The 3rd International Conference on Educational Innovation and Philosophical Inquiries (ICEIPI 2022)
DOI: 10.54254/2753-7048/2/2022381

The Impact of Official Art Training on Face Recognition Ability

Yihan Chen

University of California, Los Angeles, California 90024, the United States of America
735860970@qq.com

Abstract: Face recognition is an essential ability in people's social lives and is widely thought to be equally mastered by the majority of people. However, more and more recent studies have discovered individual differences in this skill, which may be related to various factors in everyday experience. Given that portraits artists tend to have a better face recognition ability compared to others, this correlational study investigated whether the official art training that individuals have received influences how well they recognize and memorize faces. The hypothesis is that regular practice in visual art could enhance visual memory capacity in individuals, therefore enabling them to be better at recognizing human faces than their peers. To assess participants' art training level and face recognition ability, the current study included an online survey and employed the Cambridge Face Memory Test (CFMT). The results failed to demonstrate an association that was proposed. Limitations in the study and potential future directions were discussed.

Keywords: face recognition, art training, visual working memory

1. Introduction

Humans, by nature, are social beings, and therefore interpersonal conversations are almost indispensable parts of their life. During daily interactions, faces serve as essential indicators of individuals 'biological and social information, such as race, gender, and identity. Discriminating faces allow people to distinguish one person from another, a necessary ability for fluent and efficient communication. Exposed to numerous faces ever since birth, the majority of human beings seem to be extraordinarily good at remembering and recognizing faces. After meeting someone a few times, most people are able to identify and say hello to this person even in a crowd. Meanwhile, people can easily differentiate faces, even though they have a similar structure, with a fairly nuanced variation. For instance, one would not find it hard to tell his or her paternal uncles apart, although they share similar traits inherited from the same parents. Indeed, human brains have a specific region solely for face recognition: the fusiform face area (FFA) located in the inferior temporal cortex. It becomes active when people look at faces and makes them specialists in face processing.

Nevertheless, face recognition is not as effortless as many people believe. Ma et al.'s study revealed that it requires more memory resources to represent faces in visual working memory storage organization, compared to other objects [1]. Besides, although people generally have an outstanding ability to recognize faces, individual differences exist. People with prosopagnosia, also known as face blindness, have impaired face processing abilities [2, 3]. Many of them have difficulty in recognizing acquaintances such as family members, partners, close friends, and even themselves. On the contrary,

© 2023 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2753-7048/2/2022381

there are also individuals, called super-recognizers, that perform significantly above average in various face recognition tests [4, 5]. Except for these relatively extreme cases, the rest of the population still shows naturally occurring, heritable individual differences [6]. Increasing studies have worked on figuring out factors that contribute to or predict such inconsistency. For instance, many of them have investigated links between face recognition ability and life experience (e.g., child physical abuse) [7].

One of the potential factors is, arguably, visual art training. Artists have a better visual memory representation of the original figure and the drawing than novices [8]. Meanwhile, studies have revealed differences between how artists and non-artists process faces. For example, Kozbelt et al. found that artists are better at observing internal facial features and selecting key components for drawing [9]. The research by Zhou et al. discovered that art students that acquired additional experience in drawing faces demonstrated less holistic processing than did ordinary observers when disrupted by composite faces, indicating a focus on details [10]. These differences seem to enhance face recognition ability: in their experiments, Devue and Barsics showed that portrait artists, who had finer perceptual skills with faces, could better recognize recently learned faces [11].

Since merely a few studies in the field of face recognition examines the impact of art training specifically, this present correlation study attempted to fill this gap and also replicate the previous findings. This work aimed to examine how official visual art training, such as college-level courses on painting, drawing, design, or architecture, predicts individuals' face recognition ability. Based on the findings discussed above, the main hypothesis was that regular visual art training could enhance visual memory capacity in individuals, thereby enabling them to outperform their peers in recognizing and memorizing human faces.

