EAI Endorsed Transactions
on Serious Games

Research Article EAI.EU

The Impact of Visual Style on User Experience in Games

S. Garver[1], N. Adamo-Villani[2,*], and H. Dib[2]

[1]DreamWorks Animation, 1000 Flower St, Glendale, CA 91201
[2]Purdue University, 401 N. Grant Street, West Lafayette, IN 47907

Abstract

The visual style in a game is an aspect of user experience that is often neglected in user experience studies. Visual style is reflective of the tone that a game designer intends to convey or the assumption of what the intended audience would prefer, and it is an important aspect of how a player experiences a game. This paper reports a study that investigated the effect of two elements of visual style, e.g. form and color, on user's moment and memory-based experiences (engagement and enjoyment). While the impact of color and form on experience is inconclusive, visual preference by a player does appear to be indicative of whether or not the player will be engaged and enjoy an experience. In order to control the experience, the game being used for this study was created by one of the authors.

Keywords: Visual style, User Experience, Computer Games.

Received on 28 August 2016, accepted on 6 September 2017, published on 5 January 2018

doi: 10.4108/eai.5-1-2018.153535

1. Introduction

The visual style in a video game is typically decided upon by a lead artist or game designer, based on what seems to be the overall vision of a game. Many games nowadays are made with intended audiences in mind. These audiences respond to visual stimulation differently depending upon both shared and individual experiences, with certain visual styles being seen as more appealing than others. In addition, some games may be more suited to a specific style, and a deviation from such a style could be off-putting for gamers [11]. Visual style in video games with larger scale productions might be selected with the use of focus groups and polling, but this data is rarely, if ever, shared outside of a company and is unavailable publically [11].

Research relating to the impact of visual style on user experience is very limited, to non- existent. The study reported in the paper aims to fill this gap by investigating whether visual style affects both moment and memory-based experiences. Although much research is needed before conceptual statements and guidelines for application are warranted, this study is a first step toward investigating the impact of certain elements of visual style on how players experience a game. Findings from studies like the one described in the paper are important, as they can be used by game designers to make more informed decisions when selecting a visual style for a game.

The paper is organized as follows: in section 2 we review existing literature on user experience and visual style in games. The study is described in section 3 and findings are reported and discussed in section 4. Limitations and future work are included in section 5.

2. Review of Literature

2.1. User Experience in Games

Games are numerous and varied, therefore it is difficult to evaluate user experience in games in a unified and adequate way. In 2007, the researchers IJsselsteijn, de Kort, Poels, Jurgelionis and Bellotti [15] questioned the effectiveness of traditional usability metrics for evaluating game design, and discussed whether flow and immersion should be used as an alternative. As a concept, immersion is not new, and it is often used by people of various disciplines in relation to games. The problem lies in the

*Corresponding author. Email:nadamovi@purdue.edu

lack of clarity to define what experiences are immersive. According to the authors Ermi and Mayra, “immersion means becoming physically or virtually a part of the experience" [14, p. 40]. According to Csikzentmihalyi, flow is a state of consciousness, balanced between a person's skill and a task's difficulty, that is so satisfying that it results in a focus on the task so strong that nothing else matters. Outside distractions fall away and time becomes indeterminable as a result. This state of flow is the optimal experience, the ideal state for a person to be in on a task in order to make it the most worthwhile [9].

In games research, the idea of flow is that a player's capabilities match the challenge they are experiencing. If a challenge is too easy or too hard, the player leaves flow and has less enjoyment from the experience. Immersion is a complex phenomenon that differs from game to player. In order to better define immersion, a heuristic model was developed to understand the gameplay experience with three subtypes of immersion: sensory immersion, challenge-based immersion, and imaginative immersion. [14]. The idea of immersion is that as the level of engagement of a player increases, the less aware the player is of themselves, their surroundings, or time. Where flow is more how a game feels when it plays, immersion is the component of experience that reduces awareness of everything else [15].

Experiences in a game are commonly assessed through iterative user-centered evaluations. Being able to test for time and number of errors of a user is certainly useful, but does not explore the intricacies of an experience. Instead, the concepts of flow and immersion can better serve to evaluate user experience, as argued by the academic literature [15]. Other common metrics of experience in games are presence, involvement, and arousal. Presence relates to how real a player feels elements in a game are. Involvement is the extent that a player engages with a game and its environment. Arousal refers to both the physiological response a body has to a stimulus, such as playing a game, as well as a change in overall mood. Increased presence and involvement appears to positively impact arousal [16].

2.2. Moment and memory-based evaluations of experience

Experienced utility, formally known as Bentham's definition of utility [6], which has fallen out of favor, focuses on how experiences help shape how people interpret events and influence decisions. The more modern definition of utility views utility as an analysis of a person's preferences [17]. Reflecting on a past experience is very different from describing one as it happens. Remembering and interpreting experiences lead to inaccuracies in interpretation that do not exist with evaluations of experience that are made in the moment [18]. In order to observe both the importance of moment utility, as well as the impact of an experience over time, Kahneman conducted both memory-based and moment-based analyses of experience. Memory-based evaluations focused on the retrospective view of the experience as a whole. Moment-based evaluations focused on measurements of the key aspects of an experience throughout the experience. Kahneman and Riis [18] also defined two selves, the remembering self and the experiencing self, who interpret the world differently. The experiencing self is in the moment, and every little detail of how people think and react happens here, but few last more than a few seconds. The remembering self is made up of the experiences and their interpretations that do persist, even if not so accurately archived. An interesting effect of these two selves is how the two can interpret situations differently. For example, the experiencing self can enjoy a long symphony of music, but the remembering self might feel the experience was ruined by an audio problem.

For this study, engagement was defined as moment-based experiences and enjoyment as memory-based experiences. Enjoyment was assessed using a questionnaire that focused on the retrospective view of the experience as a whole. The Game Engagement Questionnaire (GEQ) by Brokmeyer et al. [7] was used to evaluate engagement. Brokmeyer et al. developed the GEQ, (which includes 19 questions), to investigate the impact of violence in games. They suggested that engagement is a subjective indication of involvement of a player, which includes the progressive stages of immersion, presence, flow, psychological absorption, and dissociation. Immersion is considered to be the feeling of being in a game, but still being aware of the surrounding environment. Presence is “being in a normal state of consciousness and having the experience of being inside a virtual environment" [7, p.1-2]. Flow is when a player's skill and a game's challenge achieve a desirable balance that increases enjoyment. Psychological absorption is a state of altered consciousness caused by total engagement, and can result in reduced ability to process experience. Dissociation is one step further, but involves a total disconnect from reality and a complete inability to process an experience appropriately.

2.3. Visual style in games

Visual Styles in games are not academically classified, but some classifications do exist on the professional level. Styles are often decided by a client based on what the target audience is perceived to prefer, but are just as often dictated by a client's personal preference as well [11].

In the film and video game industry, visual styles are classified based on different components. For example, the visual style for a character can be classified by the intended medium (e.g., comic book, TV/Web animation, Feature Animation, Video Games). It can also be distinguished based on typical character hierarchy, which is the concept that characters fall on a spectrum from lowest level of realism to highest, (e.g., iconic, simple, broad, comedy relief, lead character) [5].

Demers et al. [11] propose a method of classification of visual styles specific to video games. The first style mentioned is realistic style. This style is reliant on the artist's ability to draw and represent the real world with high level of fidelity. The second style is the hyper-real style, in which the elements of a work must be representative of reality, but in an exaggerated sense. The third style mentioned is the stylized style. This style is dependent on the artist's own interpretation of the world (or an entirely unique world). In general, stylized works are not as focused on the smaller details, but rather how an object is represented in terms of shape, color, lighting, and stroke. The fourth of the styles mentioned is the simplified style. In a simplified style, an artist focuses on what features are the most important in representing an element. Typically the textures are reduced to convey the idea, but not the detail. The fifth style is the graphic style. Unlike the other styles, the graphic style is typically used to convey a two dimensional world in which color and shape are the two most important features. The last of the styles mentioned is the fantastic style. Normally more expressive than the other styles, this style relies heavily on the artist's imagination. Reality is often represented in unique ways that borrow and combine elements and features of different objects to create a new identity (for instance, a leaf being drawn as if it were made of human tissue).

