The International Conference on Interdisciplinary Humanities and Communication Studies
DOI: 10.54254/2753-7064/3/20220520

The Influence of Facial Features on the Attractiveness of Game Faces

Dan Kang [1,a,†], Duanwen Li[2,b,*,†], and Yuchen Liu[3,c,†]

[1] *Department of Social Services, WenZheng College of Soochow University, Suzhou, Jiangsu Province, 215104, China*
[2] *School of Electronic and Optical Engineering, Nanjing University of Science and Technology, Nanjing, Jiangsu Province, 210094, China*
[3] *School of Mechanical and Equipment Engineering, Hebei University of Engineering, Shijiazhuang, Hebei Province, 050000, China*
a. 1030760017@qq.com ,b. haloldw@njust.edu.cn, c.2363018455@qq.com
**corresponding author*
[†]These authors contributed equally.

Abstract: The study of the psychology of facial attractiveness emerged in the 1970s. Facial attractiveness plays an important role in important social decisions as well as in daily life. In this research, 30 university student participants (15 female and 15 male) were selected for this study to compare the effects of facial feature relationships (eye spacing and eyebrow spacing) on the face attractiveness of game characters by scoring on a psychological scale. The results showed that among the nine combinations of eye spacing and eyebrow spacing, the combination of medium eye spacing and medium eyebrow-eye interval has the greatest face attractiveness; face attractiveness varies significantly by eye spacing type, with medium eye spacing having the highest face attractiveness; and eye spacing type has an interactive effect with gender.

Keywords: facial attractiveness, facial features, game faces

1. Introduction

In everyday life, the human perceptual system constantly receives different stimuli from the outside world, allowing people to truly feel and experience the world at all times. Among these stimuli, visual stimuli account for a large proportion, and people's learning life, interpersonal communication, and emotional perception are all inseparable from visual perception. People can make judgments and choices through the information they receive visually, so the role of visual stimuli in their lives cannot be ignored. As an advanced and complex visual stimulus, the face contains a wealth of information, such as gender, age, emotion, and beauty, and plays an important role in interpersonal communication [1]. Face attraction is the degree to which a target person’s face induces a positive and pleasurable emotional experience and drives others to approach it [2]. People often judge whether a person is attracted to them by their assessment of their facial attractiveness, and therefore face attractiveness has an important impact on the transmission of socio-emotional messages and interpersonal interactions [3].

DOI: 10.54254/2753-7064/3/20220520

From the perspective of overall face characteristics, three factors that influence face attractiveness are averageness, symmetry, and gender dimorphism [2, 4, 5]. The experiment by Stanley Liu showed that individuals' attentional preference for gender dimorphic faces was due to the presence of attentional vigilance. The experiment explored the components of attentional preference using eye-tracking techniques and showed that individuals were more alert to feminine faces; individuals spent more time looking at masculine faces than feminine faces [6]. The same results can be obtained from Wen's experiments based on image processing techniques and eye-movement tests [7]. In contrast, Chen's experiment looked at the spatial relationship of facial features and the effect of skin colour brightness on the attractiveness of cartoon faces from specific facial features, and the study provides a solid scientific basis for the design of cartoon animation images for children [8]. Other researchers, by manipulating the values of eye size and lip thickness, have investigated the effect of facial features on face attractiveness judgments [9]. In a 2017 experiment, Stepanova studied the effects of mixed-race faces as well as skin colour, showing that mixed-race faces were considered more attractive than mono-racial faces, and that faces with medium skin colour and facial feature values were more attractive than faces with extreme levels [10]. Thornhill, in a 2001 experiment, noted that skin Texture plays an important role in determining facial beauty in women [11]. The results of experiments have shown that the influence of facial features on facial attractiveness cannot be ignored.

In their experiment, Lu Yang and Zhao Jia found that men showed more behaviors and effort to look at the opposite sex's face than women and that men were more desirous of beautiful faces of the opposite sex [12]. Meanwhile, Wan Chongyue and Wang Jingmei found that boys rated the attractiveness of cartoon faces significantly higher than that of real faces, and girls preferred real faces [13]. These findings suggest that gender differences also have an impact on face attractiveness judgments.

