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Development of typological classification and its relationship to microdifferentiation in ethnic India

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The history of the racial classification of the people of India can be looked at in three temporal phases: (1) at the national level, the initial studies of racial classification attempted along with the Census of India; (2) at the regional level, studies by anthropologists and statisticians following systematic sampling and statistical procedures were conducted after the initial national-level studies and (3) population-specific studies in different regions across the country including micro-evolutionary studies of individual populations followed the regional studies. Initially the racial classification was part of the Census survey conducted by British anthropologists in some parts of the country among castes and tribes and was based on a few physical traits. This was followed by a systematic anthropometric survey in particulars regions (e.g., UP, Bengal, etc.) by anthropologists and statisticians. This was followed by population specific micro-evolutionary studies across different regions by numerous anthropologists investigating the role of selection, drift, migration and admixture and other population structure variables among endogamous castes and tribes.

Keywords. Anthropometric survey; biological affinities; caste; *jati/varna*; race; tribe

During the early phase of physical anthropology, anthropologists were interested in the classification of worldwide regional human populations. In this context, the word 'race' has been used for the classification of populations according to certain physical traits such as pigmentation, hair form and other observable traits, primarily, of the head (Keith 1928). In India, the racial classification was attempted with respect to socially recognized diverse endogamous castes (or '*jatis*') and tribes. This was based on qualitative and quantitative physical traits such as the colour of the skin and eyes, the shape of the head and nose, the thickness of the lips, and on anthropometric measurements, as these traits showed variations across different castes and tribes. The history of the racial classification of the people of India can be looked at three temporal phases: (1) at the national level, the initial studies of racial classification attempted along with the Census of India; (2) at the regional level, studies by anthropologists and statisticians following systematic sampling and statistical procedures were conducted after the initial national-level studies, and (3) population-specific studies in different regions across the country including micro-evolutionary studies of individual populations followed the regional studies.

1. Racial classification of the people of India

The earliest such systematic attempts of racial classification of the people of India can be traced to ethnographic survey of Bengal, especially *The Tribes and Castes of Bengal* (Risley 1891a, b), in which an anthropometric analysis of the people of the Indian province was undertaken. The important result of the study was that no anthropometric differences were observed between the so-called 'Dravidian' and 'Kolarian' races of the hills of the south of Bengal.

1.1 *Sir Herbert Hope Risley – 1901*

Sir Herbert Hope Risley (1851–1911), a colonial administrator and a British ethnographer, conducted census surveys (1901) on the tribes and castes of the Bengal Presidency. The 1901 census covered three main regions – the Himalaya, where there is an admixture of Mongoloid blood; the Middle Land, the river plains of northern India taken by the Aryans; and the Deccan, the home of the Dravidian, the oldest of the Indian races. The study revealed that there were 157 distinct languages, 22 of which were spoken by over a million

people each. Because of the complexity of the castes and religions and languages, Risley had opted for the physical measurements and types as the basis for the classification of the people of India. One such anthropometric measure, e.g., is the ratio of the width of the nose to its height for the identification of the Aryan and Dravidian races (Trautmann 1977; Hough 1910; Walsh 2011).

Risley's classification of 'The People of India' (1915, 1908) included seven different types: three main categories and four intermixed groups. Overall, HH Risley's classification of the people of India included the following seven main physical types:

1. *The Dravidian type* – extends from Ceylon to the valley of the Ganges and pervading the whole of Madras, Hyderabad, the Central Provinces most of Central India and the Chota Nagpur belt. It is represented by the Paniyans (southern hills) and Santals of Chota Nagpur. This possibly is the original population of India probably modified as a result of the varying extent of the admixture of Aryan, Scythian and Mongoloid elements. Typically, these populations are of short stature or below mean; the complexion very dark, approaching black; hair plentiful with an occasional tendency to curl; eyes dark; head long; nose very broad, sometimes depressed at the root, but not so as to make the face appear flat.

2. *The Indo-Iranian type* – occupies the Punjab, Rajputana and Kashmir, which include Rajputs, Khatris and Jats. They are supposed to represent closely the traditional Aryans in India. These people are identified by the following traits: stature is mostly tall; complexion fair; eyes dark; hair on face plentiful; head long; nose narrow and prominent, but not specifically long.

3. *The Mongoloid type* – of the Himalayas, Nepal, Assam and Burma represented by the Kanets of Lahoul and Kulu, the Lepchas of Darjeeling, the Limbus, Murmis and Gurungs of Nepal, the Bodo of Assam and the Burmese. The characteristic physical traits are: the head is broad; complexion dark with yellowish tinge; hair on face scanty; stature small or below average; nose fine to broad; face characteristically flat; eyelids often oblique.