The participants were grouped into experts and non-experts based on their self-reported years of systematical training in visual art. After filling out the self-evaluation survey assessing the level of art training they had received and their subjective ability to recognize faces, participants were required to complete the online Cambridge Face Memory Test (CFMT) [12, 13], which examines their ability to recognize newly learned faces.

2. Method

2.1. Participants

Twenty-two Chinese students (N = 22, 18 females, Mage = 21.2 years, SD = 1.66) who are or have been studying abroad volunteered to participate in this study. All participants were recruited online or through social networks and reported normal or corrected to normal vision. Based on the years of the official art training they received, 11 of them were considered as experts (N = 11, 7 females, Mage = 21.5 years, SD =1.83), while the rest of them was non-experts (N = 11, 11 females, Mage = 20.9 years, SD = 1.37).

3. Design

The study was correlational, assessing the relationship between training in visual art and face recognition ability. The art training were divided into two general levels, expert and non-expert, defined by the number of years the participants had been systematically trained in visual art. The expert level is operationalized as having received over one year of the official art training, while the non-expert level is operationalized as having received less than one year of the official art training. Face recognition ability was measured using self-evaluation questions in the survey (i.e., subjective) and the online CFMT (i.e., objective).

DOI: 10.54254/2753-7048/2/2022381

4. Materials

The survey was online, including 23 questions in total. Two of them were for demographic information (i.e., gender and age), and one of them aimed to assess the level of art training participants had received: "How long have you been systematically trained in the visual art domain (e.g., taking college courses in painting, drawing, design, architecture, or others)?" The four options provided were: "None," "Less than 1 year," "1-3 years," "More than 3 years." The remaining 20 questions contain ten positive questions and ten negative questions. The question responses were on a seven-point Likert scale, with "1" standing for strongly disagree and "7" standing for strongly agree. Positive questions referred to those that should score high if participants believed that they were good at face recognition: for instance, "I find it very easy to visualize individual faces in my mind with great detail." Negative questions referred to those that should score lower if participants believed that they were good at face recognition: for instance, "When I am at school, I struggled to recognize my classmates."

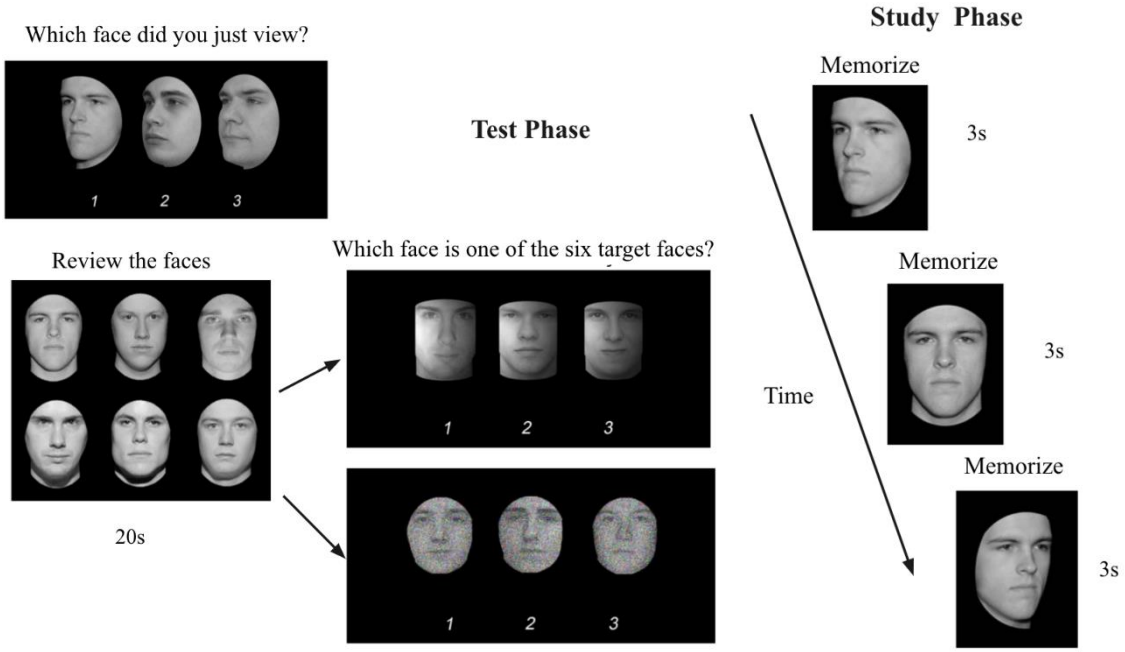

Figure 1: Flowchart of the CFMT Note. [13]