2.3.1 Elements of a visual style

A visual style is made up of many elements that work together to create a cohesive whole that is more than the sum of their parts. These elements are often defined by art historians and researchers and applied to the visualization of games. The elements of a style, as defined by Arnheim, [3] include: Balance - how elements work in unison; Shape - the contour that represents an object; Form - the visual representation that shapes define; Growth - the personal progression of a style and artist; Space - arrangement of elements, such as shape and form; Light - shadows and highlights that represent light intensity and direction; Color - the colors describing an element; Movement - the direction that an eye is led to follow; Tension - contrasting elements that evoke uneasiness; and Expression - the personal representation of an element.

Lauer and Pentak [20] define the elements of style, as follows: Unity - the combination of other elements into a cohesive whole; Emphasis - an element, or groups of elements overpower the other elements to create a point of focus; Proportion/Scale - the relationship of the sizes of elements in art in relation to other elements within the same piece; Balance - a state achieved when particular elements do not overwhelm each other (symmetrical, asymmetrical, and radial); Rhythm - the repetition of the same elements to create movement and predictability; Line - the distance between two points that can be either straight or curves, and has a width, direction and length; Shape - shapes are areas in a 2D space that are either geometric or organic; Texture - the physical feeling or visual feel of a work of art; Space - the area that contains the art, that is usually differentiated into locations, such as background, foreground, middle ground, negative and positive; Movement - the path or direction an eye is led to take when viewing art; Value - light and dark, and how they are used in contrast to each other; and Color - created when light is reflected into the eye, it is defined by hue (blue, green, red, etc.), intensity (vividness), and value (light or dark).

Both of these lists share many similarities, as well as some differences. The elements of movement, shape, and color, for example, are largely the same, while other elements are further split up or termed differently, such as balance and tension being categorized as unity, emphasis, proportion, and balance. The key difference is that Arnheim's classification is very dependent on what an artist brings to the equation, and evaluating work historically. Lauer and Pentak are very utilitarian in regard to strictly defining these terms for educational purposes.

2.3.2 Visual style and user experience

Researchers agree that visual style has a significant effect on user experience in general. While not specifically evaluated in game research, the impact of visual style on user experience has been studied in other related fields. For instance, there is a growing body of theoretical and empirical work that looks beyond color aesthetics to the link between color and psychological/physiological functioning in humans [12]. In interactive designs, color can help memorization, recall and recognition. "*It can suggest categories and give identity to chunks of information. This can create a design that is more efficient, clearer and easier to understand, easier to learn, and easier to navigate*" [19]. Colors affect us physiologically. For example certain colors have been associated with increased blood pressure, increased metabolism, and eyestrain. Colors also affect our emotions and moods in fact we describe certain emotions using colors as a reference (seeing red, feeling blue, green with envy).

A few studies can be found in the literature on the effect of character's visual style (realistic versus stylized) on user experience in e-learning environments. A limited number of experiments have been conducted on realistic versus stylized animated pedagogical agents with respect to interest and engagement effects in users. Welch et al. [24] report a study that shows that pictorial realism increases involvement and the sense of immersion in a virtual environment. Nass et al. [23] suggest that, in order to promote user engagement, embodied conversational agents should accurately mirror humans and should resemble the targeted user group as closely as possible. On the other hand, Cissel's work [8] suggests that stylized characters are more effective at conveying emotions than realistic characters. In her study on the effects of character body style (e.g. realistic versus stylized) on user perception of facial emotions, stylized characters were rated higher for intensity and sincerity. McCloud argues

that audience interest and involvement is often increased by stylization [21]. This is due to the fact that when people interact, they sustain a constant awareness of their own face, and this mental image is stylized. Thus, it is easier to identify with a stylized character. An experiment by Adamo-Villani et al. [1] suggests that stylized characters are perceived as more engaging signing avatars than realistic ones.

In summary, the literature on the impact of visual style on user experience is still at a nascent stage of development and additional research is needed before strong conceptual statements and recommendations for application are warranted. Furthermore, to our knowledge, no studies exist on the effect of visual style on user experience in games. The work reported in the paper aims to fill this gap.

3. Methodology

3.1. Study Design

An experimental study was conducted to determine to what extent player's experience is impacted by visual style. Only the aspects of research that are consistently evaluated in previous literature were focused on for this study. Experience both encompasses experience of the moment and memory, so both were considered [17]. The relevant aspects of moment-based experience were user-evaluated engagement (presence, immersion, and flow) [7]. The relevant aspects of memory-based experience were user-evaluated enjoyment [17].

Similar to experience, visual style is very broadly defined, and includes all the variations of imagery possible in an art medium [2]. Two elements that define style are color and form [13]. By manipulating color and form, four variations of style were created and their potential effect on player's experience was investigated. Color and form were selected as the independent variables because their manipulation appeared to significantly alter the visual style of the game, without creating too large of a burden on the development of the game used for the study.

Variables

- Independent: visual style (form, 2D and 3D, and color, monochrome and full color)
- Dependent: engagement (presence, immersion, flow) and enjoyment
- Interacting: technical performance

Hypotheses

- H01: The visual style of a video game does not have an impact on player engagement (moment-based experience).
- Hα1: The visual style of a video game does have an impact on player engagement (moment based experience).
- H02: The visual style of a video game does not have an impact on player enjoyment (memory-based experience).
- Hα2: The visual style of a video game does have an impact on player enjoyment (memory based experience).

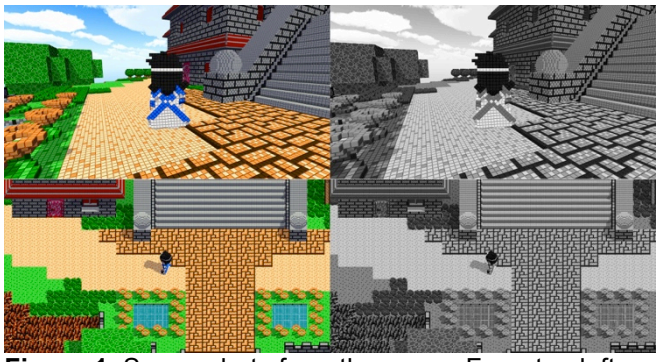

Figure 1. Screenshots from the game. From top left clockwise: Style A, Style B, Style C, and Style D

3.2. Population & Sampling

The study was an independent factorial between subjects design that employed convenience sampling, participants being recruited from accessible online gaming communities and from the Purdue University Department of Computer Graphics Technology. In order to achieve a larger sample size, the study was conducted online, using Qualtrics survey software.

A power analysis for the 2x2 factorial design was conducted on an initial sampling of 12 people with a power of 0.8. For enjoyment, the initial power analysis recommended approximately 12 participants per group for an overall effect and 17 participants for an interaction effect. For engagement, the initial power analysis recommended approximately 20 participants per group for an overall effect and 152 participants for an interaction effect. Due to the unlikelihood of being able to test with 608 participants, the target sample size was 80 participants, approximately 20 per group.

Anyone could participate with the following exceptions: people under the age of 18, participants with visual impairment (such as blindness or color-blindness), and participants who have no experience with video games. As the study focused on visuals, particularly color, it was necessary to only allow those without visual impairments. In addition, people with limited to no video game experience may not have been able to play the demo properly, and were not permitted to participate.

3.3. Procedure, Stimuli and Evaluation Instruments

Volunteers were recruited on the Purdue University campus and on internet communities. Those who agreed

to participate were given a link to a Qualtrics survey they could access from any computer, and were asked to read about the research and asked to complete a pre-survey, determining if they were eligible for participation.

Participants were assigned to one of four groups and informed as to which demo they would be playing. All were playing the same game that was altered visually depending on the assigned group. After playing through the session to completion, or alternatively 15 minutes, participants were asked to complete two anonymous surveys evaluating engagement and enjoyment.

Past studies have found that when trying to control stimulus, commercial games are not always the best option. A more controlled study could be conducted with a tailor-made game [16]. A unique game was developed for this study, which allowed for the manipulation of the art style, whilst maintaining consistent gameplay. Reia Cubed is a role-playing serious game for undergraduate students' learning of basic computer science concepts. It takes place in a single environment and consists of about 15 minutes of gameplay. To manipulate the visual style, four versions of the game were built and compiled. Two versions of the game in 3D perspective were compiled, one in full color and the other in gray-scale. Another two versions of the game in 2D isometric were compiled, one in full color and the other in gray-scale. The key elements of style being manipulated between the games were color and form. Figure 1 shows four screenshots of the game, each one illustrating one of the four visual style variations. The four styles will be referred to as A, B, C, D. Style A is perspective color. Style B is perspective monochrome. Style C is isometric color. Style D is isometric monochrome.