4. *The Aryo-Dravidian type* – found in the United Province of Agra and Oudh, in parts of Rajputana, in Bihar and Ceylon and constituting the upper caste Brahmin and the lower caste Charmer as a result of the inter-mixture of varying proportions of Indo-Aryan and Dravidian types. The characteristic physical traits are: the head form is long with a tendency towards medium; the complexion varies from light brown to black; the nose ranges from medium to broad, being always broader among the Indo-Aryans; the stature is lower than among that in the latter group, and is usually below average.

5. *The Mongolo-Dravidian type* – found in lower Bengal and Orissa, comprising the Bengal Brahmans and Kayasthas, and the Muhammadans of eastern Bengal. They possibly represent a blend of Dravidian and Mongoloid elements with a strain of Indo-Aryan blood in the higher groups. The head is broad; complexion dark; hair on face usefully plentiful; stature medium; nose medium with a tendency to be broad.

6. *The Scytho-Dravidian type* – of western India, comprising the Maratha Brahmans, Kunbis and Coorgis; probably formed by a mixture of predominately Scythian and Dravidian elements among the former three groups. These people have traits such as the head being broad; complexion fair; hair on face rather scanty; stature medium; nose moderately fine and not conspicuously long.

7. *The Turko-Iranian type* – represented by Baloch, Brahui and Afghans of the Baluchistan Agency and the North West Frontier Province, formed by a fusion of predominantly Turkic and Persian elements. They are characterized by (or identified by) the following physical traits: stature above mean; complexion fair; eyes mostly dark, but occasional grey; hair on face plentiful; head broad; nose moderately narrow, prominent and very long.

Risley's classification of the above seven types of castes and tribes was based on a survey conducted primarily among the four provinces of the North Western Province, the Bombay Presidency, Ceylon and Burma, covering regions of Punjab, Bengal, Bihar, Orissa, Rajasthan and Baluchis. This was based on a total sample size of 5784 individuals aged between 25 and 45 from 87 diverse castes and tribes. Of the total sample, comprising 87 castes and tribes, at least about 70 individuals were measured from 45 castes and tribes, and the sample size for the remaining 42 tribes and castes was small and inadequate (Mahalanobis 1934). Risley's anthropometric survey included a total of 11 measurements; which included, stature, biacromial breadth (BAB) and (9) head measurements, such as, bizygomatic breadth (BZB), cephalic breadth (CB), cephalic length (CL), frontal breadth (FB), height vertex to chin (Hvc), height vertex to tragus (Hvt), height vertex to intr superciliary point (HVI) nose height (NH), nasal width (Nm), nasomalar breadth (NW) and somotoscopic observations such as skin colour, eye colour, hair colour and form, nasal root, etc. However, it is not clear what method was adapted in selecting the individuals for the anthropometric survey. He had his own views and opinion about the origin of diverse castes and tribes. There has been criticism about Risley's classification:

1. Risley considering caste as the basis of classifying the people of India has been criticized, in view of caste conversions, laxities of social rules and regulations that allows hypergamy, miscegenation, amalgamation of caste and tribal groups in connection with the practice of Hinduism and other constraints which makes caste to be more of social rather than biological identification for classification.

2. The use of anthropometric measurements for the classification of complex social castes has also been criticized, as these measurements show greater diversity within rather than among populations. This is more so in the case of several subcastes under a caste or caste cluster, which are merely socially recognized and can change over time or due to the reasons of admixture between subcastes and with other castes and marriage rules.

3. It has been argued that Risley had hardly considered the influence of environmental factors such as climate, soil, food, etc., which widely vary across different regions of the Indian subcontinent.

4. The racial classification being based on the historical aspects of the Aryan migration for the classification of the Indo-Aryan type in northern regions and neglecting other such migrations (Iranian, Scythian, Hun, Mongol, Persian, etc.) has also been criticized.

5. Risley considered Dravidian racial features among the tribes of central India and northern plains, and possibly did not consider or recognize the presence of Mon-Khmer populations distributed over central India and extending to Assam, whom he might have considered as the Dravidian race.

6. Based on the observation of the dolicocephalic head form among Rajputs and Jats, Risley argued against their possible origin and classification as Indo-Aryans.

7. Risley considered Marathas, who had originated from Scythians and migrated to the south and intermingled, as belonging to the Dravidian types. However, there is hardly any historical evidence to support his contention.