Nowadays, video games are a common form of stress relief and recreation for today's youth. The design of game characters is not only based on the character and deeds of their historical counterparts, or the setting and style of the game's framework, but also the preferences of the game's audience for the appearance of the game's characters. To a certain extent, the preference of game characters reflects the aesthetics, personality, age, and education level of the audience. The results of this study can provide a scientific basis for the design of game characters, so that game products can be designed to better suit the interests and aesthetic preferences of different audiences.

The attractiveness of game characters with different facial features (eye spacing and eyebrow spacing) differs significantly according to traditional aesthetic criteria and previous research [14,15]. Female game characters with medium eye spacing and medium eyebrow spacing score higher on the questionnaire than game characters with wide eye spacing and wide eyebrow spacing.

2. Method

2.1. Participants

A total of 24 university student participants (12 males, 12 females) with some online game involvement and normal vision were recruited. Before the experiment, they would fill out a questionnaire about game involvement to check whether they were suitable for being the experiment subjects or not.

2.2. Experimental Design

The experiment used a mixed experimental design of 3 binocular spacing (wide/narrow/standard) *3 brow-eye spacing (large/small/standard) * participants' gender (male/female), where binocular spacing and brow-eye spacing were intra-group variables and subject gender was an inter-group

DOI: 10.54254/2753-7064/3/20220520

variable, and these subjects used online experiment website 'NaoDao' to participate in the experiment.

2.3. Experimental Materials

Using hand drawing game character faces, then keeping the facial expressions presented neutrally and ensuring the clarity among 54 face pictures, 27 for each gender. Based on the completed game character faces, the spacing between the eyes and the eyebrows of the faces was adjusted by Photoshop, and the space of each picture is 1:1. In this study, it was found that the eye spacing of game faces had a significant difference in the attractiveness of players' faces, indicating that different facial features had different attractiveness to the subjects, with game players preferring game faces with the feature of medium eye spacing (eyebrow-eye spacing/widest horizontal cheek distance = 0.21).

In this study, in order to investigate the effect of the eye and brow spacing on face attractiveness, only the five senses were retained and images with different proportions of eye and brow spacing were chosen, while other parts, such as the face shape and nose, were the same. However, for a real human face, every face cannot be the same. Therefore, in the short experiment, subjects perceived little overall difference between faces of the same gender. Although the effects of other facial features were controlled for in the experiment, studying facial attractiveness, such as face shape and nose, also had an important effect. Therefore, further consideration is necessary for future studies. Standard eye spacing: determined as the distance between two eyes / the widest distance of the lateral cheeks = 0.21; Narrow eye spacing: eye distance between eyes / widest value of face passing through both eyes = 0.17; Wide eye spacing: eye distance between eyes / widest value of face passing through both eyes = 0.26.Standard eyebrow-eye spacing : the eyebrow-eye distance/eye width = 0.5; Wide eyebrow-eye spacing: Eye width; Narrow eyebrow-eye spacing: 1/3 of the width of the eye.

2.4. Experimental Procedure

In order to compare the effects of binocular spacing and eyebrow-eye spacing on facial attractiveness, 54 games face pictures with different combinations of binocular spacing (wide/narrow/standard) and eyebrow-eye spacing (large/small/standard) were selected as the presentation material for the experimental material to assess the facial attractiveness of game characters with different facial features including eye spacing (wide/narrow/standard) and eyebrow-eye spacing (large/small/standard). The experiment was programmed by PsychoPy. In the beginning, a gaze point (3s) was presented on the screen, and a game face (1s) was presented in the middle of the screen, then the subject was asked to grade scores on a five-point scale:1-(very unattractive), 2-(unattractive), 3-(average), 4-(attractive), 5-(very attractive) about the presenting faces they saw on the screen. The experiment consisted of 6 trails, each containing 9 images, after finishing one trail, they would be seen at the gaze point again, and the face images were presented randomly.