To reduce the amount of time spent on exposition before introducing core gameplay elements, the game begins with a story that is already in progress (the relevant plot points are summarized to reduce confusion), which allows a participant to jump straight into the action. As there is no formal tutorial or ramp up of individual elements of gameplay, the difficulty is kept to a minimum to reduce frustration.

Testing instruments included 3 surveys. The first was a pre-survey intended to see if the volunteers were eligible, with questions relating to color blindness, age, and experience with playing games.

The second survey was a modified version of the Game Engagement Questionnaire (GEQ), created by the researchers Brockmyer, Fox, Curtiss, McBroom, Burkhart, and Pidruzny [7] intended to evaluate engagement (moment-based experience). Ordinarily, moment-based evaluations would be conducted simultaneous to the activity. Instead, the GEQ can be used to evaluate engagement immediately following a game session. This removed the element of distraction for the player and allowed for a remote evaluation of engagement by evaluating the engagement level at the moment the game session ended. The GEQ is not an evaluation of the engagement over time or total engagement.

The third survey was a macro evaluation on enjoyment level over the whole experience (memory-based experience), an evaluation regarding the approval of the visual style, and two other manipulation checks to make sure participants responses lined up with the correct version. The three surveys are included in Appendix A.

Due to the nature of experiment, there was no single testing environment. Participants were encouraged to use a powerful machine if possible, with their sound turned on; technical performance was considered as a confounding variable. Poor technical performance should impact both engagement and enjoyment [22].

To reduce threats to validity, the game versions are identical in all aspects of gameplay, with the exception of visual style, as previously stated. Every participant only played one game, and each group completed the same pre and post surveys. Because enjoyment level is subjective, the results may be skewed, but a large enough sample size should reduce this error. In order to prevent skewing of the data with potential performance issues, the impact of technical performance was evaluated and its effects were removed where appropriate.

3.4. Results

82 participants completed the surveys; 224 dropped or were ineligible. Because participants were asked to designate which version of the game they played (color or monochrome / perspective or isometric), it was possible to evaluate those who answered correctly separately as a manipulation check. Of the 82 participants, only 59 correctly designated which version they were playing in regard to both color and form. There is the possibility that participants could not tell the difference, or remember what they played. Further, participants may have completed the wrong game for their assigned group due to improperly following instructions. To be clear, the study did specify which version the participant would be playing.

Data was analysed with separate one-way and two-way ANOVA and ANCOVA tests (Figure 2). The results are not considered to be significant unless the sigma value is below the significance level of 0.05. Anything with a power less than 0.80 was considered unreliable.

On the scale from 19 to 95, the mean level of engagement was found to be a score of 45.63, with a standard deviation of 12.11. The mode was 49 and the median was 46. Overall, the participants appeared to be more on the lower end of engagement (Figure 3).

On the scale from 1 to 7, the mean level of enjoyment was found to be a score of 4.12, with a standard deviation of 1.76. The mode was a 5 and the median was a 4.5. Overall, more people enjoyed the experience than disliked it (Figure 4). Details of the statistical analyses can be found in Appendix B.

Effect on Engagement	Sigma	Power
Technical Performance	**0.01**	**0.96**
Groups (A, B, C, D)	0.43	0.25
Color	0.11	0.35
Form	0.93	0.05
Interaction	0.65	0.07
Visual Style	**0.02**	0.65
Factoring Technical Performance		
Groups (A, B, C, D)	0.64	0.16
Color	0.45	0.12
Form	0.50	0.10
Interaction	0.40	0.13
Visual Style	0.20	0.25
Limited Population		
Groups (A, B, C, D)	0.90	0.09
Color	0.48	0.11
Form	0.79	0.06
Interaction	0.93	0.05
Both		
Groups (A, B, C, D)	0.60	0.17
Color	0.52	0.10
Form	0.41	0.13
Interaction	0.34	0.16

Effect on Enjoyment	Sigma	Power
Technical Performance	0.12	0.55
Groups (A, B, C, D)	0.41	0.26
Color	0.80	0.06
Form	0.70	0.07
Interaction	0.11	0.36
Visual Style	**0.00**	**1.00**
Factoring Technical Performance		
Groups (A, B, C, D)	0.30	0.32
Color	0.71	0.07
Form	0.98	0.05
Interaction	0.06	0.46
Visual Style	**0.00**	**0.98**
Limited Population		
Groups (A, B, C, D)	0.56	0.19
Color	0.84	0.06
Form	0.63	0.08
Interaction	0.21	0.24
Both		
Groups (A, B, C, D)	0.32	0.31
Color	0.50	0.10
Form	0.82	0.06
Interaction	0.07	0.45

Figure 2. Sigmas and powers recorded from the statistical analyses. Tests that accounted for the impact of technical performance, used a subset of the total sample, or both, are clearly labelled

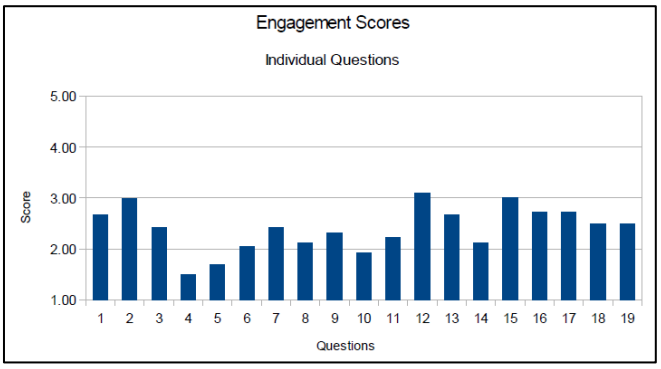

Figure 3. Average scores for the individual questions on the modified GEQ, 1 being the lowest and 5 being the highest

4. Discussion

- Because the manipulated forms of visual style, color and form, did not significantly impact engagement, H01 cannot be rejected, although the data does not necessarily support the null hypothesis either.
- Because the manipulated forms of visual style, color and form, did not significantly impact enjoyment, H02 cannot be rejected, although the data does not necessarily support the null hypothesis either.

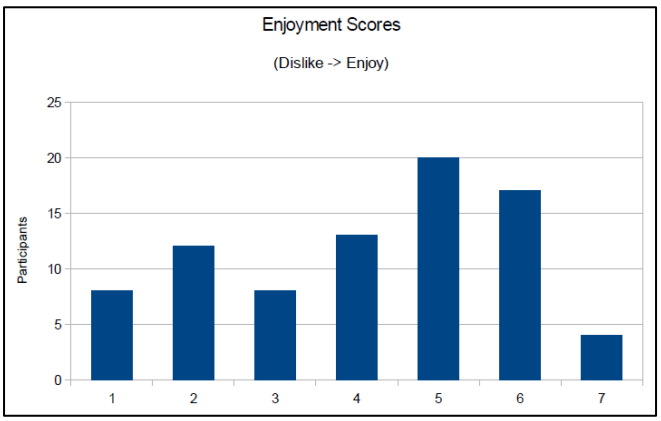

Figure 4. Participant responses for level of enjoyment, 1 being the lowest and 7 being the highest

From the results, it appears that manipulating the aspects of visual style did not have a significant effect on the engagement or enjoyment of the player. This result is surprising, but the low observed power across the tests indicates that the sample size may not have been large enough to draw a strong conclusion either way. This could have been a false negative. It is possible that engagement and/or enjoyment were impacted, but with the data, no conclusion can be drawn either way.

These results holds true for both color and form, as well as between groups. There was no observable interaction effect for engagement, although there may have been an interaction effect between color and form in regard to enjoyment. It is also worth noting that while limiting the sample to only participants who correctly designated their demo did appear to change the results, it did not have much significance in most cases. Nor did it help explain the significance, or lack of significance, in any of the analyses on engagement. Likely, the majority of participants who answered incorrectly played the correct version, but simply could not identify the correct version in the survey.

As expected, the technical performance was found to have a significant effect on the engagement level of a participant. This was true across all the statistical tests where technical performance was considered as a covariate. Surprisingly, technical performance was not found to have a significant main effect on the enjoyment level of a participant. There did appear to be an effect, just not large enough to be significant. This result is slightly suspect, as the observed power was not large enough to be reliable. Not only does this go against the literature, but for each two-way ANCOVA test, technical performance did appear to be significant and reliable as a covariate for enjoyment in most analyses.

Accounting for technical performance did change the results for many of the tests, but did not contribute to the result of observable significance. If the varying technical performance was well dispersed across the groups, it may have reduced its observable impact on the individual tests.

