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Ethnic Variation in Interfinger Correlation of Ridge Counts: Fresh Data from India[1]

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Jantz (1977) and Leguebe, Vrydagh, and Ducros (1981) have recently reviewed the existing data on correlations between ridge counts on different fingers and investigated the variation in these correlations by sex and race. While Jantz used the mean correlation of all 45 interfinger correlations for comparison, Leguebe et al. compared the mean correlation coefficients for right-hand, left-hand, non-homologous, and homologous fingers separately, finding the mean correlations between homologous fingers significantly higher than other correlations and those for right-hand fingers higher than those for left-hand ones. Jantz (1977) found a significantly higher mean correlation in Africans than in other racial groups; Leguebe et al. failed to find evidence for sex or race differences. The disagreement between these two studies may in part be due to the different methods followed; while Jantz computed the mean coefficients from individual values, Leguebe et al. obtained them indirectly from mean ridge-count values. We shall examine the extent to which data on interfinger ridge-count correlations for males of 28 population samples from India support Jantz's finding of patterning along racial/geographic lines.

The 28 populations for which complete interfinger ridge-count matrices are available come from the state of Maharashtra and, with the exception of the Parsis (Mavalwala 1962), have been studied by Malhotra et al. (1978, 1984).

To calculate mean correlation coefficients, following Jantz (1977) and Leguebe et al. (1981), each of the 45 correlation coefficients of each population was transformed to Fisher's Z, and averages were computed separately for correlations (*a*) between fingers of the right hand, (*b*) between fingers of the left hand, (*c*) between non-homologous fingers of the two hands, (*d*) between homologous fingers, and (*e*) between all 45 combinations of the 10 fingers. To test the significance of the differences between mean correlation coefficients among different populations, the normality test was used on the transformed Z-values. Because castes and tribal populations in India differ in a number of biological traits (Balakrishnan 1978, Malhotra 1978), the populations were divided into castes ($N = 24$) and tribes ($N = 3$); the Parsis, recent immigrants from Iran, were treated separately. Mean values of interfinger correlations for Indian populations and others are presented in table 1.

A great deal of variation is observed among the Indian populations in respect of various categories of interfinger ridge-count correlation. The mean correlation coefficient between right-hand fingers varies from 0.44 in Chitpavan Brahmins to 0.70 in Varhade; between left-hand fingers the range is from 0.44 in Maratha to 0.63 in Varhade. The observed ranges for non-homologous fingers and homologous fingers are from 0.45 in Maratha to 0.65 in Varhade and from 0.63 in Unnikankan to 0.78 in Varhade and Ladshe, respectively. The mean of the 45 correlations between the 10 fingers ranges from 0.49 in Maratha to 0.68 in Varhade. The homologous fingers show the highest correlations and 15 out of 28 populations show a higher correlation between right-hand fingers.

To examine the interpopulation variation, we grouped the populations of table 1 into broad categories based on ethnic and/or geographical affiliation. It is evident from table 2 that the relative magnitude of mean correlation values based on all 45 combinations is greatest among populations of African ancestry and lowest in Mongoloids: the pattern, in decreasing order of magnitude, is African > European > Indian > Mongoloid. The mean values for other categories of interfinger correlation, broadly speaking, display a similar pattern. As is apparent in table 3, populations of African ancestry significantly differ from the rest on the basis of the mean correlation based on all 45 combinations; data for other categories of correlation are not readily available for comparison. Populations of European ancestry do not differ significantly from any other population (except Africans) in mean correlation of 45 values, but they do differ significantly from Indian castes and pooled Indians on left-hand fingers, from Mongoloids on both non-homologous and homologous fingers, and from Indian tribes, castes, pooled Indians, Hehe, and Mongoloids on homologous fingers. Clearly, if the comparisons had been limited to the mean for the total correlation matrix, these differences would not have been apparent. Mongoloids do not differ significantly from Indians in any of the five categories of correlation.