3. Results

According to Table 1, it can be concluded that the mean values of medium eye spacing and standard eyebrow-eye spacing are the highest, Mean=3.00. Lowest mean values for narrow eye spacing and narrow brow-eye spacing, Mean=2.10.

DOI: 10.54254/2753-7064/3/20220520

Table 1: Descriptive statistics of face attractiveness for different combinations of eye spacing and eyebrow-eye spacing.

	1	2	3	4	5	6	7	8	9
M	3.00	2.79	2.76	2.31	2.41	2.10	2.64	2.57	2.70

Table 1: (continued).

SD	1.14	1.14	1.09	1.04	1.10	1.06	1.03	1.02	1.12

Notes:1=Medium eye spacing, standard eyebrow-eye spacing; 2=Medium eye spacing, wide eyebrow-eye spacing; 3=Medium eye spacing, narrow eyebrow-eye spacing; 4=Narrow eye spacing, standard eyebrow-eye spacing; 5=Narrow eye spacing, wide eyebrow-eye spacing; 6=Narrow eye spacing, narrow eyebrow-eye spacing; 7=Wide eye spacing, standard eyebrow-eye spacing; 8=Wide eye spacing, wide eyebrow-eye spacing; 9=Wide eye spacing, narrow brow-eye spacing;

Table 2: ANOVA of eye spacing, eyebrow-eye spacing, and gender.

	Sum of Squares	df	Mean Square	F	P
Eyebrow-eye spacing	3.46	2	1.73	1.50	0.22
Gender	12.35	1	12.35	10.73	0.001
Eye spacing	73.92	2	36.96	32.1	<.001
Eyebrow-eye spacing*Gender	2.88	2	1.44	1.25	0.29
Eyebrow-eye spacing*Eye spacing	9.12	4	2.28	1.98	0.09
Gender*Eye spacing	20.99	2	10.49	9.11	<.001
Eyebrow-eye spacing*Gender*Eye spacing	2.02	4	0.51	0.44	0.78

Table 3: Descriptive statistics of facial attractiveness with different eye spacing.

	Eye spacing	Mean	SD	SE
Faces	1	2.85	1.13	0.05
Attractiveness	2	2.64	1.06	0.05
Score	3	2.27	1.07	0.05

As shown in Table 2, separate ANOVAs were conducted for different face attractiveness scores 3 eyebrow-eye spacing x 3 eye spacing x 2 subject gender. The results found a significant main effect of gender($p<0.05$), a significant main effect of eye spacing($p<0.05$), and a significant interaction effect of gender and eye spacing($p<0.05$).

According to Table 3, it can be concluded that the main effect of eye spacing is significant. The mean value of facial attractiveness varies from one eye spacing to another. Standard eye spacing had the highest mean value, Mean=2.85, followed by wide eye spacing, Mean=2.64, and narrow eye spacing had the lowest mean value, Mean=2.27.

4. Discussion

In this study, it was found that the eye spacing of game faces had a significant difference in the attractiveness of players' faces, indicating that different facial features had different attractiveness to the subjects, with game players preferring game faces with the feature of medium eye spacing (eyebrow-eye spacing/widest horizontal cheek distance = 0.21).

This feature also applies to both male and female game faces, with men and women showing different preferences for game faces with different features. In terms of facial characteristics, Zhou's study shows that an increase in red and white colour in faces increases face attractiveness to varying degrees among individuals in Chinese culture and that the effect of the change in white

DOI: 10.54254/2753-7064/3/20220520

colour is deeper and more widespread than that of red colour, i.e. people tend to prefer fairer skinned faces [16].

