Emotional Intelligence. Kickstarter. Retrieved November 24, 2016 from <https://www.kickstarter.com/projects/povibuddy/povi-the-connected-storytelling-buddy/description>.
12. Tracy Martin. 2016. The importance of routines and schedules in childcare. Retrieved November 29, 2016 from <http://wpri.com/2016/09/26/the-importance-of-routines-and-schedules-in-childcare/>.
13. Travis Bradberry. 2014. Emotional Intelligence - EQ. Retrieved November 23, 2016 from <http://www.forbes.com/sites/travisbradberry/2014/01/09/emotional-intelligence/#7a9e14ec3ecb>.