8. Risley's conclusions were unsatisfactory, and in some cases, they are unclear and have been questioned. His conception of India 'as isolated from the rest of Asia and inhabited by barbarous tribes until the Aryan invasion c. 1500 BC, has been proved to be erroneous by the discovery of Mohenjo-daro' (Hutton 1933)

9. 'P.C. Mahalanobis has analysed Risley's anthropometric data from Bengal and has found a number of more or less serious mistakes in the calculation of average values of records of individual measurements. The data were collected by four people and the method of collection and methodology used was more on personal instructions, etc.' (Mahalanobis *et al.* 1941).

1.2 *Vincenzo Giuffrida-Ruggeri's classification – 1921*

Vincenzo Giuffrida-Ruggeri (1872–1922), the European anthropologist, attempted the classification of Asiatic people based on the shape of their head – dolicho and brachy types: dolichocephalic populations from Indo-Afghan, Indo-Iranian and Irano-Mediterranean and the Brachycephalic-type populations such as Armeno-Pamirensis and Georgians (Giuddurida-Ruggeri 1921; A.K 1922). He classified the people of India into six major ethnic types: (1) Nigrito, represented by the Veddas and some tribal populations from the southern region, e.g., Kadars; (2) Pre-Dravidian or Australoid-Veddaic, which is represented by tribal groups such as Santal, Ho, Munda, etc.; (3) Dravidians, a linguistic reference populations who speak, primarily, Tamil and Telugu; (4) Tall Dolichocephalic elements, represented by populations from the Nilgiri hills; (5) Dolichochephalic Aryans (*Homo dolichomorphus*), represented by Indo-European populations such as Indo-Afghans and Indo-Iranians, etc., and (6) Brachycephalic Leucoderms (*Homo brachymorphous*), also represented by the Indo-European groups that included the Armenians, Georgenus, etc.

1.3 *Alford Cord Haddon 1924*

Another racial classification of the people had been proposed by Alford Cord Haddon (1855–1940), a British anthropologist, in 1924. Haddon did not agree with the classification by Herbert Risley. According to Haddon, the earliest people who inhabited the Indian subcontinent are represented by the pre-Dravidian jungle tribes. The classification proposed by Haddon included three geographical regions and five racial types: (1) pre-Dravidian jungle tribes, (2) the Dravidians who are long headed and brunette, (3) the Indo-Aryans who are fair complexioned and long headed, (4) the Indo-Alphines who are broad headed and (5) the Mongolians. In general, these five types are also regionally distributed and can be considered into the following zones:

1. *The Himalayan region*: There are two principal types: Mongoloid and Indo-Aryan. The dominant group is the Mongoloid type common among Nepal, Bhutan, Sikkim, Assam, etc. In Assam, there are two sub-types:

a. Dolichocephalic – Platyrrhine (pre-Dravidian) (long head, broad nose) representing groups such as Khasi Kuki, Manipuri, Kachari, etc.
b. Dolichocephalic – Mesorrhine (long head, broad nose) and are represented by groups such as Naga and other hill tribes.
c. Mesocephalic-Platyrrhine (medium head, broad nose) represented by the Khasi group
d. Brachycephalic – Leptorrhine (round head, long nose)
e. Mesocephalic – Mesorrhine (medium head, medium nose)
f. Brachycephalic – Platyrrhine (round head, broad nose)
g. Dolichocephalic – Leptorrhine (long head, long nose)

2. *Hindustan region or the northern plains*: This is represented by one main type – the Indo-Afghan and represented by populations with light brown skin colour, black and wavy head hair, long head or dolichocephalic, long face, dark eyes, finely cut straight or convex prominent nose, stature with medium to tall height. This is represented by communities such as Jats, Rajputs, etc.

3. *Deccan region or the southern plateau*: This consists of three sub-types:

a. Negrito, characteristic of people like Kadars of the southern region
b. Pre-Dravidian with features such as dark brown to black skin colour, dark and curly head hair, long head (dolichocephalic), dark eye colour, broad nose and short stature, represented by tribal groups such as Bhil, Gond, Santal, Oraon, etc.

c. Dravidian with features such as brownish skin colour, dark and curly head hair, dolichocephalic, dark eye colour, medium nose with medium stature, including southern regional linguistic groups such as Malayalam, Telugu, Tamil and Canarese

4. *Southern Brachycephals*: This group is characteristic of brown skin colour, medium head form (or mesocephalic) to broad (brachycephalic) medium nose type and is represented by, e.g., Panayan from Tamil Nadu, and Pavara of the Tinnevelly coast.

5. *Western Brachycephals*: This group is characterized by populations with a light brown skin colour, brachycephalic head form, long nose and tall stature. Populations representing these groups are Nagar Brahmans of Gujarat to people from Coorg and people inhabiting the western coastal region.

