Perfectwritings.com
custom writing service

Gender Bias in Face Recognition

Abstract

Face recognition is a complex process which involves difficulties when identifying faces that belong to the same or diverse race, age or gender groups. Moreover, the perceptual expertise plays a crucial role in face recognition as it contributes towards a better interpretation of emotions and facial expressions. This research paper focused on the phenomenon of the gender bias, studying the differences between perceptions of individuals belonging to different genders as well as possessing distinct in-group identification. The necessity of the further research integrating the study of other biases in face recognition is also discussed.

Gender Bias in Face Recognition

Face recognition is the ability of a person to recognise human faces and identify different people to whom they belong. Apparently, there are various biases in the process of face recognition, which depend on the type of faces and the way a particular person perceives them. In this regard, there can be distinguished such biases as own-race bias, own-age bias and own-gender bias. The own-race bias refers to difficulties connected with recognising faces of different ethnic groups while the process of identifying faces that belong to the same race is comparatively easier. Furthermore, the own-age range facilitates remembering of faces to a considerable degree. People usually get accustomed to recognising similar faces belonging to the same age and race group. In addition, there is also the own-gender bias, which demonstrates the tendency to recognise individuals from one's own gender better than individuals from the other gender. Thus, this research paper was focused on the phenomenon of the gender bias in face recognition.

As a rule, women outperformed men in various face recognition tasks. In this regard, Wolff et al. (2014) summarised several studies showing that the results of similar tasks for male participants appeared to be more variable. On the whole, the memory performance of men was substantially enhanced, while the process of face recognition was found to be relatively the same. Nonetheless, it is possible to single out a general face recognition advantage of females, whereas they are better at interpreting emotions and facial expressions. This finding stems from studies on sex differences in terms of the perception of emotional expressions as well as perceptual face processing. However, Wolff et al. (2014) argued against the above mentioned enhanced perceptual

expertise because of the lack of empirical support.

According to the categorisation-individuation model, the process of face recognition undergoes each of these steps of encoding. In terms of the perceptual expertise, individuation is more effective when people deal with those they are familiar with. Such experience was found to depend on the early communication with representatives of a particular cultural group, friends or carers. Thus, the classification is based on individual features of faces, whereas for the in-group identification, categorisation is the initial step, leading to the identification of shared group features.

The current study aimed to assess the validity of two alternative hypotheses which could explain the own-gender bias: the perceptual expertise hypothesis and the socio-cognitive one. Based on the perceptual expertise, it was hypothesised that the own-gender bias arisen as a function of the perceptual expertise, as the greater perceptual expertise of faces of one`s own gender (as compared to faces of the other gender), leads to own-gender faces being encoded more efficiently. Meanwhile, the socio-cognitive hypothesis stated that the own-gender bias arisen as a function of the in-group identification, as the greater identification with one`s own-gender group (as compared the other gender group), leads to own-gender faces being encoded more efficiently.

Method

PARTICIPANTS

There were 851 participants in the current research, namely first year students, who were asked to participate as a part of their course requirement. 61% comprised of 520 females, while the rest 39% comprised of 331 males. In terms of the age of the participants, it ranged from 15 to 56 years, with average 19,81 and standard deviation of 4,73.

MATERIALS

All the participants were asked to complete several tasks and questionnaires. The demographic and background questionnaire aimed at obtaining general information about the participants. The face recognition task comprised of blocks, each consisting of a learning phase and a test phase. In order to obtain a representative set of stimuli for the sample of the participants, faces of people representing other races were included in the task, namely the Asians and the Caucasians. The perceptual expertise questionnaire measured a participant's experience with gender groups; 14 questions equally addressed the theme of interactions with males and females. Levels of the participants' in-group identification with the own gender were assessed in the context of a relevant questionnaire. In this task, there are 15 questions with scores ranging from 15 to 105.

The obtained data was analysed based on the descriptive statistics that summarised the respective sample and the inferential statistics used to test hypotheses.

PROCEDURE

Prior to allocation of all the participants into groups, they were asked to complete the demographic and background questionnaire. The

obtained information regarding their age and gender allowed dividing them into smaller groups for convenience.

During the face recognition memory task, a number of faces were demonstrated, with half of them belonging to females and the other half to males. The learning phase consisted in the necessity to memorise the demonstrated faces. In the following test phase, those faces were shown again but with new faces next to them. The participants were given the task to identify and indicate faces they were familiar with because of the precious phase.

The perceptual expertise questionnaire focused on measuring interactions with different genders. All the participants were asked to respond to diverse statements using a seven-point Likert scale, which ranged from strong disagree to strong agree.

The in-group identification questionnaire was similar to the previous one with 14 statements that required a response based on the same seven-point Likert scale.

All the obtained data was accurately collected and organised in order to facilitate the following analysis.