5. Limitations and Future Work

The study had the following limitations:

- The sample size was too small and therefore it is difficult to generalize the results. The initial power analysis suggested that a sample size around 80 would be sufficient, however the final results suggest a sample size much larger than this.
- In regard to the various aspects of visual style, color and form were selected because the changes appeared substantial and easy to manipulate. Rather than manipulating specific aspects and investigating them individually, future studies might consider using the same game with entirely different art directions. While the game itself is controlled, an altered visual style might set the mood differently for the player.
- For collecting data, the study made use of online testing in order to hit a larger target sample size. The Game Engagement Questionnaire may not have been the best method for evaluating moment-based experiences by itself. In future work, by conducting the study in a set location, physiological measurements can be used together with the GEQ. The physiological measurements can be taken during a game session without distracting the player, and may yield more reliable results.

References

[1] Adamo-Villani, N., Lestina, J., & Anasingaraju, S. (2015). Does Character's Visual Style Affect Viewer's Perception of Signing Avatars? *Proc. of e-LEOT 2015, 2nd EAI International Conference on e-Learning e-Education and Online Training*, Novedrate, Italy.

[2] Alpers, S. (1987). Style is what you make it. In Lang, B., ed., *The Concept of Style*. Cornell University Press, New York, NY.

[3] Arnheim, R. (1949). The Gestalt theory of expression. *Psychological Review,* 56.

[4] Arnheim, R. (1954). *Art and visual perception: A psychology of the creative eye*. University of California Press, Oakland, CA

[5] Bancroft, T. (2006). *Creating characters with personality*. Random House LLC, New York, NY

[6] Bentham, J. (1994). *The principle of utility*. Ethics, 306-312.

[7] Brockmyer, J.H., Fox, C.M., Curtiss, K.A., McBroom, E., Burkhart, K.M., Pidruzny, J.N. (2009). The development of the Game Engagement Questionnaire: A measure of engagement in video game-playing. *Journal of Experimental Social Psychology*, 45, 624-634.

[8] Cissell, K. (2014). A Study of the Effects Of Computer Animated Character Body Style On Perception Of Facial Expression. MS thesis, Purdue University. Available at: http://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1029&context=cgttheses.

[9] Csikszentmihalyi, M. (1991). *Flow: The psychology of optimal experience*. Volume 41. Harper Perennial, New York, NY.

[10] Csikszentmihalyi, M. (2000). *Beyond boredom and anxiety*. Jossey-Bass, Hoboken, NJ.

[11] Demers, O., Urszenyi, C., Maestri, G. (2001). *Digital texturing and painting. New Riders Publishing,* San Francisco, CA.

[12] Elliot, A. J., & Maier, M. A. (2014). Color psychology: Effects of perceiving color on psychological functioning in humans. *Annual review of psychology*, 65, 95-120.

[13] Elsner, J. (2010). Style. In Nelson, R.S., Shiff, R., eds., *Critical terms for art history*. University of Chicago Press, Chicago, IL, 98–109.

[14] Ermi, L., Mayra, F. (2007). Fundamental components of the gameplay experience: Analyzing immersion. In De Castell, S., Jenson, J., eds. *Worlds in play: International perspectives on digital games research*. Volume 21. Peter Lang, New York, NY, 37-54.

[15] Ijsselsteijn, W., de Kort, Y., Poels, K., Jurgelionis, A., Bellotti, F. (2007). Characterizing and measuring user experiences in digital games. *Proc. of Int. conference on advances in computer entertainment technology*. Vol 2, 27.

[16] Ivory, J.D., Kalyanaraman, S. (2007). The effects of technological advancement and violent content in video games on players feelings of presence, involvement, physiological arousal, and aggression. *Journal of Communication*, 57, 532–555.

[17] Kahneman, D. (2000). Experienced utility and objective happiness: A moment-based approach. In Kahneman, D., Tversky, A., eds. *Choices, values, and frames*. Cambridge University Press, Cambridge, 673–692.

[18] Kahneman, D., Riis, J. (2005). Living, and thinking about it: Two perspectives on life. In Diener, E., ed. *The science of well-being*. Springer, New York, NY, 285–304.

[19] Karr, A. (2013). Color and user experience. *ACM Interactions*, Retrieved from http://interactions.acm.org/blog/view/color-and-user-experience.

[20] Lauer, D.A., Pentak, S. (1995). *Design Basics*. Fourth edn. Harcourt Brace College Publishers, Fort Worth.

[21] McCloud, S. (1993). *Understanding Comics*. HarperPerennial, New York, NY.

[22] Montola, M. (2012). Social constructionism and ludology: Implications for the study of games. *Simulation Gaming*, 43, 300–320.

[23] Nass, C., Isbister, K., & Lee, E. J. (2000). Truth is Beauty - Researching Embodied Conversational Agents. In Cassell, J., Sullivan, J., Prevost, S., Churchill, E. (Eds.), Embodied Conversational Agents. MIT Press, Cambridge, MA, pp.374-402.

[24] Welch, R. B., Blackmon, T. T., Liu, A., Mellers, B. A., & Stark, L. W. (1996). The effects of pictorial realism, delay of visual feedback, and observer interactivity on the subjective sense of presence. *Presence: Teleoperators and Virtual Environments*, 5(3), 263-273.

APPENDIX A. EVALUATIVE SURVEYS

The following are the two surveys used to collect data in this study:

PURDUE UNIVERSITY

Respond with how much you agree with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I lost track of time	○	○	○	○	○
Things seemed to happen automatically	○	○	○	○	○
I felt different	○	○	○	○	○
I felt scared	○	○	○	○	○
The game felt real	○	○	○	○	○
If someone had said something to me, I wouldn't have heard them	○	○	○	○	○
I got wound up	○	○	○	○	○
Time seemed to stand still or stop	○	○	○	○	○
I felt space out	○	○	○	○	○
I didn't answer when someone talked to me	○	○	○	○	○
I couldn't tell if I was getting tired	○	○	○	○	○
Playing seemed automatic	○	○	○	○	○
My thoughts went fast	○	○	○	○	○
I lost track of where I was	○	○	○	○	○
I played without thinking about how to play	○	○	○	○	○
Playing made me feel calm	○	○	○	○	○
I played longer than I meant to	○	○	○	○	○
I really got into the game	○	○	○	○	○
I didn't want to stop	○	○	○	○	○