As shown in Figure 1, the online CFMT has two phases: the study phase and the test phase. In the study phase, the participants learned six target faces, each from three different angles. After seeing the three views of each target face sequentially, participants were tested on whether they had memorized it through a three-alternative forced-choice. The target face images in the question was the same as the images that the participants viewed before. After seeing all six target faces and being tested on each, they were allowed to review all the target faces (in frontal view) for 20 seconds. Then, they should pick one of the faces out in 30 forced-choice trials. However, the target face images were now not the same as those in the learning face. The face was still from the same identity, but the visual angle or lighting was different. In the final part of the test phase, participants were exposed to the review image again for 20 seconds and were given 24 test trials, where the target identity must be selected from a series of images that were not only different but also had noise added. The result of the CFMT was a percentage showing participants' accuracy.

DOI: 10.54254/2753-7048/2/2022381

5. Procedure

The survey and the CFMT links online were distributed online. The participants first filled in the survey and then completed the test. They reported test scores to us by showing a screenshot of the results.

6. Results

A two-sample t-test was used to examine whether the level of art training (expert or non-expert) affected participants' subjective evaluation about how well they recognize faces. It revealed that for positive questions, the mean survey scores had no significant difference between experts (M = 4.491, SD = 1.36) and non-experts (M = 5.109, SD = 0.55), t(20) = -1.397, p = 0.186. Similarly, for positive questions, the mean survey scores had no significant difference between experts (M = 2.527, SD = 1.47) and non-experts (M = 1.982, SD = 0.56), t(20) = 1.151, p = 0.271. Therefore, the result demonstrated no significant difference between the subjective face recognition ability of art experts and non-experts.

Meanwhile, a two-sample t-test was conducted to examine whether the level of art training (expert or non-expert) affected participants' performance on the CFMT. Even though, as shown in Figure 2, the mean CFMT score of experts (M = 0.807, SD = 0.112) was slightly higher than that of non-experts (M = 0.748, SD = 0.146), the test revealed no significant difference, t(20) = 1.259, p = 0.223. The difference between the face recognition ability of art experts and non-experts was insignificant.

The participants were divided into two score types based on their test scores: Group "above" containing those who scored higher than the overall mean CFMT score and Group "below" containing those who scored lower than the overall mean CFMT score. To test whether score types were different in each group, a $\chi 2$ test of independence was conducted. According to the $\chi 2$ test of independence, this difference was not statistically significant $\chi 2(1, N = 22) = 0.78571$, p = 0.3754.

In sum, there was no evidence to show that the mean self-evaluation score and the mean CFMT score for experts and non-experts were different. The study failed to find a correlation between official visual art training and face recognition ability.