1.4 *Egon Freiherr von Eickstedt – 1934, 1952*

The German physical anthropologist Egon Freiherr von Eickstedt (1892–1965) proposed a racial classification of the Indian populations based on skin colour and physical types and the geographical location, and these have been described in his book *Rassenkunde und Rassengeschichte der Menschheit* (*Ethnology and the Race History of Mankind*) (1934). He considered the Melanide race as the earliest and that it had descended from the Indo-Negroid or the Eastern branch of the Negro race. It consisted of primarily three main races and 18 sub-types (Eickstedt 1952, 1934).

1. *Weddide or Ancient Indians:* Represented, primarily, by forest-dwelling tribes and consisted of two sub-types, namely,

a. Gondoid – consisting of tribes such as: Oraon, Bhils, Juangs, Gonds, Bhils, etc. (dark brown skin colour),
b. Malid type – represented by tribes from the southern region and are characteristic of dark brown skin colour, curly head-hair, short stature; the populations include Kurumbas, Veddas, etc.

2. *Melanid or Black Indians*: Mixed group characterised by black skin colour and composed by two sub-types:

a. South Melanid represented by Chenchu and Yanadi tribes,
b. Kolid type with black brown skin colour, dark and curly head hair, with short stature: the typical examples of the populations of this type include the Santal, Ho and Mundas, etc., from the central and the eastern regions.

3. *Indid or New Indians:* Includes plain dwellers represented by non-forest populations with morphological features of brown skin colour with a gracile appearance. It consisted of two sub-types:

a. Gracile Indid – represented by Bengalis,
b. North Indid – populations with features as light brown skin colour and represented by Todas of the Nilgiris and Rajputs from Rajasthan, etc.

4. *Palaeo-Mongoloid:* Showing incipient Mongoloid traits, e.g., Palayans of the Wayanad region in Kerala.

In general, Eickstedt's classification is regarded as more systematic and a better approach to classification of the people of India, as it covered major regions and diverse populations. It also followed representative samples from diverse regions. However, there has been criticism for a more systematic representation of populations and procedures that could have been incorporated. This was followed by BS Guha's classification where the scope of the classification was extended and some of the criticisms were addressed.

1.5 *Biraja Sankar Guha – 1935*

During the 1931 census, the racial classification of Indian populations was undertaken by an Indian anthropologist, BS Guha (1894–1961) (Guha 1935). Guha's racial classification was based on a systematic approach, following better standardization and a more elaborate analysis when compared with his predecessors (e.g. Eickstedt). The sample consisted of a total of 38 characters, 63 coefficients of racial likeness measures of 2511 persons (2163 males, 348 females) belonging to 39 groups (males of 34 groups and females of 5

Table 1. BS Ghua's racial classification – 1931 Census

Number	Source	Period	No. of individuals	Sex	Investigator	Number of groups
1	1931 Census	1932–1934	2163	Males	BSG	34
2	1931 Census	1932–1934	348	Females	BSG	5
Total			2511		BSG	39
3	Cochin hills	1927	?	Males	BSG	2
4	Hindu Kush	1929	~700	Males	BSG	10
Total			~3211	M + F	BSG	51
5	Other scholars	?	3774	Males	Others	7
Grand	Total		6985	M + F	BSG and others	?

groups) and the data was collected during 1931–1934 (Fisher 1936). 'With the exception of 171 Nicobarese, all the subjects were said to have been measured by him' (Mahalanobis *et al.* 1949, p. 96). During the 1927–1929 period, Guha also had collected anthropometric and somotoscopic observations of about 700 males from the Hindu Kush region (1929), and during 1927 some males from two populations of Cochin hills were also studied. Apart from Guha, his associates also collected data from 3774 male individuals but the details of the total groups studied and the time period of the study is not clearly known. Altogether, a total of 6985 males and females have been studied during Guha's period of 1931 Census of India (1931, Pt. III). The details of the sample size and distribution are shown in table 1. Guha and his associates collected a total of 18 anthropometric measurements: (1) stature, (2) auricular height, (3) maximum head length, (4) maximum head breadth, (5) minimum frontal breadth, (6) bizygomatic breadth, (7) bigonial breadth, (8) intra-orbital breadth, (9) orbito nasal breadth, (10) orbito-nasal arc, (11) nose length, (12) nose breadth, (13) nasal height or depth, (14) upper facial length, (15) total facial length, (16) head circumference, (17) sagital arc and (18) transverse arc. They have also collected qualitative data, especially 20 observations of different types such as skin, hair and eye colour, hair form, shape of nose, chin and forehead, prognathism of the jaw, and epicanthic fold of upper eyelids.

