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Facial-based ethnic recognition: insights from two closely related but ethnically distinct groups

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Previous studies on facial recognition have considered widely separated populations, both geographically and culturally, making it hard to disentangle effects of familiarity with an ability to identify ethnic groups per se. We used data from a highly intermixed population of African peoples from South Africa to test whether individuals from nine different ethnic groups could correctly differentiate between facial images of two of these, the Tswana and Pedi. Individuals could not assign ethnicity better than expected by chance, and there was no significant difference between genders in accuracy of assignment. Interestingly, we observed a trend that individuals of mixed ethnic origin were better at assigning ethnicity to Pedi and Tswanas, than individuals from less mixed backgrounds. This result supports the hypothesis that ethnic recognition is based on the visual expertise gained with exposure to different ethnic groups.

Key words: faces, ethnicity, facial recognition, exposure, cross-cultural studies

Introduction

The human face reveals an enormous wealth of information, most importantly on identity, age, gender and ethnicity, and plays an important role in mate preferences. Cross-cultural studies, for example, have shown that people generally agree on attractiveness ratings across different ethnic groups. However, evidence also suggests that we perceive our own ethnic group differently from other ethnic groups. First, people can recognise individuals belonging to different races and ethnic groups (where ethnic group refers to distinct populations within a particular racial grouping, e.g. comparing pairwise comparisons). This was not significantly different ($P = 0.05$) from the mean log s.e.m. value of $-1.58 \pm 0.19$ obtained from 36 pairwise comparisons of crania ofPan t. schweinfurthii. The main difference was the greater degree of morphological variability expressed by the higher standard deviation in the case of the latter taxon, but in both cases the mean log s.e.m. values were (as expected) within the 95% confidence limits for log s.e.m. for conspecific pairs.

A mean log s.e.m. value of $-1.44 \pm 0.17$ ($n = 90$ pairwise comparisons) was calculated when pairwise comparisons were made between specimens ofPan t. schweinfurthii andPan t. troglodytes. A mean log s.e.m. value of $-1.32 \pm 0.17$ was obtained whenPan troglodytes andPan paniscus were compared ($n = 100$ comparisons). As expected, this mean value was higher (more positive) than that obtained when subspecies ofPan troglodytes were compared against each other.

These results can be assessed in the relation to results obtained from morphometric analyses of African hominins. TM 1517 (type specimen of Paranthropus robustus from Kromdraai, South Africa) and OH 5 (type specimen of Paranthropus (Australopithecus/Zinjanthropus) bosei from Olduvai Gorge, Tanzania) were compared using measurable dimensions common to both specimens (Table 1), resulting in a log s.e.m. value of $-1.15$. This value was not significantly different ($P = 0.05$) from the corresponding value obtained when two species of chimpanzee (Pan troglodytes andPan paniscus) were compared.

Thackeray indicated previously that TM 1517 and OH 5 are potentially conspecific. Analyses of measurements (Table 1) included in the current study of chimpanzees do not contradict the possibility that TM 1517 and OH 5 may be conspecific. However, it should be emphasised that the log s.e.m. value for the comparison between TM 1517 and OH 5 is close to the upper 95% confidence limit for conspecific extant pairs.

As indicated in our morphometric study, the boundaries between taxa are difficult to determine. In addition to the methodology used here, further analyses based on morphological differences between TM 1517 and OH 5 will be undertaken to assess probabilities of conspecificity.

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Germs to Britons within the Caucasian grouping). Secondly, faces from the same race as the observer illicit more brain activity in regions linked to face recognition. Lastly, recognition of one’s own ethnic group is better than that for other ethnic groups. One plausible explanation for superior recognition of same race and same ethnic group faces is exposure. Most people, especially young people, have more exposure to their own ethnic group. This variation in exposure can contribute to the development of visual expertise for same group faces. If individuals are exposed more frequently to different ethnic groups, one might expect their visual expertise to include other ethnic groups as well. Two recent studies showed that individuals from minority ethnic groups are better at recognising other ethnic groups in their area than individuals from majority ethnic groups. Thus, despite agreement on attractiveness across races, there may remain a significant element of ethnic recognition, and potential preference, within particular racial categories that potentially may influence mate preferences and subsequent mate choice.

To date, however, studies comparing differences within ethnic groups have focused on groups that show a significant separation of culture and geography (North America, Germany and the Czech Republic). This means one cannot discount an influence of environmental and/or sociocultural factors on facial morphology and/or greater familiarity with faces of one’s own ethnicity compared to other groups. In order to resolve these issues, we tested whether recognition is also possible in a population where there is a large overlap of both culture and geography between the different ethnic groups. Specifically, we tested for ethnic recognition within the African population of South Africa.