Our finding that homologous fingers show the highest correlations is in complete agreement with the results obtained in populations from other parts of the world (see, among others, Holt 1951, 1968; Mavalwala 1962; Jantz 1977; Leguebe et al. 1981). Our finding that 15 out of 28 Indian populations display higher correlations between right-hand than left-hand fingers is at variance with the results obtained by Leguebe et al. (1981). The pattern of relative magnitude of mean correlation values among different populations supports Jantz's (1977) report of racial differences in finger ridge-count correlations. That the Indian populations show close affinities with Europeans and American whites is easily explainable in that a majority of the castes and the Parsis belong to the Caucasoid racial category. The close similarity with the Mongoloid castes is intriguing because there is no discernible evidence of Mongoloid admixture in Maharashtrian populations. Our results support the contention of Leguebe et al. (1981) that interpopulation comparisons based on the mean value of 45 correlations alone entail considerable loss of information.

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TABLE 1

MEAN VALUES OF INTERFINGER RIDGE-COUNT CORRELATIONS FOR INDIAN POPULATIONS AND OTHERS

POPULATION	SAMPLE SIZE	RIGHT-HAND FINGERS (10)	LEFT-HAND FINGERS (10)	NON HOMOLOGOUS FINGERS (20)	HOMOLOGOUS FINGERS (5)	TOTAL (45)	SOURCE
Indian							
Chitpavan Brahmin	65	0.44	0.52	0.48	0.75	0.52	Malhotra et al. (1978)
Deshastha Rg. Brahmin	59	0.57	0.62	0.59	0.75	0.61	"
Chandraseniya K. Prabhu	54	0.52	0.46	0.47	0.75	0.52	"
Maratha	78	0.49	0.44	0.45	0.73	0.49	"
Nava Budha	85	0.52	0.50	0.51	0.69	0.53	"
Bhil	94	0.57	0.61	0.55	0.72	0.59	"
Katkari	66	0.57	0.52	0.48	0.72	0.54	"
Pawara	64	0.57	0.61	0.53	0.69	0.57	"
Ahir	273	0.58	0.57	0.56	0.75	0.59	"
Dange	165	0.48	0.52	0.49	0.73	0.52	Malhotra, Chakraborty, and Bhanu (1984)
Gadhari-Dhengar	95	0.56	0.51	0.53	0.73	0.56	"
Gadhari-Nikhar	87	0.55	0.59	0.57	0.74	0.59	"
Hande	72	0.46	0.49	0.46	0.73	0.50	"
Hatkar	580	0.54	0.52	0.52	0.74	0.55	"
Kannade	82	0.47	0.54	0.52	0.73	0.54	"
Khatik	127	0.55	0.50	0.52	0.71	0.55	"
Khutekar	445	0.57	0.58	0.55	0.76	0.59	"
Kurmar	60	0.46	0.60	0.52	0.77	0.56	"
Ladshe	75	0.56	0.49	0.51	0.78	0.55	"
Mendhe	155	0.58	0.55	0.55	0.76	0.58	"
Sangar	57	0.53	0.51	0.50	0.70	0.53	"
Shegar	80	0.51	0.48	0.48	0.70	0.52	"
Telangi	77	0.51	0.48	0.48	0.68	0 51	"
Thellari	101	0.49	0.57	0.52	0.72	0.55	"
Unnikankan	50	0.42	0 37	0.38	0.63	0.42	"
Varhade	58	0.70	0.63	0.65	0.78	0.68	"
Zende	119	0.49	0.55	0.51	0.70	0.54	"
Parsi	200	0.51	0.56	0.52	0.73	0.55	Mavalwala (1962)
European							
American white	133	...	...	...	...	0.56	Jantz (1977)
English	825	0.56	0.58	0.56	0.79	0.60	Holt (1951)
Belgian	202	0.52	0.58	0.54	0.77	0.57	Leguebe, Vrydagh, and Ducros (1981)
German	400	0.56	0.60	0.57	0.81	0.61	Brehme, Riedel, and Baitsch (1966)
German	174	0.53	0.59	0.56	0.78	0.59	Knussmann (1967)
Mongoloid							
Japanese	242	0.48	0.52	0.47	0.75	0.52	Leguebe, Vrydagh, and Ducros (1981)
Bali isolate	92	0.43	0.46	0.43	0.70	0.47	Vrydagh and Breguet (1981)
Bali east	52	0.58	0.68	0.60	0.76	0.63	"
Eskimo	100	0.51	0.57	0.55	0.75	0.57	Leguebe, Vrydagh, and Ducros (1981)
African							
Hehe	107	0.61	0.62	0.60	0.69	0.62	Roberts, Chavez, and Redmayne (1974)
American black	102	...	...	...	...	0.64	Jantz (1977)
Bedic Bassari	103	...	...	...	...	0.59	"
Dogan	169	...	...	...	...	0.69	"
Efe Pygmy	152	...	...	...	...	0.65	"
Yoruba	127	...	...	...	...	0.71	"