Result

Prior to analysing the obtained information, the data cleaning took place. Meanwhile, no cases were deleted due to missing responses, 2 outliers were detected and removed. Descriptive statistics describing the data and summarising the results of the questionnaires and tasks

completed by the participants are shown in Table 1.

Table 1

Descriptive Statistics

	Mean	Standard Deviation	Range	Standard Error
Face Recognition Memory Task accuracy rate	0.77	0.10	0.43 – 1.00	0.003
Perceptual expertise score (own-gender)	38.80	5.63	16.00 – 49.00	0.19
In-group identification score	61.54	5.92	42.00 – 83.00	0.20

According to the obtained results, the in-group identification had a higher mean than the perceptual expertise score. However, the difference between the mean ratings relative to the variability (standard deviation) in the scores obtained was relatively small for the perceptual expertise and the in-group identification. It allowed suggesting that the above mentioned difference was relatively less crucial. The standard error of the face recognition memory task showed that the results were accurate and precise to a considerable degree.

The next phase of the study was to identify the presence of the own-gender bias in the sample, the results of which are presented in Table 2.

Table 2

Identification of the own-gender bias in the sample

		Female Faces	Male Faces
Female Participants	Mean	0.77	0.78
	Standard Deviation	0.12	0.12
	Range	0.25 – 1.00	0.40 – 1.00
	Standard Error	0.01	0.01
	Cohen's *d*	-0.08	
Male Participants	Mean	0.75	0.77
	Standard Deviation	0.12	0.12
	Range	0.35 – 1.00	0.45 – 1.00
	Standard Error	0.01	0.01
	Cohen's *d*	-0.16	

Analysing the results of the questionnaires and tasks completed by the participants, it was essential to evaluate the ratio of difference. In both cases, a difference can be noted when comparing Cohen's *d*. It emphasises the distinction between female and male participants recognising the own-gender faces as well as those of the other group. Since the ratio is relatively small, the chance of a false alarm is minimised to a certain extent. Meanwhile, the ratio depends on the size of sample, correlating with its respective growth.

Table 3

Prediction 1 - Statistics

		Own-Gender Faces	Other-Gender Faces
High perceptual expertise (N = 429)	Mean	0.77	0.78
	Standard Deviation	0.12	0.12
	Range	0.25 – 1.00	0.40 – 1.00
	Standard Error	0.01	0.01
	Cohen's *d*	-0.08	
Low perceptual expertise (N = 422)	Mean	0.77	0.76
	Standard Deviation	0.11	0.12
	Range	0.40 – 1.00	0.35 – 1.00
	Standard Error	0.01	0.01
	Cohen's *d*	0.08	

Table 4

Prediction 2 - Statistics

		Own-Gender Faces	Other-Gender Faces
High perceptual expertise (N = 484)	Mean	0.77	0.76
	Standard Deviation	0.11	0.12
	Range	0.40 – 1.00	0.35 – 1.00
	Standard Error	0.01	0.01
	Cohen's *d*	0.08	
Low perceptual expertise (N = 367)	Mean	0.77	0.77
	Standard Deviation	0.12	0.11
	Range	0.25 – 1.00	0.45 – 1.00
	Standard Error	0.01	0.01
	Cohen's *d*	0	

In this regard, a detailed examination of the obtained data is presented in Table 3 and Table 4, both analysing the predictions that were hypothesised in the introduction of this research paper.

Discussion

The current study aimed at assessing the validity of two alternative hypotheses which could explain the own-gender bias: the perceptual expertise hypothesis and the socio-cognitive hypothesis. In terms of the perceptual expertise, it was hypothesised that the own-gender bias arisen as a function of the perceptual expertise, as the greater perceptual expertise of faces of one`s own gender (as compared to faces of the other gender), leads to own-gender faces being encoded more efficiently. In addition, the socio-cognitive hypothesis stated that the own-gender bias arisen as a function of the in-group identification, as the greater identification with one`s own gender (as compared the other gender group), leads to own-gender faces being encoded more efficiently.

The first hypothesis stating that individuals with greater perceptual expertise for faces of their own gender will demonstrate a greater own-gender bias, as compared to individuals with the lower perceptual expertise for faces of their own gender was not supported. Thus, individuals with high perceptual expertise tend to recognise various faces effectively irrespective of their gender group. Meanwhile, the second hypothesis predicted that individuals, who more strongly identify with their own gender group, will demonstrate a greater own-gender bias, as compared to individuals, who less strongly identify with their own gender group. Similarly to the previous hypothesis,

individuals with the low in-group identification tend to identify faces equally not relying on the gender.

In terms of the current study results, the phenomenon of the gender bias in face recognition is multilateral and requires further research. It will be worthwhile to extend the variation of data by including a thorough study of race and age biases.