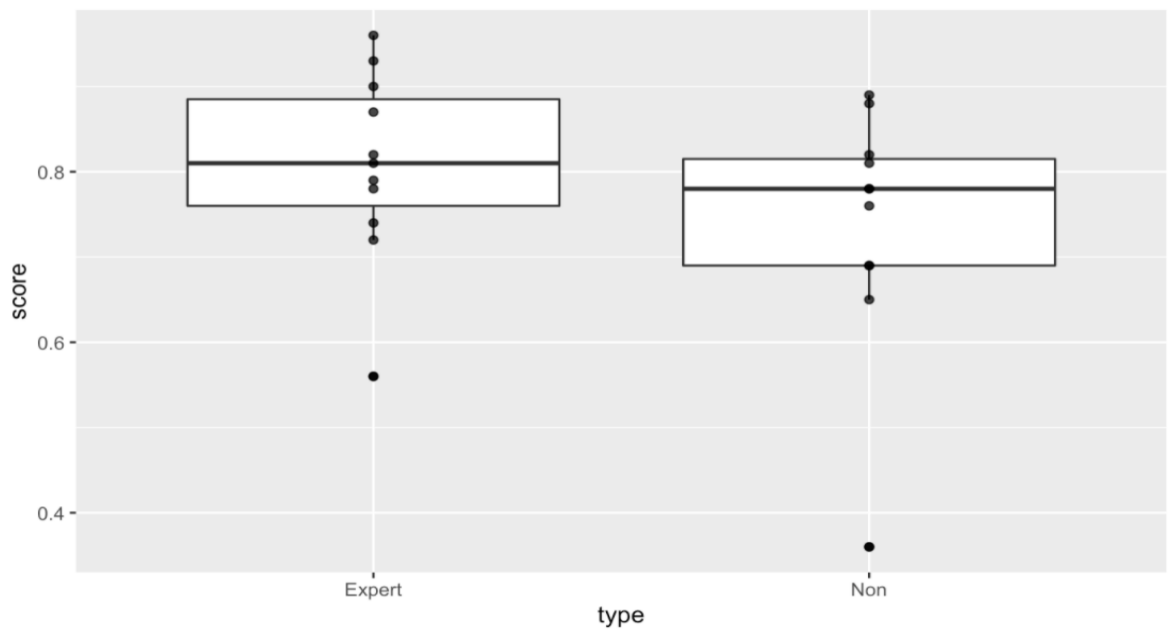

Figure 2: Effect of Art Training on CFMT scores

DOI: 10.54254/2753-7048/2/2022381

7. Conclusion

Our current correlational study employed an online self-evaluation survey and the Cambridge Face Memory Test (CFMT) to investigate whether regular visual art training can enhance people's face recognition ability. The researchers conducted two t-tests to analyze whether there were differences between the mean survey scores of experts and non-experts. Also, a two-sample t-test and a $\chi 2$ test were employed to analyze differences between mean CFMT scores of experts and non-experts. The statistics did not demonstrate any significant difference in all these tests. The study discovered no link between systematical art training and face recognition ability. The finding implies that for individuals who consider recognizing and remembering faces hard, a frequent artistic practice may not help solve this problem.

Our results contradict those found in Devue and Barsics' [11] study, through which they found that portrait artists were better at identifying newly learned faces. One explanation is that while portrait artists specialize in humans and their faces, there is not much emphasis on portraits in general art training. Therefore, the experts in our study did not display an improved face recognition ability. It indicates that the experience of drawing faces, not drawing itself, is the main contributor to portrait artists' better performance on the task. In addition, many studies have shown that brains have relatively little plasticity in face recognition during adulthood, as individuals' substantial experience with faces may have pushed them to the limits of their capabilities [14]. It is plausible that the participants of this study did not gain benefit from art training since they only took relevant courses in adulthood.

However, such patterns of results might also arise from several limitations in our study. First, our sample size was small, mostly females, and voluntary based, which was biased and could not represent the general population. Besides, the CFMT suffered from the cross-race effect, a phenomenon that adults were better at recognizing own-race than other-race faces [15]. The participants were all Asians, but the test only contained Caucasian faces. Despite the fact that all participants had studied abroad, the duration varied. In this case, the exposure to Caucasian faces was a confounding variable, suggesting that the CFMT scores might not reflect true face recognition ability but how experienced participants were with Caucasian faces. Moreover, a self-evaluation survey was designed to assess how good participants were at recognizing faces in everyday life. The survey results might be unreliable due to self-report biases and variation in question interpretations.

Given the limitations of our experiment, it would be helpful for future research to use a large, random sample from various age groups and examine whether the results remain similar. For less cross-race effect, it would be better for future studies to adopt CFMT with faces of the same race as the participants. Lastly, CFMT is designed for examining visual short term memory skills. How experts and non-experts perform in long-term face memory tests requires further exploration.