For example, Wu Yujia notes that an increase in the perceived attractiveness and trust of faces on a webpage enhances users' cognitive and emotional experience during browsing, which in turn leads to online loyalty [17]. In their study, Holzwarth et al. found that virtual agents with highly attractive faces in online consultation scenarios made consumers more satisfied with the retailer and more likely to buy the product [18]. Therefore, the creation of game characters with more attractive faces can promote user stickiness and experience for gamers in the gaming industry and stimulate consumer behaviour. The more attractive a face is, the more attention it attracts, and Nakamura and Kawabata found that an attractive face attracts more attention than an unattractive face [19]. Faces with different levels of attractiveness activated different reward circuits, and people showed stronger motivation to repeat viewing highly attractive faces [20]. Therefore, enhancing the attractiveness of faces can also increase the activity of gamers and make them stay in the game longer. Highly attractive faces have emotional reward value and activate both emotional and reward systems, which together can facilitate and enhance perceptual processing and memory formation. Beringer's research shows that highly attractive faces are often associated with altruistic behaviour, and that people of both sexes tend to favor the lexical evaluation of highly attractive faces as good [21]. The use of changing facial features to create highly facially attractive game character faces, then, has implications for games that shape positive IP characters and make character appearance more in line with character traits.

At the same time, there are also differences in cultural backgrounds in terms of preferences for facial features. With historical and cultural changes, Western culture continues to enter China, and Chinese and Western cultures continue to collide, merge and cross over, which may lead to a different aesthetic for contemporary youth than in the past. Participants' perceptual responses when observing game faces may be different from observing real human faces. Would the same conclusions be drawn if the experimental task were replaced with an implicit task, i.e. without a direct judgement of attractiveness? It is open to discussion.

In addition, the experiment also has several limitations. Due to the small number of subjects participating in the experiment, which was focused on mainland China, it was not possible to study the effect of different facial features on the attractiveness of faces in a cross-cultural context. In this study, to investigate the effect of the eye and brow spacing on face attractiveness, only the five senses were retained and images with different proportions of eye and brow spacing were chosen, while other parts, such as the face shape and nose, were the same. However, for a real human face, every face cannot be the same. Therefore, in the short experiment, subjects perceived little overall difference between faces of the same gender. Although the effects of other facial features were controlled for in the experiment, studying facial attractiveness, such as face shape and nose, also had an important effect. Therefore, further consideration is necessary for future studies.

5. Conclusion

This study concluded that face attractiveness scores for medium eye spacing and standard eyebrow-eye spacing were significantly higher than face attractiveness scores for other facial features. This indicates that for both male and female subjects, face attractiveness scores for medium eye spacing and standard eyebrow-eye spacing were significantly higher than those for large eye spacing and standard eyebrow-eye spacing.

There has been a great deal of research into facial proportions about facial attractiveness and it has been found that there is a new 'golden ratio' of facial attractiveness in adult women and that the eyes play a very important role in the proportion of facial beauty. The position of the eyes plays a key role in the attractiveness of a face. Future research will have to examine the combined effects of

DOI: 10.54254/2753-7064/3/20220520

physical, psychological, and social factors on judgments of facial attractiveness. Future research needs to further explore face attractiveness judgments in conjunction with face preference direction and face preference strength.

As perceptual and cognitive processing may differ for different attractiveness components, future research needs to further explore how attractiveness components and their underlying cognitive processing are differentiated in face attractiveness judgments. Although research has been conducted on the cross-cultural consistency of face attractiveness, the current research on face attractiveness judgments has mainly focused on Western cultures, and whether there is cross-cultural consistency or cultural differences in face attractiveness judgments between Eastern and Western cultures remains to be studied in depth.

References

[1] *Zhou, G. M., Zheng, R. Y., Lin, J., & Liu, X. Ge. (2022). Holistic representations of face attractiveness and its dynamic enhancement. Advances in Psychological Science, 30(7), 1429.*

[2] *Rhodes, G. (2006). The evolutionary psychology of facial beauty. Annual review of psychology, 57, 199.*

[3] *Chen, E. Z., Fang, H., Shen, N., Wu, M.R., Zheng, L.Y., Wang, J.M., & Lu, Y.J. (2013). Spatial relationships of facial features and the effect of skin colour brightness on the attractiveness of cartoon faces. Psychological Development and Education, 29(6), 561-570.*