>>

Figure A.1. Modified Game Engagement Questionnaire

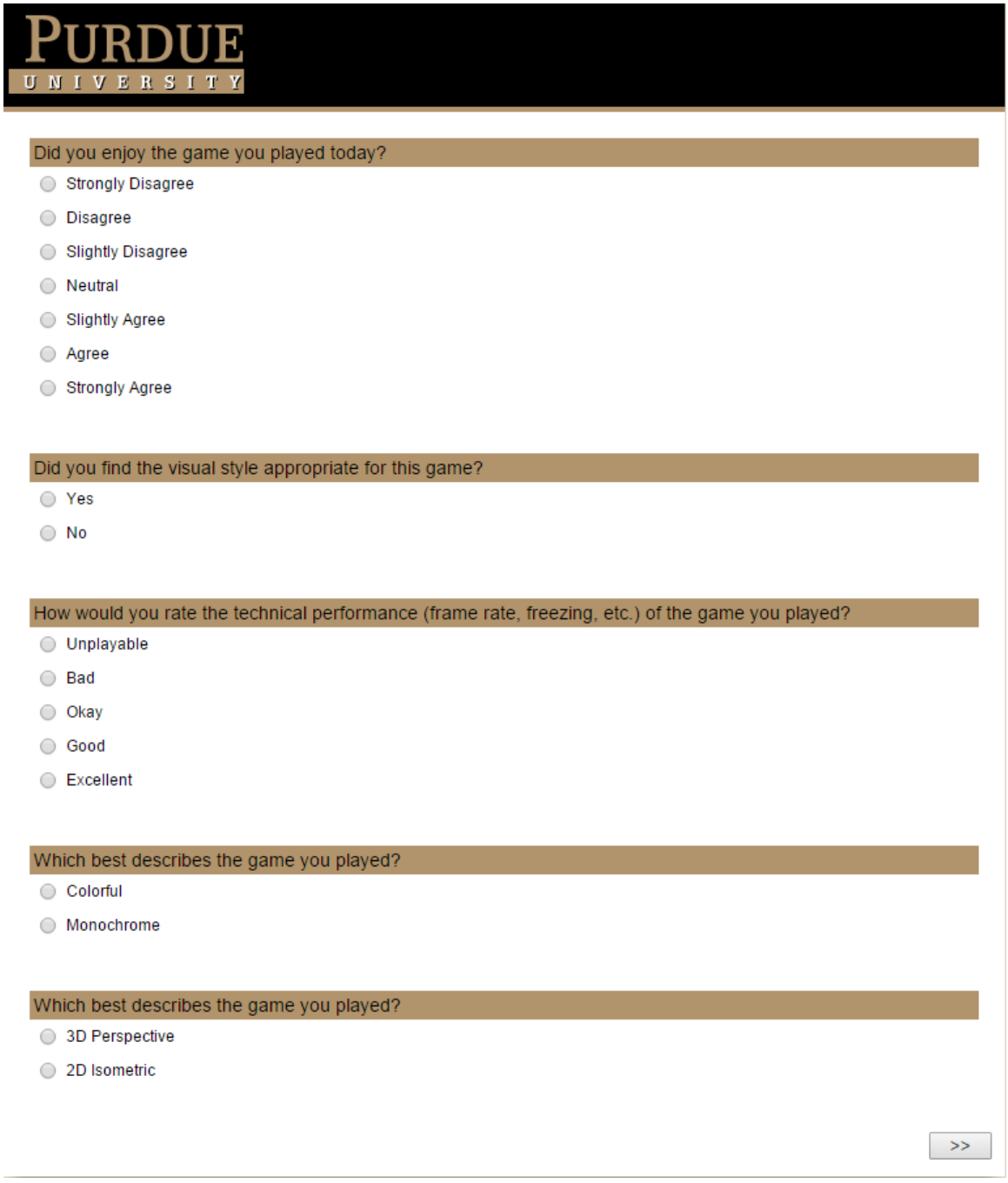

Figure A.2. Enjoyment Survey

APPENDIX B. DATA ANALYSIS

The following are the tables and graphs from the data analysis.

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2479.342[a]	4	619.835	5.078	.001	.209
Intercept	30409.603	1	30409.603	249.108	.000	.764
TECHNICAL	2479.342	4	619.835	5.078	.001	.209
Error	9399.683	77	122.074			
Total	182642.000	82				
Corrected Total	11879.024	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	20.310	.956
Intercept	249.108	1.000
TECHNICAL	20.310	.956
Error		
Total		
Corrected Total		

a. R Squared = .209 (Adjusted R Squared = .168)

b. Computed using alpha = .05

Figure B.1. ANOVA analysing engagement levels in regard to technical performance

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	409.885[a]	3	136.628	.929	.431	.035
Intercept	170943.046	1	170943.046	1162.560	.000	.937
GROUP	409.885	3	136.628	.929	.431	.035
Error	11469.139	78	147.040			
Total	182642.000	82				
Corrected Total	11879.024	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	2.788	.246
Intercept	1162.560	1.000
GROUP	2.788	.246
Error		
Total		
Corrected Total		

a. R Squared = .035 (Adjusted R Squared = -.003)

b. Computed using alpha = .05

Figure B.2. ANOVA analysing engagement levels between the four groups of participants using raw data

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2581.568[a]	4	645.392	5.345	.001	.217
Intercept	2873.053	1	2873.053	23.794	.000	.236
TECHNICAL	2171.683	1	2171.683	17.986	.000	.189
GROUP	206.004	3	68.668	.569	.637	.022
Error	9297.456	77	120.746			
Total	182642.000	82				
Corrected Total	11879.024	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	21.380	.965
Intercept	23.794	.998
TECHNICAL	17.986	.987
GROUP	1.706	.162
Error		
Total		
Corrected Total		

a. R Squared = .217 (Adjusted R Squared = .177)

b. Computed using alpha = .05

Figure B.3. ANCOVA analysing engagement levels between the four groups of participants using data adjusted for technical performance

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	98.066[a]	3	32.689	.199	.896	.011
Intercept	111576.497	1	111576.497	680.598	.000	.925
GROUP	98.066	3	32.689	.199	.896	.011
Error	9016.646	55	163.939			
Total	125816.000	59				
Corrected Total	9114.712	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	.598	.085
Intercept	680.598	1.000
GROUP	.598	.085
Error		
Total		
Corrected Total		

a. R Squared = .011 (Adjusted R Squared = -.043)

b. Computed using alpha = .05

Figure B.4. ANOVA analysing engagement levels between the four groups of participants using raw data for participants who correctly indicated their demo

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3011.462[a]	4	752.865	6.661	.000	.330
Intercept	781.109	1	781.109	6.911	.011	.113
TECHNICAL	2913.396	1	2913.396	25.777	.000	.323
GROUP	210.653	3	70.218	.621	.604	.033
Error	6103.250	54	113.023			
Total	125816.000	59				
Corrected Total	9114.712	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	26.645	.988
Intercept	6.911	.733
TECHNICAL	25.777	.999
GROUP	1.864	.171
Error		
Total		
Corrected Total		

a. R Squared = .330 (Adjusted R Squared = .281)

b. Computed using alpha = .05

Figure B.5. ANCOVA analysing engagement levels between the four groups of participants using data adjusted for technical performance for participants who correctly indicated their demo

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	409.885[a]	3	136.628	.929	.431	.035
Intercept	170943.046	1	170943.046	1162.560	.000	.937
COLOR	374.727	1	374.727	2.548	.114	.032
FORM	1.297	1	1.297	.009	.925	.000
COLOR * FORM	30.385	1	30.385	.207	.651	.003
Error	11469.139	78	147.040			
Total	182642.000	82				
Corrected Total	11879.024	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	2.788	.246
Intercept	1162.560	1.000
COLOR	2.548	.351
FORM	.009	.051
COLOR * FORM	.207	.073
Error		
Total		
Corrected Total		

a. R Squared = .035 (Adjusted R Squared = -.003)

b. Computed using alpha = .05

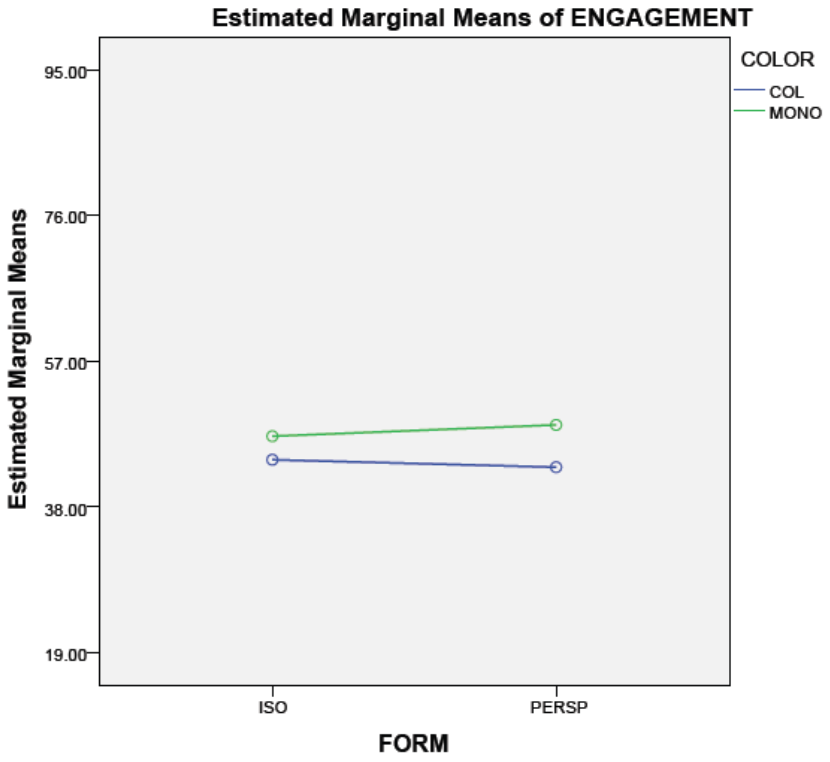

Figure B.6. ANOVA analysing engagement levels for the main and interaction effects of color and form using raw data

