



Physical Anthropology Section – 2010

H91 Twentieth Century Change in Facial Morphology and Its Relationship to Metric Sexing

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The goal of this presentation is to bring attention to secular change over the past 80 years in the most dimorphic dimension in the skull, bizygomatic breadth. Attendees will learn the magnitude of secular change in this dimension and how it can influence sex assessments.

This presentation will impact the forensic science community by demonstrating the changing nature of facial morphology and the need for appropriate data.

Secular change in craniofacial morphology has been documented (Jantz and Meadows Jantz (2000)).² The most pronounced changes are seen in vault morphology, and these have been seen to impact ancestry assessment, at least as far as Blacks and Whites are concerned (Ayres et al. 1990).¹ Facial morphology, especially bizygomatic breadth, is normally the most important dimension in metric sexing from crania. Trials with Fordisc 3 show that bizygomatic contributes from 30 to 50 % of sex discrimination, depending on number of variables, and is always chosen in stepwise procedures. Bizygomatic breadth alone can correctly sex over 80 % of crania. It is therefore important to understand the nature of secular change in facial dimensions.

Measurements were taken from crania in the forensic anthropology data bank. Samples were available as follows: White males (N=436), Whites females (N=319), Black males (N=205), Black females (N=146). Individuals were limited to those with twentieth century birth years. Birth years range from 1900-1988. Analysis was focussed on bizygomatic breadth, because of its high sex dimorphism. Whites and Blacks were analyzed separately, by sex. The crania were grouped by decade of birth for purposes of analysis. Analysis of variance was run on nine decades of birth cohorts.

Anova results on the decade of birth cohorts are as follows:

White males	F=2.96	P=0.0031
White females	F=1.61	P=0.121
Black males	F=0.83	P=0.580
Black females	F=3.43	P=0.0013

The pattern among groups is inconsistent. White males exhibit a consistent decline in bizygomatic breadth, beginning about 1940. Maximum values prior to 1940 are about 131 mm., while by 1960 they have reduced to about 128. Black females exhibit a less regular pattern, but generally one sees a decrease in bizygomatic after 1920, followed by an increase after 1960. Black males and White females do not exhibit significant variation among decade of birth cohorts, and there is no pattern to be seen in the variation.

The reduction in face breadth in white males influences sex classification using bizygomatic alone. There are 83 White males born 1960 and after. One quarter of them are misclassified using a sectioning point from Fordisc's current data base. Misclassification is less pronounced in multivariate sexing, since other variables also contribute to the function.

In both Blacks and Whites, significant change in one sex and not the other may suggest that sex dimorphism varies significantly among decade of birth cohorts. The interaction term of sex and decade of birth in two level analysis of variance is not significant, so that hypothesis is not supported.

Insight into the relationship of bizygomatic breadth to other craniofacial features may be gained by observing its correlation with other dimensions. Bi-auricular breadth is the most highly correlated variable, followed by biorbital breadth. Both of these dimensions also show significant variation among decade of birth cohorts, which to a considerable extent parallels that seen in bizygomatic breadth. Maxillary breadth and face height have low correlation with bizygomatic and do not exhibit variation among decade of birth cohorts.

These results demonstrate that secular change in face dimensions that influence metric sex estimation is continuing among modern Americans. This finding emphasizes the importance of continuing to collect information from skeletal remains of modern Americans. **References:**

¹ Ayers, HG; Jantz, RL; Moore-Jansen, PH (1990): Giles and Elliot race discriminant functions revisited: A test using recent forensic cases. In: Skeletal Attribution of Race. (Eds: Gill, GW; Rhine, S) Maxwell Museum of Anthropology, Anthropological Papers No. 4, Albuquerque, NM, 65-71.

² Jantz, RL; Meadows Jantz, L (2000): Secular change in craniofacial morphology. *Am. J. Hum. Biol.* 12, 327-338.

Sex Estimation, Secular Change, Cranial Morphology