



Visual Representation and Its Impacts in Rising Positive Emotions Through Interactive Media: Candy Crush Saga Case Study

Arwin Purnama Jati^(✉) and Agustinus Dicky Prastomo

Universitas Katolik Soegijapranata, Semarang, Indonesia
arwin@unika.ac.id

Abstract. The objective of this research is to observe visual elements in CCS as an interactive media that represent objects led to positive emotions and determine well-perceived visual aspects as one of measurement of interaction basic between people and technology-based media. The Covid-19 pandemic that occurred in Indonesia had an impact on changes in several aspects, including social interaction. It also arises negative emotions such as sadness, depression, and others. In difficult situations, people start using technology-based media and cause changes in social communication/interaction. These changes occur because digital media naturally convey information in an efficient, even personal, way. Visual images are important to support the needs. Visuals are considered a trigger for positive emotions. Visual applied in digital media as user-centered interaction allows user to access digital content easily, as well as to absorb information efficiently. It can also help increase one's work productivity. Case study in "Candy Crush Saga" (CCS) game is chosen as the game represents the impact of positive emotion rises on its user or game player. The research uses qualitative methodology through collecting data of interactive digital media, visual experience studies that relate to positive emotions, visual elements of CCS interface, as well as data analysis and the interpretation of positive emotions. The study results that digital media interactive such game and its visual could increasing positive emotions. In the future the model of visual trend might be applied in some media related to digital media interactive and for sustainable development.

Keywords: Visual Analysis · Representation · Interactive Media · Positive Emotion

1 Introduction

The development of digital media at recently affects changes in the way of communicating. Interactive digital media are widely accessed by people for efficiency reasons. Interactive digital media is digital media that is integrated with writing, images, and sound combined in structure that computerized aims to ease people interact with information or data, for certain or proper purposes [1]. Interactive media such as digital applications, websites, games, and other programs supposed to accommodate the need

for interactivity between users and data integrated into the computer program. The study in cognitive conducted by Wang stated that through visuals, three types of emotions can appear, which are: positive, negative, and neutral emotions [2]. Through this research, positive emotion was studied through visual elements representation contained in the digital interface of an interactive media. Games were chosen as interactive media type example which closely related to the user response as well as its popularity among the users. It is also considered as the example as the games is convenient and the response in games is easily recognized. Candy Crush Saga (CCS) game was chosen as a case study, as it had millions review, and occupies as one of the top position ranks among games in 2022. CCS is also claimed as the most downloaded Android game in 2014 [3]. CCS considered as a casual puzzle phenomenon genre that gain major success. The gameplay is fairly simple and repetitive, yet the addictiveness of the design at the core is strong [4]. Candy Crush Saga's opening text is "Swipe, Match, Relax". The opening text is related to the way of game playing that indicates the play, strategy, and enjoyment. For example, "Swipe" indicates an interaction (of playing game), "Match" represents cognitive aspect as the game need strategy, and "Relax" that represents a state of feeling or emotion. The visual elements of CCS game as well as its representation were studied to find relations between the user's emotion (focusing on positive emotion) and the interaction type (of game playing system).

1.1 Interactive Media

The wide and varied use of interactive digital media in emerged discipline area shows that interactive media afford to facilitate user needs, as a problem solving. Users, in this case, are the people who access certain interactive media. As a media that directly related to its users, based on studies of human/user-centered interaction [5] considered as an important aspect of system design, which is interaction between technology and human (user). The term user-centered design introduced in the 1980s from Donald Norman's research laboratory, and to a large extent used after publication scientific research by Norman & Draper in 1986 entitled "User-Centered System Design: New Perspectives on Human-Computer Interaction" [6]. User-centered design (UCD) is focusing on the user and to develop the system in order to provide user needs and their engagement to the system. User-centered design is a wide term to describe design processes about the influence of end-users to describe the process of design and the way it takes shape [7]. There is interactive aspect in user-centered design, or in other term known as human-centered interaction. The interactive aspect must meet usability requirements or its aspect. Usability is an aspect of the process in which the users perform "tasks" or activities when accessing interactive media or system. Users are expected to learn and use computer systems without difficulties. For example, the use of basic operations on the device (directly found in the interface), how to make new functions easier to be learnt individually, and the use of icons. It means that human-centered or user-centered focus on usability of system design, as well as based on the need and interest of the users.

Usability aspect is also related to the convenience when the user accesses the media, mostly when in direct contact with the interface. A good interface is considered in a situation when the user easily engaged to the interface. There are features that are considered as interesting aspect when relate to the user engagement with the interface, which

are navigation, visual effect, animation, responsive system, eye-catching interface that capture user attention, and unique interface layout. The engagement is also considered as successful if it also related to the user's feelings, like how the user's emotions appear when involved with the media.