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2581.568[a]	4	645.392	5.345	.001	.217
Intercept	2873.053	1	2873.053	23.794	.000	.236
TECHNICAL	2171.683	1	2171.683	17.986	.000	.189
COLOR	68.672	1	68.672	.569	.453	.007
FORM	55.588	1	55.588	.460	.499	.006
COLOR * FORM	85.162	1	85.162	.705	.404	.009
Error	9297.456	77	120.746			
Total	182642.000	82				
Corrected Total	11879.024	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	21.380	.965
Intercept	23.794	.998
TECHNICAL	17.986	.987
COLOR	.569	.116
FORM	.460	.103
COLOR * FORM	.705	.132
Error		
Total		
Corrected Total		

a. R Squared = .217 (Adjusted R Squared = .177)

b. Computed using alpha = .05

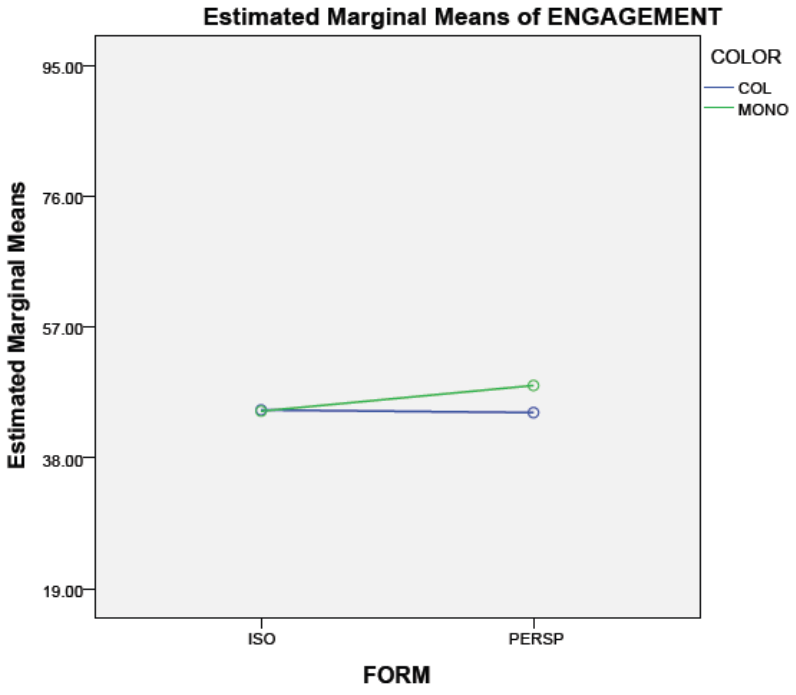

Figure B.7. ANCOVA analysing engagement levels for the main and interaction effects of color and form using data adjusted for technical performance

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	98.066[a]	3	32.689	.199	.896	.011
Intercept	111576.497	1	111576.497	680.598	.000	.925
COLOR	81.920	1	81.920	.500	.483	.009
FORM	12.321	1	12.321	.075	.785	.001
COLOR * FORM	1.415	1	1.415	.009	.926	.000
Error	9016.646	55	163.939			
Total	125816.000	59				
Corrected Total	9114.712	58				

Tests of Between-Subjects Effects

Dependent Variable: ENGAGEMENT

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	.598	.085
Intercept	680.598	1.000
COLOR	.500	.107
FORM	.075	.058
COLOR * FORM	.009	.051
Error		
Total		
Corrected Total		

a. R Squared = .011 (Adjusted R Squared = -.043)

b. Computed using alpha = .05

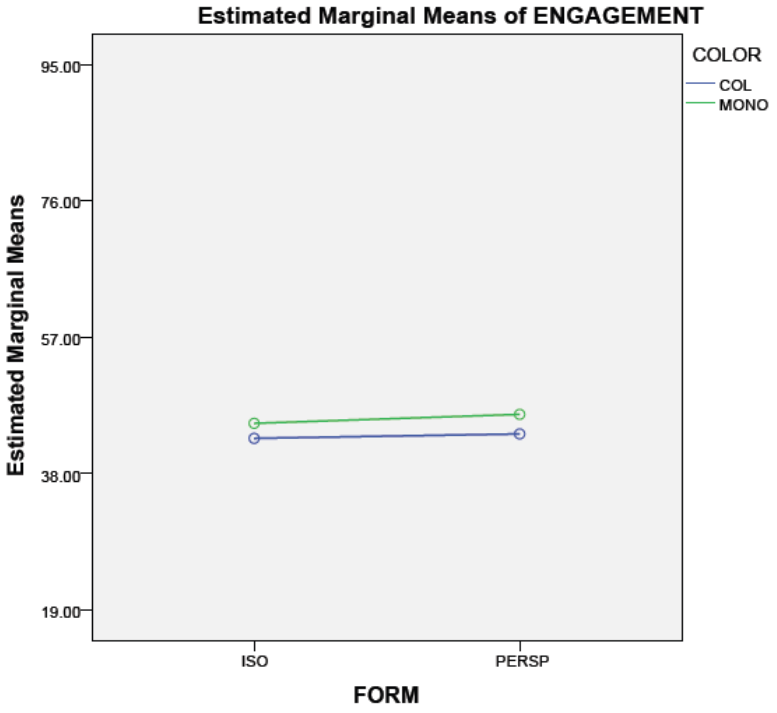

Figure B.8. ANOVA analysing engagement levels for the main and interaction effects of color and form using raw data for participants who correctly indicated their demo

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3011.462[a]	4	752.865	6.661	.000	.330
Intercept	781.109	1	781.109	6.911	.011	.113
TECHNICAL	2913.396	1	2913.396	25.777	.000	.323
COLOR	48.137	1	48.137	.426	.517	.008
FORM	78.085	1	78.085	.691	.410	.013
COLOR * FORM	105.637	1	105.637	.935	.338	.017
Error	6103.250	54	113.023			
Total	125816.000	59				
Corrected Total	9114.712	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	26.645	.988
Intercept	6.911	.733
TECHNICAL	25.777	.999
COLOR	.426	.098
FORM	.691	.129
COLOR * FORM	.935	.158
Error		
Total		
Corrected Total		

a. R Squared = .330 (Adjusted R Squared = .281)

b. Computed using alpha = .05

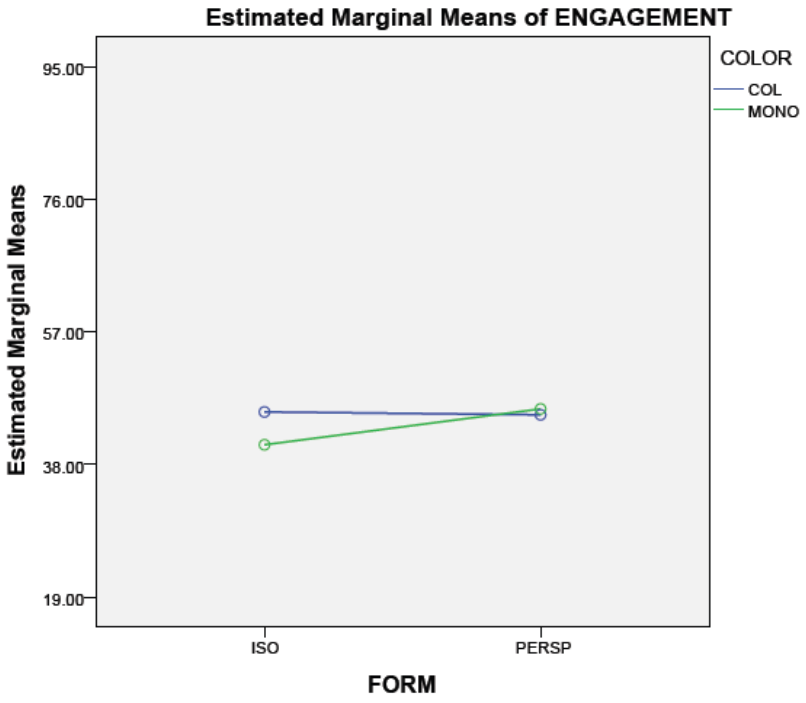

Figure B.9. ANCOVA analysing engagement levels for the main and interaction effects of color and form using data adjusted for technical performance for participants who correctly indicated their demo

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	697.185[a]	1	697.185	4.721	.034	.076
Intercept	107192.101	1	107192.101	725.860	.000	.927
VISUAL	697.185	1	697.185	4.721	.034	.076
Error	8417.527	57	147.676			
Total	125816.000	59				
Corrected Total	9114.712	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	4.721	.570
Intercept	725.860	1.000
VISUAL	4.721	.570
Error		
Total		
Corrected Total		

a. R Squared = .076 (Adjusted R Squared = .060)

b. Computed using alpha = .05

Figure B.10. ANOVA analysing engagement levels in regard to visual preference using raw data