TABLE 2

MEAN VALUES OF INTERFINGER RIDGE-COUNT CORRELATIONS FOR ETHNIC AND BROAD RACIAL CATEGORIES

ETHNIC OR RACIAL CATEGORY	NO. OF POPULATIONS	RIGHT-HAND FINGERS	LEFT-HAND FINGERS	NON-HOMOLOGOUS FINGERS	HOMOLOGOUS FINGERS	TOTAL
Indian						
Tribal	3	0.57	0.59	0.52	0.71	0.57
Caste	24	0.54	0.54	0.53	0.74	0.56
Total	27	0.54	0.54	0.53	0.74	0.56
Parsi	1	0.51	0.56	0.52	0.73	0.55
Hehe	1	0.61	0.62	0.60	0.69	0.62
African	6	...	...	...	...	0.66
European	4	0.55	0.59	0.56	0.79	0.59
European including American white	5	...	...	...	...	0.59
Mongoloid	4	0.49	0.54	0.50	0.74	0.53

TABLE 3

NORMALITY-TEST VALUES FOR DIFFERENCES BETWEEN MEAN CORRELATIONS FOR DIFFERENT ETHNIC AND RACIAL CATEGORIES

PAIRS OF CATEGORIES	RIGHT-HAND FINGERS	LEFT-HAND FINGERS	NON-HOMOLOGOUS FINGERS	HOMOLOGOUS FINGERS	TOTAL
Hehe × European	0.83	0.49	0.65	−2.35*	0.42
× Mongoloid	1.58	1.12	1.45	−1.08	1.19
× Indian tribal	0.48	0.36	1.03	−0.40	0.64
× Indian caste	1.09	1.25	0.88	−1.02	0.92
× Indian	1.03	1.17	1.16	−1.05	0.94
× Parsi	1.17	0.73	1.02	−0.74	0.88
African × European	...	...	...	...	2.70**
× Mongoloid	...	...	...	..	3.53**
× Indian tribal	...	...	...	...	2.00*
× Indian caste	...	...	...	...	3.91**
× Indian	...	...	...	...	4.25**
× Parsi	...	...	...	...	2.30*
European × Mongoloid	1.69	1.40	3.05**	2.33*	1.69
× Indian tribal	−0.38	−0.08	0.79	2.63**	0.47
× Indian caste	0.45	2.52*	1.58	3.91**	1.55
× Indian	0.55	2.16*	1.58	4.26**	1.68
× Parsi	0.77	0.52	0.76	1.95	0.85
Mongoloid × Indian tribal	−1.39	−0.95	−0 42	0.84	−0.65
× Indian caste	−1.30	0.10	−0.83	0.00	−0.87
× Indian	−1.39	−0.10	−0.86	0.25	−0.72
× Parsi	−0.40	−0.45	−0.46	0.37	−0.31

* $p < 0$ 05, ** $p < 0.01$

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