

On the development process of *ReApp*, an Emotion Regulation Training Mobile Game, in the context of Gamification and the creation of Games for Wellbeing.

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ABSTRACT

ReApp is a mobile, multiplayer game aimed at training people in emotional regulation, specifically in cognitive reappraisal (CR). The game was produced as part of an interdisciplinary research between a group of researchers from the *Baruch Ivcher School of Psychology at IDC - Prof. Eran Halperin, Lihi Harel*, and researchers from the *Game Design Program at Shenkar College for Engineering and Design - Dr. Vered Pnueli, Benjamin Cook, Adi Galili and Mor Mendelevi*. The process of CR involves the reinterpretation of situations in a manner that changes our emotional responses to them. In this process an individual learns how to control her emotions and express less negative and more positive emotions. CR is an *antecedent* focused strategy for emotion regulation as it concerns the things we do *before* our emotion response tendencies have become fully activated and influence our behavior. By contrast to other emotion regulation technics, such as *Suppression* for instance, CR trains people to reappraise situations first and following this to control their emotional response. Suppression, on the contrary, is a response – focused strategy. People who suppress reappraise their emotional response. CR is widely valued as a more productive process for emotion regulation that benefits from less side-effect, such as memory loss. This paper focuses on the process of developing a game that will serve as a training tool for people who are interested in practicing CR. It describes the challenges we faced in our attempt to implement a psychological model into a fun driven environment, whilst keeping the game effective in its psychological goal. *ReApp* is still a work in progress. Future research raises questions related to the use of user-generated-content to increase players' scope of training and sense of playfulness, and the employment of AI to have a better monetization on players progression in CR.

Author Keywords

Emotion regulation; Cognitive Reappraisal; Behavior change for Health; Games for wellbeing ; Purposeful Games; Gamification.

ACM Classification Keywords

K.4.1. Computers and Society; Public Policy Issues – Computer-related health issues; K.8. Personal Computing; Games.

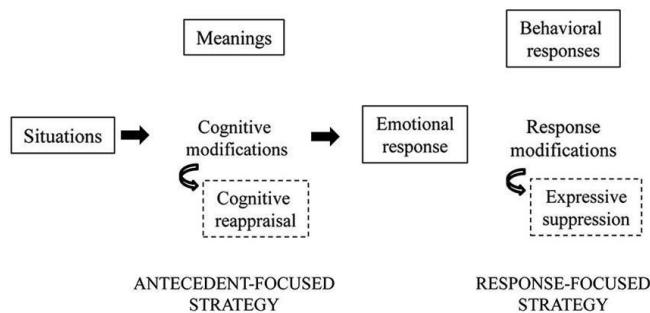
INTRODUCTION

This research is a collaborative interdisciplinary effort aimed at developing a tool that will train people to use Cognitive Reappraisal (CR), a valued strategy for Emotion Regulation. Emotion Regulation is the process by which people learn how to control their emotions, their intensity, and how to express them. [1] People who are not trained in Emotion Regulation or who are unable to match emotion to the situation, are more exposed to extreme psychological problems and social dysfunction. [2] Emotions are generated when a person appraises a stimulus emotional significance, which triggers an effective psychological and behavioral response. [3-4] There are several ways to regulate emotions. Regulation can be intrinsic – of personal feelings, extrinsic – regulating the emotions of other, it can be automatically, or controlled, consciously or unconsciously, and may affect one or more stages of the emotion generation process. [5] The two major emotion regulation strategies used in the field study of emotions are Cognitive Reappraisal and Expressive Suppression. However, researchers in the study of emotions see clear benefits for using CR over Suppression. Following James

Gross' classic model for emotion regulation strategies, CR trains people how to change the trajectory of emotional responses by reinterpreting the meaning of the emotional response stimuli. [1] In contrast to suppression, which is a response strategy for emotion regulation, CR is an antecedent focused strategy for emotion regulation that concerns the things we do before the emotion response tendencies have become fully activated and have changed our behavior responding. Studies have suggested that individual who habitually reappraise experience and express less negative and more positive emotions. Moreover, they show that across a variety of negative emotions, such as disgust, anger, sadness and distress, CR effectively decreases negative emotional experience without substantial psychological costs. [6]

Expressive Suppression, on the other hand, is defined as the attempt to hide or reduced ongoing emotion and generally is perceived as less effective than CR due to side-effects such as memory loss. [7]

Figure1: A scheme by Gross and John of Cognitive Reappraisal and Expressive Suppression emotion regulation processes [1]