References

[1] *Ma, W. J., Husain, M., & Bays, P. M. (2014). Changing concepts of working memory. Nat. Neurosci, 17, 347-356. https://doi.org/10.1038/nn.3655*

[2] *McNeil, J. E., & Warrington, E. K. (1993). Prosopagnosia: A face-specific disorder. The Quarterly Journal of Experimental Psychology, 46(1), 1-10. https://doi.org/10.1080/14640749308401064*

[3] *Meadows, J. C. (1974). The anatomical basis of prosopagnosia. Journal of Neurology, Neurosurgery & Psychiatry, 37(5), 489-501. http://dx.doi.org/10.1136/jnnp.37.5.489*

[4] *Russell, R., Duchaine, B., & Nakayama, K. (2009). Super-recognizers: People with extraordinary face recognition ability. Psychonomic bulletin & review, 16(2), 252-257. https://doi.org/10.3758/PBR.16.2.252*

[5] *Tardif, J., Morin Duchesne, X., Cohan, S., Royer, J., Blais, C., Fiset, D., ... & Gosselin, F. (2019). Use of face information varies systematically from developmental prosopagnosics to super-recognizers. Psychological science, 30(2), 300-308. https://doi.org/10.1177/0956797618811338*

DOI: 10.54254/2753-7048/2/2022381

[6] *Wilmer, J. B. (2017). Individual differences in face recognition: A decade of discovery. Current Directions in Psychological Science, 26(3), 225-230. https://doi.org/10.1177/0963721417710693*

[7] *Wagner, M. F., Milner, J. S., McCarthy, R. J., Crouch, J. L., McCanne, T. R., & Skowronski, J. J. (2015). Facial emotion recognition accuracy and child physical abuse: An experiment and a meta-analysis. Psychology of Violence, 5(2), 154. https://doi.org/10.1037/a0036014*

[8] *Perdreau, F., & Cavanagh, P. (2015). Drawing experts have better visual memory while drawing. Journal of Vision, 15(5), 5-5. https://doi.org/10.1167/15.5.5*

[9] *Kozbelt, A., Seidel, A., Elbassiouny, A., Mark, Y., & Owen, D. R. (2010). Visual selection contributes to artists ' advantages in realistic drawing. Psychology of Aesthetics, Creativity and the Arts, 4(2), 93-102. https://doi.org/10.1037/a0017657*

[10] *Zhou, G., Cheng, Z., Zhang, X., & Wong, A. C. N. (2012). Smaller holistic processing of faces associated with face drawing experience. Psychonomic bulletin & review, 19(2), 157-162. https://doi.org/10.3758/s13423-011-0174-x*

[11] *Devue. C., & Barsics, C. (2016). Outlining face processing skills of portrait artists: Perceptual experience with face predicts performance. Vision Research,127, 92-103. https://doi.org/10.1016/j.visres.2016.07.007*

[12] *Duchaine, B., & Nakayama, K. (2006). The Cambridge Face Memory Test: Results for neurologically intact individuals and an investigation of its validity using inverted face stimuli and prosopagnosic participants. Neuropsychologia, 44(4), 576-585. https://doi.org/10.1016/j.neuropsychologia.2005.07.001*

[13] *Psychology experiments: Cambridge face memory test. (n.d.). https://www.bbk.ac.uk/psychology/psychologyexperiments/experiments/facememorytest/startup.php?r=8&p=0&d=1&dn=0&g=0&m=68f7d848edeaebd6cc29371b806b3017*

[14] *Tree, J. J., Horry, R., Riley, H., & Wilmer, J. B. (2017). Are portrait artists superior face recognizers? Limited impact of adult experience on face recognition ability. Journal of Experimental Psychology: Human Perception and Performance, 43(4), 667–676. https://doi.org/10.1037/xhp0000328*

[15] *Mondloch, C. J., Elms, N., Maurer, D., Rhodes, G., Hayward, W. G., Tanaka, J. W., & Zhou, G. (2010). Processes underlying the cross-race effect: An investigation of holistic, featural, and relational processing of own-race versus other-race faces. Perception, 39(8), 1065-1085. https://doi.org/10.1068/p6608*