1.2 Positive Emotion

Positive emotions are considered of cognitive process that give impact to the human behavior or work productivity as it studied by Wang in 2017.

[...it has been well known that emotion affects a broad range of cognitive processes, e.g., visual processing, working memory, attentional allocation, cognitive control, and social categorization (Foster et al., 2008; Levens and Phelps, 2008; van Steenbergen, 2015, cited in Wang, 2017).]

The study resulted that positive emotion facilitates cognitive flexibility, through the examination of the effects of different emotional states on brain activity associated with cognitive flexibility using a task-switching paradigm. It brought evidence that a task done by people could affect the positive emotion. As it relates to the user task in playing games, visual elements that appear on the interface possible to rise positive emotion like satisfaction, as the example. Rachmawati's research in 2009 on visual merchandising and positive emotions defined positive emotions as moods that influence consumer decisions in the intensity of decision-making and decision-making [8]. In interactive media, visuals appear on the interface which is the first layer seen by the user and affects the user's interactivity with technology. Some studies have revealed that emotion processors relate to the need of affection prefer graphic information rather than text information [9].

The positive emotions include desire, pleasant surprise, inspiration, amusement, admiration, satisfaction, and fascination, while the negative emotions include indignation, contempt, disgust, unpleasant surprise, dissatisfaction, disappointment, and boredom [10].

1.3 Candy Crush Saga

Candy Crush Saga (CCS), often referred to as "Candy Crush", is a match-3 video game, which was released on 12 April 2012 on Facebook and on 14 November 2012 on mobile (iOS and Android) devices. The CCS game (single player) game can be an example of an attractive and trending visual representation of a game (as it is the most downloaded game in 2014). There are elements in CCS based on the visual and the system, which includes:

- Shapes and colors displayed are associated with imagination, fantasy leads to positive emotions.
- Interactivity as it relates to the game-playing system (via swipe, match, and relax text through a goal of crushing candies to win levels in order to have satisfaction).
- Game play mode covers the concept of:



Fig. 1. (a) Candy Crush Saga visual interface; (b) Tiffi character.

- Durability
- Fun/ enjoyment/ escapism and boredom
- Learning
- Achievement/ goals/ achievement oriented
- Recognition, praise
- Counting time/ accountability
- Thinking/strategy
- Tiered/ leveling
- Category/ categorizing
- Engagement

The non-verbal/ visual, for example the CCS icon, is similar to *wayang* or Indonesian leather puppet (as there is a handle as attribute in most CCS characters). The popular character of CCS named “Yeti” and “Tiffi” (as RPG-role playing game that mainly guide the player, give instruction to reach the goal, and share information) appear in most visual interface (Fig. 1).

1.4 Visual Element and Representation

The visual design of the game’s interface covers the entire layout of the website display. The layouts are organized by components which covers: Menus, Buttons, Images, Icons, Colors, Fonts, and other components related (Fig. 2). As it related to the way of the visual elements represent the meaning, Shaw said that Hall’s (Stuart Hall) model imparts a semiotic framework on communication studies, moving away from earlier stimulus-response behaviorist models [11].

2 Methods

The research uses qualitative methodology through collecting data of interactive digital media, visual experience studies that relate to positive emotions, visual elements of CCS interface, as well as data analysis and the interpretation of positive emotions. Visual

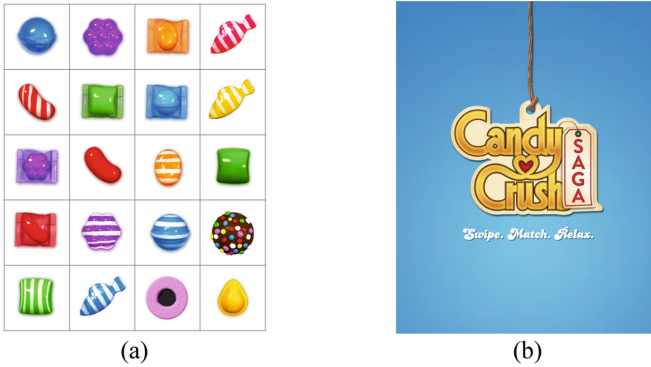


Fig. 2. (a) CCS candy icons; (b) Opening text visual interface.

element in the Candy Crush game was analysed through color, shape, interactive (object, element) variables. Visual elements were also selected and categorised into variable that relate to or evoke positive emotions. Basic visual elements of CCS game that related to positive emotion were studied/ examined to meet the criteria of research objectives.