Our goal in the development of *ReApp* was to create a training tool for people practice CR on a daily basis. We chose to begin with a digital adaptation to a training method that was regularly used in the research lab of the *Baruch Ivcher School of Psychology at IDC* that study CR. In this method, testers were asked to write their interpretations for situation that were exposed to then via images. They needed to specifically choose an emotion that expresses their feeling toward the situation presented in the picture. After writing down their interpretation and subsequent feeling e.g. Angry, Happy, Disgust, they were asked to reappraise their interpretation of the situation, and then write again how they feel about it. Testing sessions usually lasted twenty minutes, in small groups and over two weeks before showing initial results. Our task was to create a tool that would enable a larger scope of people to train in CR on a daily basis. Furthermore, we wanted to produce a product that people would use over time during their leisure time. Therefore, we decided to create a game that would adopt the principles of CR, and at the same time will have an

engaging game mechanic that also appeals to people who are not looking for emotional therapy.

RELATED WORK: COGNITIVE REAPPRAISAL IN GAMES

As notably observed by Richard M. Ryan and Edward L. Deci in their study of self Determination, there are two types of motivations which call people to action: intrinsic and extrinsic. Extrinsic motivation refers to doing an activity, primarily, because it leads to a separable outcome or an instrumental value. Intrinsic motivation occurs when the activity itself is interesting and spontaneously satisfying. When intrinsically motivated, people display curiosity, explore novel stimuli and work to master optimal challenge. [8] In recent years, the process of Gamification has widely grown to be an effective method for creating intrinsic motivation in people. By adding game elements to non-game activities and platforms, the use of Gamification has the ability to create a participation-and-reward system that shapes user behavior and increase her motivation to continue engaging with the activity. [9] Indeed, recent years have seen a rise in the development of games and gamified systems for therapy. In the specific field of 'Emotion-focused therapy' there are several examples. For instance, *Aurora* (2011), [10] is a gamified systems aimed to promote emotional reflection and social sharing of emotions. Users of *Aurora* can archive their emotions and share it with others. Yet, while the system corresponds with some game aspects, such as personalization, archiving and sharing, this mobile app is not a game per se, as it lacks aspects of progression, competitiveness and skill development that we sought to include in the development of *ReApp*. Another mobile app in this category is *iCouch CBT*. [11] The app teaches users to think "better thoughts" In regard to upsetting situations through filling out guided questions that ask them to re-evaluate and select the distortions that may be negatively influencing their feelings. Similar to *Aurora*, this app is focused on archiving feelings and introspection. A different approach to training people in positive psychology via mobile technology is introduced in the app *Live Happy*. [12] *Live Happy* offers tips and ideas to meaningful lives through a moderated system of interviews with positive psychology professionals. There are various activities that are set to help users boost their happiness, including a 'Gratitude Journal' and a 'Strive Journal' for designed to aid users to achieve happiness goals. However, while such examples and similar others fall into the category of gamification, there are very few examples for games that implement positive psychology principles into their game mechanics. A unique example is *Good*

Blocks. [13] The game mechanic is based on swiping positive emotions or thoughts towards you (downwards), and negative ones away from you (upwards). Unlike the aforementioned examples, in *Good Blocks* there is a clear winning and losing framework and a clear progression mechanic. Similarly to *Good Blocks*, *ReApp* belongs to the category of Purposeful Games - Games that intend to fulfil a purpose beyond the self-contained goal of the game itself. [14] Yet, purposeful games' biggest challenge is to demonstrate the transfer of learning, and at the same time, remain engaging and entertaining, i.e, to be games. Correspondingly, in the development process of *ReAPP* we opt to create a game that will translate our desire to train people in emotional regulation, yet at the same time, it was very important for us that the game will appeal to people who seek to connect through competitive play, regardless any emotional therapy needs. We hoped we could entice more people this way to gradually train in CR.

METHODOLOGIES

In the initial brainstorming of the main mechanic of *Reapp*, we immediately seized upon the idea that the game must be multiplayer. The practicing of regulating emotions and dealing with stressful situations is best done while facing another human, who can understand the full depth and complexity of a situation. Inspired by other turn based games, such as *Draw Something*, [15] we determined that we should use the editing of images to allow our players to reappraise their partner's emotions.

The game flows as follows:

- 1) Judge receives a picture and is asked to input her emotional response on the “emotional wheel”.
- 2) Editor receives Judge’s picture, her initial response, and a “challenge”. The challenge is to get Judge to react in a different way to the picture (example: reduce Judge’s sadness towards the situation). Editor has tools to modify the picture, such as adding a caption or speech bubble.
- 3) Judge receives the modified picture and again is asked to input his emotional response of the wheel.
- 4) Based on Judge’s response and how close Editor was to her given challenge, the players receive a score. Based on this score, items and behaviors in the progression will unlock.

