Chimpanzee subspecies and ‘robust’ australopithecine holotypes, in the context of comments by Darwin

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On the basis of comparative anatomy (including chimpanzees, gorillas and other primates), Darwin¹ suggested that Africa was the continent from which ‘progenitors’ of humankind evolved. Hominin fossils from this continent proved him correct. We present the results of morphometric analyses based on cranial data obtained from chimpanzee taxa currently recognised as distinct subspecies, namely Pan troglodytes troglodytes and Pan troglodytes schweinfurthii, as well as Pan paniscus (bonobo). Our objective was to use a morphometric technique² to quantify the degree of similarity between pairs of specimens, in the context of a statistical (probabilistic) definition of a species.³,⁴ Results obtained from great apes, including two subspecies of chimpanzee, were assessed in relation to same-scale comparisons between the holotypes of ‘robust’ australopithecine (Plio-Pleistocene hominin) taxa which have traditionally been distinguished at a species level, notably Paranthropus robustus from South Africa, and Paranthropus (Australopithecus/Zinjanthropus) boisei from East Africa. The question arises as to whether the holotypes of these two taxa, TM 1517 from Kromdraai and OH 5 from Olduvai, respectively, are different at the subspecies rather than at the species level.

Key words: hominin taxonomy, Pleistocene, Australopithecus, Paranthropus, chimpanzee

Darwin was among the first to recognise difficulties in distinguishing taxa at the species or genus level. Even in 1851, and again in 1854, he was finding problems in expressing differences between barnacle species, especially as sample sizes available for study became large, as is the case today with hominin fossils from Africa and elsewhere in the world.⁵ Darwin⁶ noted that ‘after considerable experience, when numerous varieties of a species have been carefully examined, the eye acquires a sort of instinctive knowledge by which it can recognise the species, though the character cannot be defined by language’. In The Origin published 150 years ago,⁷ he stated that it would not be a ‘cheering prospect’ if it was necessary to treat ‘species in the same manner as those naturalists treat genera, who admit that genera are merely artificial combinations of convenience’. He recognised the need to quantify the ‘amount of difference’ between species.

Recognition of boundaries between species is problematic, particularly in palaeoanthropological contexts. Indeed, depending on the criteria used to define a species, hominin specimens in some cases have been recognised as either distinct species, or classified instead at a subspecies level. For example, specimens from Dmanisi in Georgia include the holotype of Homo georgicus⁸ but have alternatively been classified as Homo erectus georgicus⁹ using criteria for the recognition of extant subspecies¹⁰ (geographical separation and morphological discontinuity). Another example is the classification of Ardipithecus kadabba from Ethiopia, initially described as a subspecies of Ardipithecus ramidus (Ardipithecus r. kadabba)¹¹ but raised to species level after the discovery of new dental material.¹²

Boundaries between the fossil hominin taxa are not clear, but morphometric analyses can facilitate the assessment of probabilities of conspecificity, in the context of a statistical definition of a species. The morphometric technique we used is based on least-squares linear regression analysis of cranial measurements of pairs of specimens, in this case equal numbers of males and females of Pan troglodytes troglodytes, Pan troglodytes schweinfurthii and Pan paniscus. Cranial measurements were used, based on anatomical landmarks (Table 1). A frame of reference for morphometric comparisons has been presented by Thackeray³ who reported that the standard error (s.e.) of the coefficient m (associated with the regression equation $y = mx + c$) shows a log-normal distribution in the case of pairwise comparisons of conspecific pairs of extant mammals, birds, reptiles, lepidoptera and coleoptera ($n = 1424$ specimens). In this instance, the log-transformed standard error of the coefficient m (designated log s.e.,) for pairwise comparison of conspecific pairs is $–1.61 ± 0.23$, constituting a morphometric definition of a species,³ expressed in terms of probabilities (95% confidence limits for log s.e., values, around a mean of $–1.61$, range between $–2.07$ and $–1.15$). The quantification of the ‘amount of differences’ (as expressed by log s.e., values) is relevant for purposes of assessing the probability that any two specimens are conspecific, without assuming that all hominin fossils can be pigeon-holed into discrete taxa.³,⁵

Table 1. The dimensions, used in this study, of TM 1517 (holotype of Paranthropus robustus from Kromdraai), OH 5 (holotype of Paranthropus/Australopithecus/Zinjanthropus boisei from Olduvai Gorge), Pan troglodytes troglodytes, Pan troglodytes schweinfurthii and Pan paniscus. Anatomical features are described in standard manuals. The definitions of White and Folkens¹⁰ are used in this case.

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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. 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


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