3 Data Analysis

The data variable used to analyse the game is categorised into three variables, which is interaction, cognitive, and emotion. The later variable is the most data we used for finding the relation between visual or visual representation and the “potential” of rising emotion on the game player.

3.1 Interaction Variable

The interaction in this game is highlighted in the interaction between “a single player” of the user. Single player mode was considered as it correspondence with the state of personal/ individual emotion that would be observed. The interaction provided in the game includes below:

- System
- Communication & information (how to)
- Visual icon/ symbol (Fig. 3)

3.2 Cognitive Variable

The cognitive variable mostly the strategy of playing the game as it needs cognitive aspect that vary among the game players (as single/ individual player). As it is provided in games as standard, there is visual instruction that explains the strategy or tips of playing the game. The player can relate to the visual instruction strategy to understand the gameplay or finding shortcut to reach certain level (Fig. 4).

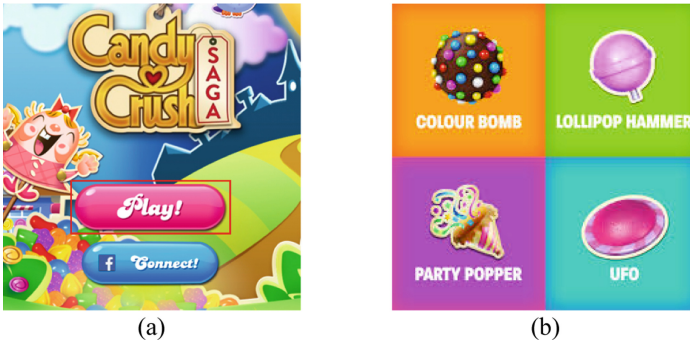


Fig. 3. (a) CCS play instruction button; (b) Treat icons to help crushing/ crushing power.

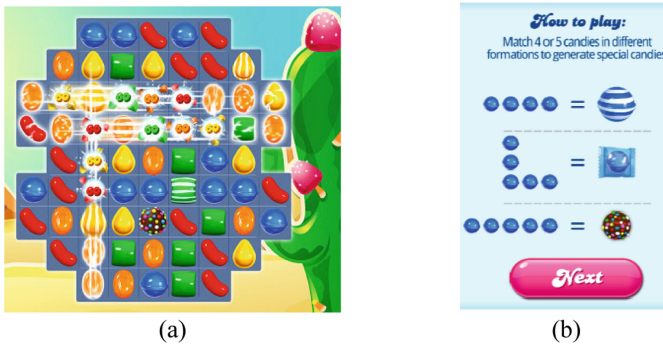


Fig. 4. (a) CCS horizontal/ vertical blasting visual; (b) Strategy tips visual.

3.3 Emotion Variable

State of emotion of the single player in CCS game is represented through aspects like visual and sound that are integrated in the gameplay interface. Through the interface, some visual elements were examined to find the relation between object appearance and the possibility of how the objects rise the player's emotion. The object appearance includes colors, shapes, texts, and the representation based on the real object. The examination or analysis of the object should correspond with the data from literatures.

One of the visual elements analysed in the game specifically is the text appear as an appraisal when the player reaches a goal (achievement) or have multiple goal over the requirements in a level of playing. The analysis of CCS games revealed that there is a relation between "praise text" and user's satisfaction (Fig. 5). The examination of the relationship between praise text and user's satisfaction showed that CCS gamers with higher score were found to be more engaged as their goals achievement. The praise text "delicious" and high scores indicated that ccs gamers are satisfied with their lightning/ blasting achievement as part of playing game in order to reach each level goal. This qualitative analysis confirmed with the below figure findings.

The candy crush saga (single player) game can be an example of an attractive visuals and conventional and recognizable images. There are two aspects of visual element that



Fig. 5. CCS praise text visual.

are shape and color. The feature of the CCS visual interface or icons is observed from the visual that most recognized conventionally.

Shape. The shape is not angular/curved, has dimension (3D), soft, and shiny, representing the actual shape of the candy.

Color. The candies color is mostly solid with bright colors, but some also in pastel colors, which can be perceived with sweetness (such as fruit, cake, and others). The praise text color is same one another (golden light brown) as the text is covering the candies object on the interface. So, it can be seen clearly without distraction.

The shapes and colors displayed in the interface are associated with imagination/fantasy and joy/ pleasure.

4 Results

The study results that digital media interactive such game and its visual could increasing positive emotions. Below is the Tables 1 and 2 indicates that there is relation between praise text and the state of emotion represented through the visuals and gameplay:

The impacts in rising positive motion can be observed from the early level which is through text represent the praise to the player. It might bring good feeling like satisfaction or happiness when the player is getting the added points or reaching higher level. The

Table 1. Finding of Relation between Text Representation and the state of emotion of CCS case study.