By modifying the original picture, the Editor helps the other player to reappraise her emotions regarding the picture, decreasing or increasing her initial emotional reaction. The

players switch roles every round, and thus both are trained in reappraisal in both forms: The ability to reappraise a situation, and to regulate their emotional response to it.

THE DESIGN FLOW

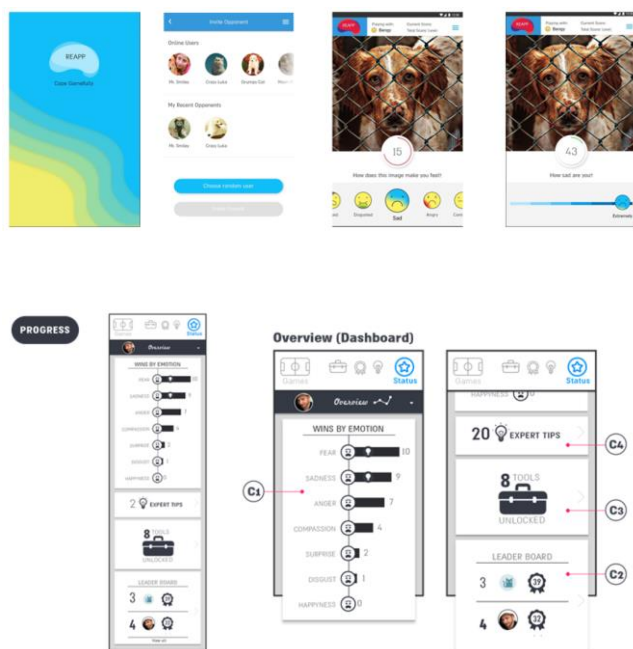
Figure 2: *ReApp* design scheme



During the development process we made sure to conduct play-testing at every milestone: Ensuring both the game remains light hearted and fun, while interesting and actually valid to Cognitive Reappraisal. Initial play testing was taken at stages of paper prototype. Students were modifying images on paper to validate the initial game design. Following playtests were taken with the actual game on smartphones. In addition to the participants answering

surveys about their experience, the app itself records analytics and was used to measure long term effects. In a survey conducted by Lihi Erhael that tested the effectiveness of *ReApp* on users to reduce political conflicts, the following findings were found: “*Results indicated that ReApp is successful in training participants to use reappraisal. Participants who played ReApp (compared with the control condition) reported more frequent usage of reappraisal when responding to conflict-related images. Moreover, participants who played ReApp reported fewer negative and more positive emotional experiences when reacting to conflict-related images; specifically, anger, disgust and sadness were reduced, Joy was increased, and fear was not significant*”. [16]

Figure 3: ReApp screen samples



CONCLUSIONS

There are interesting analogies between the practice of game design and the methodologies used in the field of Behavioral Psychology. In both practices lay a common goal to stimulate a specific behavior. At the same time, both practices face similar challenges as they set to engage and train people, such as engagement, motivation, retention and progress. This highlights the interdisciplinary power of Purposeful Games and their exclusive ability to convey content such as CR. *ReApp* is still a work in progress. While play-tests have shown a general success in training people in CR, further tests are required to understand the long term efficacy of the game. We plan to examine the impact of two additional elements on the game flow of design and its overall effectiveness. A) We are curious to know whether the embedment of User-Generated Content

in the game could enrich its value as a training tool for CR. In this version of the game, users are encouraged to compete over photos offered to them. While there is a button for uploading pictures, the feature is not promoted in the game as a primary activity. We would like to test whether the promotion of the 'upload button' as a primary feature can 1- encourage people to use the game, 2- enhance their ability to reappraise situations related to their personal views and solve personal problems.

B) We want to examine the effects of an artificial intelligence system on the effectiveness of training in CR. We consider the development of an AI system that tracks players' progress and, accordingly, match tasks and competitions according to her abilities and interests. However, a possible side-effect for this AI system is that players will expose less to subjects they do not know and will operate in a limited range of fields.

ACKNOWLEDGMENTS

We thank all the volunteers, play testers and all publications support and staff, who wrote and provided helpful comments on previous versions of this document. Dr. Vered Pnueli and Benjamin Cook gratefully acknowledge the grants from Shenkar College headed by Professor Yuli Tamir and from the Baruch Ivcher School of Psychology at IDC headed by Prof. Eran Halperin, which enabled us to conduct this research. .

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