Out of the total 39 groups studied, Guha's samples included a total of 1004 Brahmin individuals from 14 groups, 884 individuals from 16 Hindu castes, 275 tribal individuals from four groups, and 348 individuals from five groups whose ethnicity details are not known. As far as the sample size is concerned, it represented a sample ranging from 100 to 143 individuals from seven populations (17.9%) and a range of 50–99 individuals from six populations (66.7%), and there were less than 50 individuals studied from six groups (15.4%).

Guha's (1937, 1944) racial classification of the people of India includes the following types:

1. *The Negrito*: They are considered to be the first settlers in the Indian subcontinent. The characteristic features of Negrito are: a dark pigmy strain having spirally curved hair; the head is small, medium or broad with a bulbous forehead, the nose is flat and broad, and the lips are everted and thick. Examples of these types of populations are: the Kadars, the Irulas, the Paniyans, etc., of the southern region. Such type of characteristics is also seen among the tribes of the Rajmahal hills. With respect to the head and hair forms, the Indian Negrito strain resembles the Melanesian pygmies than the Andamanese or African pygmies.

2. *The Proto-Australoid*: These are the second oldest racial groups in India. The characteristic features of the people are: short height, dark brown to nearly black skin colour, dolichocephalic head, broad and flat nose depressed at the root, the hair wavy or curly, and prominent supra-orbital ridges. These are seen among the tribal populations of central Indian, Deccan and the southern and western regions, e.g., the Oraons, the Santhals, the Mundas of the Chota Nagpur region; the Chenchus, the Kurumbas, the Yeruvas, the Badagas of the southern region and the Bhils, and the Kols of the central and western regions.

3. *The Mongoloid*: These people are characterized by scanty growth of hair on face and body, the eyes are obliquely set with an upper eye epicanthic fold, and the face is flat with prominent cheek bones and straight hair. This group consists of two subgroups:

a. Paleo-Mongoloid group: Of which there were two further groups: Long-headed groups – these groups live in the sub-Himalayan region, e.g., Seema Naga, Limbhus (Nepal). Broad headed group – these groups include: the hill tribes of Chittagung, e.g., the Chakmas and the Maghs, etc.
b. Tibeto-Mongoloid group: The characteristic features of the group are: broad and massive head, tall stature, long and flat face; medium to long nose; eyes oblique with an epicanthic fold; body hair is scanty; light brown skin colour. These people are Tibetans of Bhutan and Sikkim.

4. *The Mediterranean:* This division was further classified into three groups:

a. Palaeo-Mediterranean: These groups are characterized by long head, bulbous forehead, projected occiput with high vault; medium stature, small, broad nose, narrow face and pointed chin; the hair on the face and body is scanty; skin colour is dark. These probably can be traced to the megalithic cultures in India. The Dravidian people of southern India are the best examples: the Tamil Brahmans of Madura, the Nairs of Cochin and the Telugu Brahmans.
b. Mediterranean: The characteristic features of this group includes: long head with arched forehead; narrow nose; medium to tall stature; light skin colour; well-developed chin; dark-coloured hair and eyes; brownish to dark facial hair and plentiful body hair. These are represented by people from states like UP, Maharashtra, Bengal, Malabar; and Nambudiri Brahmans of Cochin, Brahmins of Allahabad and Bengali Brahmins. The populations are probably related to the Indus Valley civilization.
c. Orientals: The physical features of this group are similar to the Mediterranean except that the nose is long and convex. The best examples of this group are: the Punjabis, the Chattris, the Bania of Rajasthan and the Pathans.

5. *The Western Brachycephals:* They were subdivided into three groups:

a. Alpinoid: This consists of groups such as the Bania (Gujarat), the Kathi (Kathiawar) and the Kayasthas (Bengal). The characteristic features include: broad head with a rounded occiput; medium stature; prominent nose; rounded face; abundant hair on face and body; light skin colour.

b. Dinaric: There were three regional (Bengal, Orissa and Coorg) populations, especially Brahmans of Bengal and Mysore. The typical traits include: broad head, rounded occiput and high vault; nose very long and convex; long face; tall stature; dark colour skin and eyes. Historically, both the Alpino and the Dinaric entered India through Baluchistan, Sind, Gujarat and Maharashtra, Ceylon, Karnataka, Hyderabad and Tinnevelley. These can be traced to the Indus valley civilization.
c. Armenoid: This group is characteristic of similar traits of Dinarics except with respect to the occiput and the nose, which are less prominent. The typical examples of these populations included were Parsis (Bombay), Vaidyas and Kayasthas (Bengal).

6. *The Nordics:* The characteristic features of this group include: long head, protruding occiput and arched forehead; straight nose and high bridged; tall stature, strong jaws, robust body build, blue or grey eye colour, fair body colour (reddish white). They are found in different parts of the northern regions, especially Punjab and Rajasthan. Others include: the Kho of Chitral, the Red Kaffirs and the Khatash. Historically, the Nordics came from the north, probably from south-east Russia and south-west Siberia, and entered India through Central Asia.