Dependent Variable: ENGAGEMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2965.165[a]	2	1482.582	13.501	.000	.325
Intercept	1281.281	1	1281.281	11.668	.001	.172
TECHNICAL	2267.979	1	2267.979	20.653	.000	.269
VISUAL	164.356	1	164.356	1.497	.226	.026
Error	6149.547	56	109.813			
Total	125816.000	59				
Corrected Total	9114.712	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	27.002	.997
Intercept	11.668	.919
TECHNICAL	20.653	.994
VISUAL	1.497	.225
Error		
Total		
Corrected Total		

a. R Squared = .325 (Adjusted R Squared = .301)

b. Computed using alpha = .05

Figure B.11. ANCOVA analysing engagement levels in regard to visual preference using data adjusted for technical performance

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	22.530[a]	4	5.633	1.900	.119	.090
Intercept	267.099	1	267.099	90.106	.000	.539
TECHNICAL	22.530	4	5.633	1.900	.119	.090
Error	228.250	77	2.964			
Total	1644.000	82				
Corrected Total	250.780	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	7.601	.550
Intercept	90.106	1.000
TECHNICAL	7.601	.550
Error		
Total		
Corrected Total		

Figure B.12. ANOVA analysing enjoyment levels in regard to technical performance

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9.094[a]	3	3.031	.978	.407	.036
Intercept	1393.256	1	1393.256	449.648	.000	.852
GROUP	9.094	3	3.031	.978	.407	.036
Error	241.687	78	3.099			
Total	1644.000	82				
Corrected Total	250.780	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	2.935	.257
Intercept	449.648	1.000
GROUP	2.935	.257
Error		
Total		
Corrected Total		

a. R Squared = .036 (Adjusted R Squared = -.001)

b. Computed using alpha = .05

Figure B.13. ANOVA analysing enjoyment levels between the four groups of participants using raw data

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	30.815[a]	4	7.704	2.697	.037	.123
Intercept	19.349	1	19.349	6.773	.011	.081
TECHNICAL	21.721	1	21.721	7.604	.007	.090
GROUP	10.560	3	3.520	1.232	.304	.046
Error	219.965	77	2.857			
Total	1644.000	82				
Corrected Total	250.780	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	10.787	.723
Intercept	6.773	.729
TECHNICAL	7.604	.777
GROUP	3.697	.318
Error		
Total		
Corrected Total		

a. R Squared = .123 (Adjusted R Squared = .077)

b. Computed using alpha = .05

Figure B.14. ANCOVA analysing enjoyment levels between the four groups of participants using data adjusted for technical performance

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7.264[a]	3	2.421	.702	.555	.037
Intercept	935.394	1	935.394	271.172	.000	.831
GROUP	7.264	3	2.421	.702	.555	.037
Error	189.719	55	3.449			
Total	1149.000	59				
Corrected Total	196.983	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	2.106	.189
Intercept	271.172	1.000
GROUP	2.106	.189
Error		
Total		
Corrected Total		

a. R Squared = .037 (Adjusted R Squared = -.016)

b. Computed using alpha = .05

Figure B.15. ANOVA analysing enjoyment levels between the four groups of participants using raw data for participants who correctly indicated their demo

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	35.260[a]	4	8.815	2.943	.028	.179
Intercept	4.929	1	4.929	1.646	.205	.030
TECHNICAL	27.996	1	27.996	9.348	.003	.148
GROUP	10.816	3	3.605	1.204	.317	.063
Error	161.723	54	2.995			
Total	1149.000	59				
Corrected Total	196.983	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	11.773	.753
Intercept	1.646	.243
TECHNICAL	9.348	.851
GROUP	3.611	.305
Error		
Total		
Corrected Total		

a. R Squared = .179 (Adjusted R Squared = .118)

b. Computed using alpha = .05

Figure B.16. ANCOVA analysing enjoyment levels between the four groups of participants using data adjusted for technical performance for participants who correctly indicated their demo

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9.094[a]	3	3.031	.978	.407	.036
Intercept	1393.256	1	1393.256	449.648	.000	.852
COLOR	.197	1	.197	.064	.802	.001
FORM	.480	1	.480	.155	.695	.002
COLOR * FORM	8.011	1	8.011	2.585	.112	.032
Error	241.687	78	3.099			
Total	1644.000	82				
Corrected Total	250.780	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	2.935	.257
Intercept	449.648	1.000
COLOR	.064	.057
FORM	.155	.067
COLOR * FORM	2.585	.355
Error		
Total		
Corrected Total		

a. R Squared = .036 (Adjusted R Squared = -.001)

b. Computed using alpha = .05

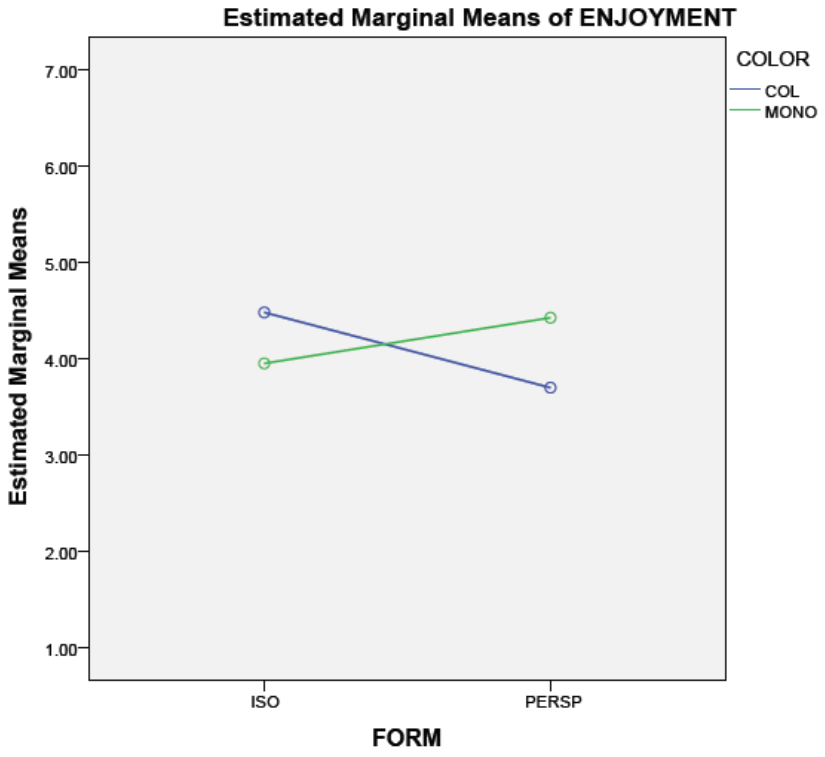

Figure B.17. ANOVA analysing enjoyment levels for the main and interaction effects of color and form using raw data

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	30.815[a]	4	7.704	2.697	.037	.123
Intercept	19.349	1	19.349	6.773	.011	.081
TECHNICAL	21.721	1	21.721	7.604	.007	.090
COLOR	.390	1	.390	.137	.713	.002
FORM	.003	1	.003	.001	.975	.000
COLOR * FORM	10.206	1	10.206	3.573	.062	.044
Error	219.965	77	2.857			
Total	1644.000	82				
Corrected Total	250.780	81				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	10.787	.723
Intercept	6.773	.729
TECHNICAL	7.604	.777
COLOR	.137	.065
FORM	.001	.050
COLOR * FORM	3.573	.463
Error		
Total		
Corrected Total		

a. R Squared = .123 (Adjusted R Squared = .077)

b. Computed using alpha = .05

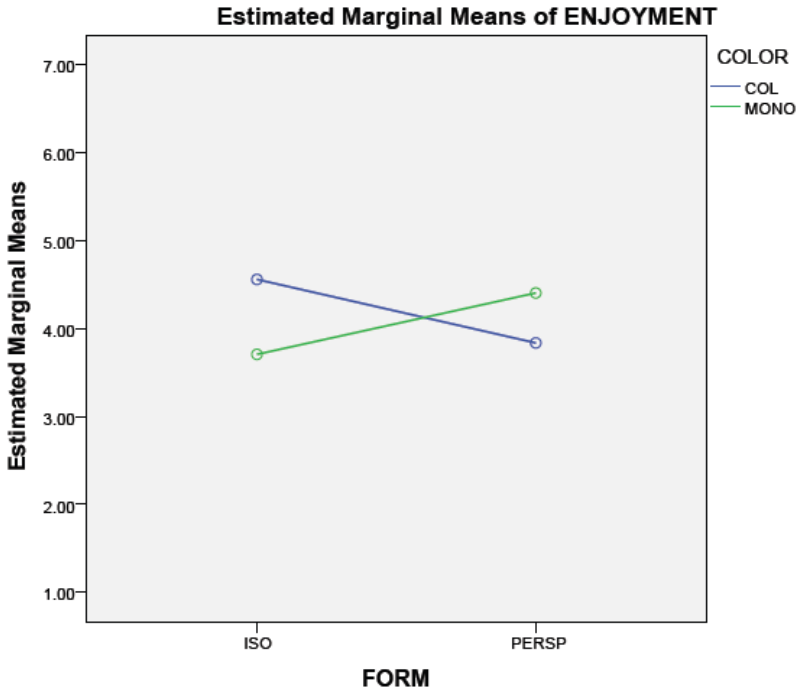

Figure B.18. ANCOVA analysing enjoyment levels for the main and interaction effects of color and form using data adjusted for technical performance