Praise Text	Scores	Emotions	Representations
Sweet	Lower	Desire	Sets of three in same color
Tasty	Basic	Amusement	Horizontal/ vertical moves
Divine	Chain reactions	Pleasant surprise	Match/ crush candy with color bomb
Delicious	high	satisfaction	Match/ crush candy combo in most or all

Table 2. Finding of Relation between Visual Representation and the real objects of CCS case study.

Candies	Colors	Plays	Representations
Rounded candy	blue	Match, swipe	Lollipop without stick
Jelly flower	purple	Match, swipe	Jelly
Jelly bean	red	Match, swipe	Jelly bean
Ellipse candy	orange	Match, swipe	Hard candy
Rectangle candy	green	Match, swipe	Hard candy
Stripes candy	Blue, purple, red, orange, green	Swipe, crushing horizontally or vertically	Hard candy
Wrapped candy	Blue, purple, red, orange, green, yellow	Swipe, crushing by exploding nearby candies	Any wrapped candies
Jelly fish	Blue, purple, red, orange, green	Swipe, swimming to crush randomly	Jelly
Color bomb	Black with multicolor dots	Swipe, exploded	Mini button candies or chocolates

visual, sound and praise text when the player reach the expected goal are playing role in rising the positive emotion of the player such a glory as the player wins a game level.

The visual of candies represented in the gameplay indicates that it refers to the real “candies” object which familiar to the user/ player, and commonly found in the real life. The satisfaction of crushing candies in the CCS game bring the imagination of crushing real candies in the real life and it also supported by the relevant sound of candy’s cracking.

5 Conclusion

- There are three findings which considered as research conclusion. Based on the topic in visual representation, positive emotion, and interactivity aspect, the conclusions are listed below:
- The candy crush saga (single player) game can be an example of an attractive and trending visual representation.
- Shapes, colors displayed are associated with imagination, fantasy that leads to positive emotions.
- Interactivity (via swipe/switch, match/match, and relax/blast candies to win levels or can be associated with satisfaction).
- The satisfaction as one of the state of emotions was found both in the visual (candies) and interactivity of gameplay (crushing and sound of the cracking-candies).
- The finding might be comprehensive as it focusing on the basic aspect in positive emotion as research foundation. There would be further research to conduct in order to find a model as foundation to create visual elements that meet usability criteria of an interactive media.

Acknowledgements. We would like to express our gratitude and appreciation to ICADE 5 - The Fifth International Conference on Arts and Design Education and UPI-Universitas Pendidikan Indonesia which offered such an opportunity of dissemination for our research on September 22nd, 2022. We hope that the research we conducted can be sustained to the further broaden research.

References

1. Griffey J.: Introduction to Interactive Digital Media, Concept and Practice. Routledge, London (2020).
2. Wang, Y., Chen, J., Yue, Z.: Positive Emotion Facilitates Cognitive Flexibility: An fMRI Study. *Frontiers-In Psychology*, (2017).
3. Judge, A.: Candy Crush Saga is officially the most downloaded Android game of 2014. (2015). from <https://www.pocketgamer.biz/news/60597/candy-crush-saga-the-most-downloaded-android-game-of-2014/>.
4. Marsh, C.: 24 Most Downloaded Mobile Games. (2022). from <https://www.thegamer.com/most-downloaded-mobile-games/>
5. Noyes, J., Baber, C.: User-Centred Design of Systems. Springer, London (1999).
6. Norman, D. A., Draper, S. W.: User Centered System Design: New Perspectives on Human-computer Interaction. Lawrence Erlbaum Associates, Hillsdale, N.J. (1986).
7. Abras, C., Maloney-Krichmar, D., Preece, J.: User-Centered Design. In Bainbridge, W. *Encyclopedia of Human-Computer Interaction*. Sage Publications, Thousand Oaks (2004).
8. Sudarsono, J. G.: Pengaruh Visual Merchandising Terhadap Impulse Buying Melalui Positive Emotion Pada Zara Surabaya. *Jurnal Manajemen Pemasaran* 11(1), 2017.
9. Sojka, J. Z., Giese, J. L.: The influence of personality traits on the processing of visual and verbal information. *Marketing Letters* 12(1), 91-106 (2001).
10. Xiong Z, Weng X, Wei Y.: Research on the Influence of Visual Factors on Emotion Regulation Interaction. *Front Psychol*, (2022).
11. Shaw, A.: Encoding and decoding affordances: Stuart Hall and interactive media technologies. *Media, Culture & Society* 39(4), 592–602 (2017).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