Overall, BS Guha's classification was more detailed than the previous attempts of racial classification of the people of India. One significant development of BS Guha's racial classification of the Indian populations is the application of Karl Pearson's coefficient of racial likeness, or CRL, a quantitative measure to estimate the relative affinity and/or diversity among diverse castes and tribes of India (Pearson 1926; Fisher 1936). He had considered 63 CRL indexes for the classification and its size and shape components (Penrose 1954). This was based on 18 anthropometric measurements and 20 anthroposcopic observations among 39 populations, and their regional and intra- and inter-affinities were estimated by using cluster analytical techniques.

The geographical and regional distribution of the diverse racial features of BS Guha's racial classification of Indian populations is shown in figure 1.

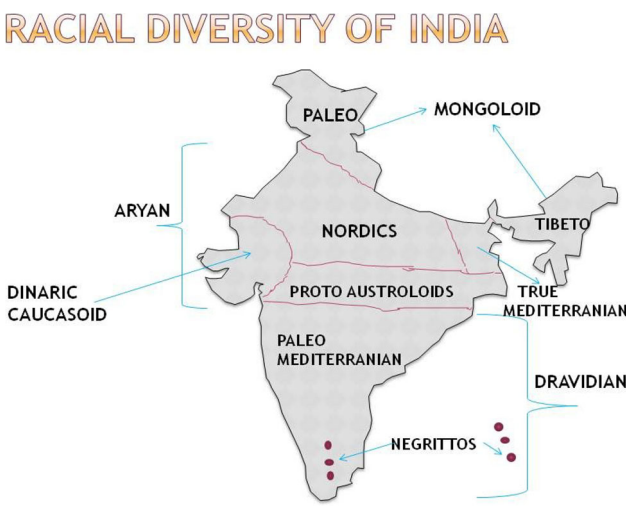

Figure 1. Geographical distribution of racial types of the people of India according to BS Guha (1935).

1.6 *Criticism of Guha's classification*

For the classification of the Indian populations, BS Guha, similar to earlier anthropologists, considered racial and linguistic criterion, namely, Nergritos, Tibeto-Mongoloid, etc., and thus attributed foreign origin and migration to the Indian racial types; the identification of Negrito elements and foreign origin of Indian racial classification has been criticized by later anthropologists (e.g., Keith 1928). He has been credited with considering the standardization of anthropometric techniques approved by International Agreements (1906, 1912), a more reliable method for the classification of racial types. There are concerns about inadequate sample sizes for some populations sampled and the use of CRL index, since it does not take into account the internal correlations of the traits (e.g., Seltzer 1937). The average size of the samples of the 32 groups measured by Guha during the 1931 survey is 64.4; of the samples, five were less than 50 (of which the Chenchu sample was 23 individuals), eighteen were between 50 and 60, four between 60 and 100 and only five samples were above 100, the largest sample is of Orissa Brahmans. His identification of the four main racial types based on a sample of 275 individuals from four tribal groups also raised questions about the selection of the tribal groups and the number of individuals as well. In addition, Guha's identification of the brachycephalic form and classification of Mongoloid as a major racial element distributed in West Bengal, west coast, down south in Deccan and of the Himalayan region has been opposed. Sarkar's (1961) view is that the brachycephalic form has restricted some populations, as against the major racial type as viewed by Guha.

1.7 *Classification by Sasanka Sekhar Sarkar (1961)*

Sasanka Sekhar Sarkar (1908–1969) proposed the racial classification of Indian populations based on the cephalic index. Sarkar identified dolichocephalic as the predominant type of Indian population, and mesocephalic and brachycephalic types restricted to some regional populations. He has identified six major racial elements (Sarkar 1958, 1961).

1.7.1 *The Dolichocephals:* 1. *Australoid:* The Australoids are also described as Proto-Australoid, Pre-Dravidian, Nisada and Veddid by previous anthropologists. In general, the aboriginal people of mainland India exhibit a Veddid or Australoid element in different degrees. Sarkar has identified certain castes and tribes of south India exhibiting the Australoid traits, e.g., the Uralis, the Kannikars, Paniyan and

others. In general, the Australoid traits are widely distributed throughout India and are present among all castes, but more predominantly among the lower castes groups. The other attributes of the population are: short stature with dark complexion, platyrrhine nose and wavy hair.