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7.264[a]	3	2.421	.702	.555	.037
Intercept	935.394	1	935.394	271.172	.000	.831
COLOR	.144	1	.144	.042	.839	.001
FORM	.835	1	.835	.242	.625	.004
COLOR * FORM	5.655	1	5.655	1.640	.206	.029
Error	189.719	55	3.449			
Total	1149.000	59				
Corrected Total	196.983	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	2.106	.189
Intercept	271.172	1.000
COLOR	.042	.055
FORM	.242	.077
COLOR * FORM	1.640	.242
Error		
Total		
Corrected Total		

a. R Squared = .037 (Adjusted R Squared = -.016)

b. Computed using alpha = .05

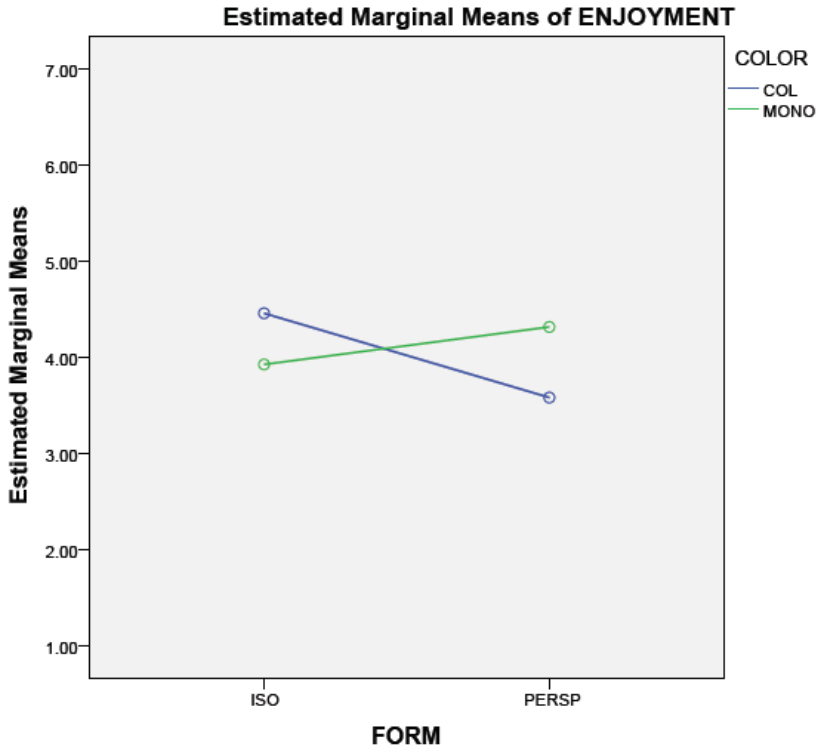

Figure B.19. ANOVA analysing enjoyment levels for the main and interaction effects of color and form using raw data for participants who correctly indicated their demo

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	35.260[a]	4	8.815	2.943	.028	.179
Intercept	4.929	1	4.929	1.646	.205	.030
TECHNICAL	27.996	1	27.996	9.348	.003	.148
COLOR	1.359	1	1.359	.454	.503	.008
FORM	.149	1	.149	.050	.824	.001
COLOR * FORM	10.476	1	10.476	3.498	.067	.061
Error	161.723	54	2.995			
Total	1149.000	59				
Corrected Total	196.983	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	11.773	.753
Intercept	1.646	.243
TECHNICAL	9.348	.851
COLOR	.454	.101
FORM	.050	.056
COLOR * FORM	3.498	.451
Error		
Total		
Corrected Total		

a. R Squared = .179 (Adjusted R Squared = .118)

b. Computed using alpha = .05

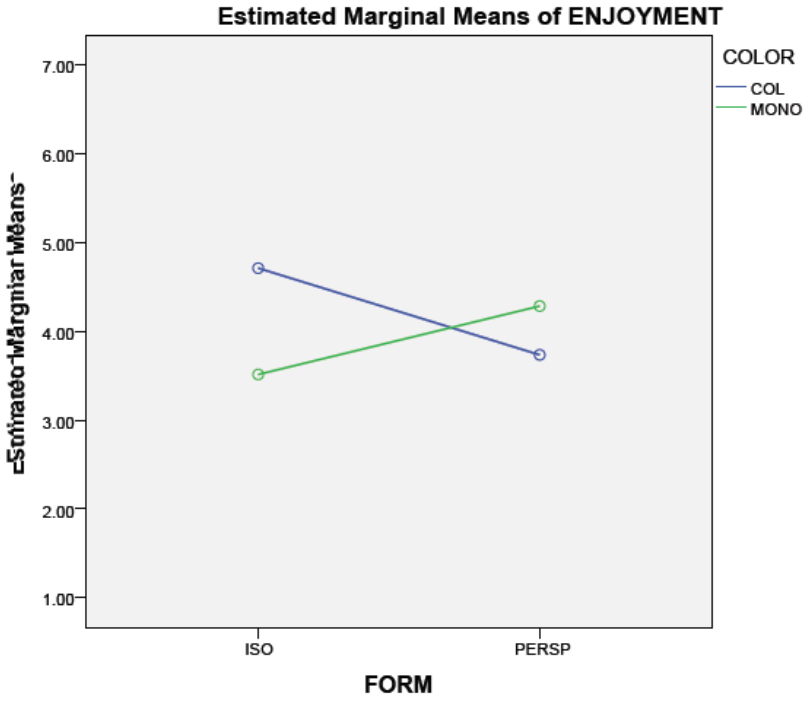

Figure B.20. ANCOVA analysing enjoyment levels for the main and interaction effects of color and form using data adjusted for technical performance for participants who correctly indicated their demo

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	49.624[a]	1	49.624	19.195	.000	.252
Intercept	814.777	1	814.777	315.165	.000	.847
VISUAL	49.624	1	49.624	19.195	.000	.252
Error	147.359	57	2.585			
Total	1149.000	59				
Corrected Total	196.983	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	19.195	.991
Intercept	315.165	1.000
VISUAL	19.195	.991
Error		
Total		
Corrected Total		

a. R Squared = .252 (Adjusted R Squared = .239)

b. Computed using alpha = .05

Figure B.21. ANOVA analysing enjoyment levels in regard to visual preference using raw data

Dependent Variable: ENJOYMENT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	59.795[a]	2	29.897	12.204	.000	.304
Intercept	16.427	1	16.427	6.706	.012	.107
TECHNICAL	10.170	1	10.170	4.152	.046	.069
VISUAL	35.351	1	35.351	14.430	.000	.205
Error	137.188	56	2.450			
Total	1149.000	59				
Corrected Total	196.983	58				

Source	Noncent. Parameter	Observed Power[b]
Corrected Model	24.408	.994
Intercept	6.706	.721
TECHNICAL	4.152	.517
VISUAL	14.430	.962
Error		
Total		
Corrected Total		

a. R Squared = .304 (Adjusted R Squared = .279)

b. Computed using alpha = .05

Figure B.22. ANCOVA analysing enjoyment levels in regard to visual preference using data adjusted for technical performance

Correlations

		ENGAGEMENT	ENJOYMENT
ENGAGEMENT	Pearson Correlation	1	.557**
	Sig. (2-tailed)		.000
	N	82	82
ENJOYMENT	Pearson Correlation	.557**	1
	Sig. (2-tailed)	.000	
	N	82	82

**. Correlation is significant at the 0.01 level (2-tailed).

Figure B.23. Correlation between engagement and enjoyment levels