According to ethnological, linguistic and genetic data, the South African Bantu-speaking people can be divided into two major groups: the Nguni and the Sotho group. Autosomal and Y-chromosome data group the Xhosa, Zulu, Swazi and Ndebele major groups: the Nguni and the Sotho group. Autosomal and Y-chromosome data group the Xhosa, Zulu, Swazi and Ndebele major groups. Their ethnicity and that of both parents was self-reported. (14 male, 25 female, aged 18–26) belonging to the Pedi or Tswana group were used to compile 40 full-colour presentations; each presentation contained two randomly selected male photographs (1 Pedi male, 1 Tswana male) and two randomly selected female photographs (1 Pedi female, 1 Tswana female). These presentations were then displayed to 100 individuals of 18–26 years. To test whether Tswana and Pedi individuals can be correctly identified we compared the proportions of correctly identified individuals faces was corrected by rotation around the facial midline using vertical guidelines and cropped 5 cm from each side to standardise size using Corel PHOTO-PAINT v.10. Next, faces were masked to eliminate confounding factors using Corel Knockout v. 1.5 (Fig. 1). All volunteers were students at the University of Pretoria and signed a subject information and consent form briefly explaining the study. Ethical clearance for the study was obtained from the University of Pretoria (EC 030606-018).

Thirty individuals (11 Pedi females, 8 Tswana females, 6 Pedi males, 5 Tswana males), for which both parents belonged to the same ethnic group, were used to compile 40 full-colour presentations; each presentation contained two randomly selected male photographs (1 Pedi male, 1 Tswana male) and two randomly selected female photographs (1 Pedi female, 1 Tswana female). These presentations were then displayed to 100 individuals (50 male, 50 female) of known ethnic origin. Each subject was asked to assign ethnicity to each of the images in the presentations as a forced choice between Tswana and Pedi. Thirteen participants (10 male, 3 female) were excluded from the study as both their parents were not originally from South Africa and one female participant was excluded for falling outside the age range of 18–26 years. To test whether Tswana and Pedi individuals can be correctly identified we compared the proportions of correctly rated images to the proportions expected under the binomial distribution, with a probability parameter of 0.5. Data were analysed using a binomial test in SPSS version 13.0 (Chicago, IL) and each gender was tested separately. To determine whether rater gender or rater ethnicity affected the ability to assign ethnicity, we performed a general linear model (GLM), with rater gender and rater ethnicity as ‘between subject’ factors. Raters were divided into four main groups: (a) both parents belonging to the Sotho major group (Sotho major), (b) both parents belonging to the Nguni major group (Nguni major), (c) one parent belonging to the Sotho major group (mixed), and (d) one parent belonging to the Nguni major group (mixed).
parents belonging to the Nguni major group (Nguni major), (c) one parent belonging to the Sotho major and one parent belonging to the Nguni major group (mixed major) and (d) one or both parents belonging to the Venda or Tsonga ethnic groups (Venda/Tsonga group).

Results

Our rater population was ethnically mixed, with 43% of the 86 raters in the study being of mixed ethnic origin (i.e. having parents belonging to two different ethnic groups). Within this mixed origin group, 19% had one parent belonging to the North and one parent belonging to the Sotho major groups, while 71% had both parents belonging to the same major group but different ethnic groups within those major groups. The remaining 10% had one parent that belonged to either the Venda or Tsonga group. Overall, ethnic groupings were fluid and many individuals were exposed to different ethnic groups within, as well as between, families.

Our results revealed no significant deviation from the expected 50% for the correct assignment of Tswana and Pedi individuals. Both male (observed proportion = 0.49, P > 0.05, n = 87) and female images (observed proportion = 0.59, P > 0.05, n = 87) could not be recognised better than expected by chance alone. Rater ethnicity significantly affected the proportion of correct assignments (P = 0.042, F_{3,84} = 2.881), while rater gender did not (P > 0.05). Pairwise comparisons revealed that individuals from the mixed major group were significantly better at assigning ethnicity compared to the Sotho major (P = 0.010), Nguni major (P = 0.009) and Venda/Tsonga groups (P = 0.013). These differences were no longer significant after Bonferroni corrections, but mixed major individuals still showed a tendency to assign ethnicity better than Sotho major (P = 0.063), Nguni major (P = 0.056) and Venda/Tsonga groups (P = 0.075).

Discussion

A high degree of intermixing between the different ethnic groups was observed (43%) in our sample, which is likely due to drawing our subjects from an urban area. Our study population therefore had high-level exposure to individuals of different ethnicity, especially those individuals whose parents belong to different major ethnic groups.

Our results show that individuals from our study population cannot differentiate between facial features of Tswana and Pedi individuals. To our knowledge, this is the first study to test ethnic recognition in two such closely related ethnic groups, with similar environmental and sociocultural histories. We also show no difference in the ability of males and females to differentiate between Tswana and Pedi images. This suggests that perceptual or morphological differences are negligible between the genders, and it is therefore unlikely that there has been selection for one gender to be better at recognising or displaying ethnicity than the other.

Although previous studies have shown that individuals are better at recognising their own ethnic group, we found that Sotho major group individuals were comparatively poor at recognising own group faces. However, individuals whose parents belonged to different major ethnic groups were better at recognising Tswana or Pedi images. This discrepancy can most probably be attributed to exposure to variation for individuals of mixed origin, who are likely to have been exposed to a greater variety of ethnic groups within their family environment.

In conclusion, our study shows that African peoples from South Africa cannot reliably differentiate between Tswana and Pedi individuals, based on facial features alone. We cannot exclude the possibility that ethnic recognition is possible based on whole body features, but our results suggest that Tswana and Pedi individuals could be used interchangeably in facial preference studies. We also show that more ethnically mixed individuals are better at recognising Tswana and Pedi faces. This is presumably because of their heightened exposure to a variety of different ethnic groups, but more research is needed to unravel the correlation between exposure and ethnic intermixing.

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