2. *Indo-Aryan:* The dolichocephalic Indo-Aryans are predominantly found in the northern regions of the country and are distinct from that of the Australoids. In general, these characteristics are tall stature and light skin colour. The eye colour is also light; even the hair colour is not as dark as that of the Australoids. The cranial capacity of Indo-Aryans is higher and their physique is well built and robust. The best example of the Indo-Aryan racial type can be seen among the Baltis of the Hindu Kush mountains. Historically, it appears that the Indo-Aryan people had contact with the Indus and the Gangetic valley populations of western India. Possibly, in view of this, these racial elements are predominantly seen among the inhabitants of Gangetic valley of western India and sporadically in eastern Bihar, Bengal and Assam, mainly among the higher castes, possibly as a result of the historical migration in the past.

3. *Mundari speakers:* Sarkar identifies 'the Mundari-speakers' as the sturdy, short-height people with a robust constitution and of dolichocephalic head, and skin colour lighter than that of the Australoids; however, their thick, straight, black hair is more or less akin to the Mongoloids. The regional distribution of Mundari-speakers can be found in the river valleys and plateaus of eastern and central India, Chota Nagpur plateau, Orissa and Madhya Pradesh, where they show the highest concentration. Historically, there has been a migration of Mundari-speakers from the east towards the northeastern parts.

1.7.2 *The Mesocephals:* 4. *Irano-Scythian:* The Irano-Scythian racial elements among Indian populations can be attributed to the historical migration from the northwest, similar to the Indo-Aryan populations. The typical physical features of Indo-Scythian racial type include mesocephalic head and medium stature, different from that of the dolichocephalic Indo-Aryans. The average cephalic index among the Irano-Scythian ranges between 77 and 79 as against 73 of the Indo-Aryans. These racial elements can be found among populations of eastern Bihar, Bengal and Assam, where the dolichocephalic Indo-Aryans have been replaced by the Mesocephalic Irano-Scythians. The Mesocephalic Irano-Scythians appear to be more variable in physical features. Historically, Irano-Scythinas were one of the successful populations who spread wide to the other parts of the country. From the northern region, they also moved to the eastern, western and southern regions. Their distribution has been noted up to northern Mysore, the Deccan and further south.

1.7.3 *The Brachyecephals:* 5. *Far Eastern:* Since pre-historical times, the Indian subcontinent had contacts with people from Southeast Asian countries, and there were migrations of people and cultural diffusion, and this is more prominent in the eastern parts of Bangladesh through Burma, etc. This also can be seen in some of the racial elements in the Indian subcontinent. Sarkar describes this as a Malayan strain, quite distinct from other racial elements and identifies it with traits of the brachycephalic head, short stature, dark skin colour and a slight obesity.

6. *Mongolian:* The Monglian racial elements are especially yellowish skin colour, akin to Mongoloid skin colour, sparsely distributed face and body hair, and epicanthic eye fold as that of typical Mongoloid populations, and these are the characteristic traits among populations in the foothills of the Himalayas and the northeastern borders of the Indian subcontinent. These traits are also found sporadically among other Indian populations, especially among Australoids. Our present knowledge instigates us to conclude that the earliest inhabitants of India were the Australoids who might have received some infiltration of Negrito strains in certain parts of India.

2. Salient features of various classifications

An overview of the studies on the racial classification of Indian populations at the national level showed vast variation in anthropometric characters and anthroposcopic traits. The number of populations considered also varied and included diverse castes and tribes. The studies have also considered diverse regions of the country as some studies did not consider the northeast Indian region and others have considered samples from the mainland region (Roy 1934; Sarkar 1954). The sample size considered varied and was adequate in some cases and inadequate in others. The number of measurements and observations also differed among the various authors, and they all followed standard techniques of measurements and observations (e.g., WHO 1995). The studies showed diverse racial and physical types and the number of racial types identified also varied: Risley and Eickstedt identified seven types, Ruggeri and Sarkar identified six types, whereas Guha identified 15 racial types. In identifying the different racial types, the authors have also used varied nomenclature for the types: some considered language, geography and ethnicity for identifying the racial types. The main racial types identified included: Nigrito, Proto-Australoid, Caucasoid and Mongoloid, and these varied between regions and there were more than one racial type in a given region. The studies indicated that the different racial types of the contemporary Indian populations have come from elsewhere. The antiquity of the diverse types is not very clear; however, the studies suggested that the Proto-Austroloid were the earliest settlers of the country. The studies also indicated that the tribes and the lower caste groups showed predominantly Proto-Austroloid or Palaeo-Mediterranean elements, whereas the higher castes showed more of Caucasoid elements of Indo-Aryan, Alemenoid, Dinaric and the Nordics.