[4] *Baudouin, J. Y., & Tiberghien, G. (2004). Symmetry, averageness, and feature size in the facial attractiveness of women. Acta psychological, 117(3), 313-332.*

[5] *Li, O., & Chen, H. (2010). A review and prospective of face attractiveness. Advances in Psychological Science, (3), 472-479.*

[6] *Liu, S., Li, Y., Tan, Q., Xu, Q., & Zhang, L. (2016). Mechanisms of the influence of gendered traits on the evaluation of face attractiveness. In Proceedings of the 19th National Conference on Psychology Abstracts.*

[7] *Wen, F. F., & Zuo, B. (2012). The effect of masculinity and femininity on face preference - An examination based on image processing techniques and eye movements. Journal of Psychology, 44(1), 14-29.*

[8] *Chen, Y. Z., Fang, H., Shen, N., Wu, M. R., Zheng, L. Y., Wang, J. M., & Lu, Y. J. (2013). Spatial relationships of facial features and the effect of skin colour brightness on the attractiveness of cartoon faces. Psychological Development and Education, 29(6), 561-570.*

[9] *Zhang, Y., Zhao, P. Q., Kong, F. C., & Zhao, L. N. (2015). The effect of facial features on the attractiveness of cartoon faces. Psychological and Behavioral Research, 13(6), 751.*

[10] *Stepanova, E. V., & Strube, M. J. (2018). Attractiveness as a function of skin tone and facial features: Evidence from categorization studies. The Journal of General Psychology, 145(1), 1-20.*

[11] *Fink, B., Grammer, K., & Thornhill, R. (2001). Human (Homo sapiens) facial attractiveness in relation to skin texture and color. Journal of Comparative Psychology, 115(1), 92.*

[12] *Lu, Y., Zhao, J., & Xu, Z. L. (2016). A study of gender differences in perceived preferences for face attractiveness and motivated behavior. Chinese Sex Science, (9), 134-138.*

[13] *Wan, C. Y., Wang, J. M., Zhu, L., & Lu, Y. J. (2019). A study on the interaction between the attractiveness of real and cartoon faces and facial expressions in older children. Collection, 6.*

[14] *Zhang, Y., Kong, F. C., Guo, Y., Ren, J., & Chen, H. (2012). Implicit or explicit memory: An ERP study of female face attractiveness memory preferences. Journal of Peking University: Natural Sciences Edition, 48(1), 160-168.*

[15] *Zhang, Y., Kong, F.C., Chen, H., Xiang, Y.F., Gao, X., & Chen, M.Y. (2010). Men's perceived preference for female face attractiveness: Evidence from ERP. Journal of Psychology, 42(11), 1060-1072.*

[16] *Zhou, J. N.(2020).The effect of face colour on the perception of face attractiveness (Master's thesis, Northwest Normal University).https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD202101&filename=1020977521.nh*

[17] *Holzwarth, M., Janiszewski, C., & Neumann, M. (2006). The Influence of Avatars on Online Consumer Shopping Behavior. Journal of Marketing, 70, 19 - 36.*

[18] *Bai, L. N. (2020). The influence of face attractiveness on altruistic behavior (Master's thesis, Beijing Forestry University). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD202101&filename=1020338758.nh*

[19] *Wu,Y. N.(2018). Research on the influence of face trait-based reasoning on individual behavior and preference: behavioral and cognitive neuroscience perspectives (Doctoral dissertation, Beijing University of Posts and Telecommunications).https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDLAST2018&filename=1018116401.nh*

DOI: 10.54254/2753-7064/3/20220520

[20] Aharon, I., Etcoff, N., Ariely, D., Chabris, C. F., O'connor, E., & Breiter, H. C. (2001). Beautiful faces have variable reward value: fMRI and behavioral evidence. Neuron, 32(3), 537-551.

[21] Nakamura, K., & Kawabata, H. (2014). Attractive faces temporally modulate visual attention. Frontiers in Psychology, 5, 620.