Table 2. Details of regional anthropometric studies undertaken by various scientists

Number	State/region	Year	Number of groups	Number of traits	Sample size	Reference
1	United provinces	1948	22	12/16	2836	PC Mahalanobis, DN Majumdar, CR Rao
2	Maharashtra	1951				I Karve and VM Dandekar
3	Bengal	1958	41	14/16	3240	DN Majumdar, CR Rao
4	Gujarat	1950				DN Majumdar
5	Tamil Nadu	1981	12		1150	LD Sanghvi, V Balakrishnan and I Karve
6	Central India	2013	22	8	6663	RK Gautham, DK Adak, M Pal and P Bharati
7	United provinces	1896	Castes, tribes		4906	Drake-Brockman

3. Regional studies

The national-level study of the anthropological studies of the types of people of India has encouraged similar such detailed and structured studies with respect to the different regions of the country. These studies, particularly Guha's study, showed that collaboration between anthropologists and statisticians was essential for a systematic study of racial or physical types of Indian populations. The earliest regional anthropometric study was conducted by Sir Drake-Brokeman in the United Provinces and included a sample size of 4906 individuals belonging to castes and tribes. Prof. PC Mahalanobis had worked on the statistical analysis of Anglo-Indian data and other anthropometric measurements and published a series of papers (Mahalanobis 1922, 1925a, b, 1930, 1933, 1931, 1940; Mahalanobis and Bose 1941) and later conducted anthropometric surveys in Uttar Pradesh and Bengal Provinces, which was considered to be one of the classical studies in view of sampling strategy and statistical analysis performed. DN Majumdar studied antrhopometric variation among tribes and castes from central, western and eastern regions (Majumdar 1938, 1950). This was followed by three studies during the 1950s, one in the 1980s, and a recent study conducted during 2013. The six regional studies and details of their publications are given in table 2.

3.1 *UP anthropometric survey*

3.1.1 *Sir Drake-Brockman study:* In 1896, Captain Drake-Brockman undertook an extensive anthropometric survey and the results were published in the first volume of *Castes and Tribes of North Western Provinces and Oudh*. He is said to have measured about 4906 males aged 25 years and above from all castes and tribes. However, only a summary of the data was available, but not the individual measurements. Drake-Brockman appears to have considered three main division of the castes and tribes: 'Aryan, Medium and Dravidian; the Medium group contains a large number of castes, which form more or less an intermediate type, and are not capable of being classified strictly under either of the other two main groups. The tribal groups he considers them as: an Hinduised and an Aboriginal' (Mahalanobis *et al.* 1949, p 95–96).

3.1.2 *DN Majumdar, PC Mahalanobis and CR Rao study:* In connection with the Population Census in India in 1941, DN Majumdar had conducted an anthropometric survey among castes and tribes of Agra and Oudh residing in the United Provinces. The results of the study were published in Sankhya with the collaboration of two statisticians, PC Mahalanobis and CR Rao. It is one of the classical regional studies in view of the methodology, systematic sampling technique followed, statistical analysis, and interpretation of the results that has been attempted. There were such similar studies among, e.g., Anglo-Indians, etc. (Mahalanobis 1922, 1925a, b, 1930, 1931, 1940; Mahalanobis and Boss 1941)

The UP study consisted of altogether 2386 individuals belonging to 22/23 castes and tribes – 15 caste groups and 7 tribal groups and Tharu (female) – who were measured. The sample size varied from a minimum of 41 (Agharia – Ag), 68 (Ahir A1) to a maximum of 173 (Other Artisans A2) and 182 (Tharu Th). The total number of persons belonging to the artisan castes was 392: 68 Ahirs, 57 Kahars, 94 Kurmis and 173 others. The subjects were selected at random. The number of measurements taken were maximum 16, but usually 12 measurements were commonly taken: (1) stature, (2) sitting height, (3) head length, (4) head breadth, (5) minimum frontal breadth, (6) nasal length, (7) nasal breadth, (8) nasal depth, (9) total facial length, (10) upper facial length, (11) bizygomatic breadth, (12) bigonial breadth, and in some areas, (13) orbito-nasal breadth, (14) orbito-nasal arc, (15) auricular height and (16) span and weight of the individuals were also recorded.

To investigate the affinity and diversity between the castes or tribes, generalized distance D^2-statistic was calculated based on nine characters. However, the study had 'not made any use of the indices' (Mahalanobis *et al.* 1941). The results of the UP anthropometric study of racial affinities between castes and tribes can be inferred from the clustering pattern obtained based on the above anthropometric data (figure 2). The results obtained show that 'about 85% of the total variance can be accounted for the variation in three different directions, indicating that the 22 different groups show a clear pattern in physical appearance'. It showed three basic clusters: two Brahmin groups form a cluster, while four artisan groups another cluster and eight tribal groups along with Tharus form another cluster. Three groups, Chattri,

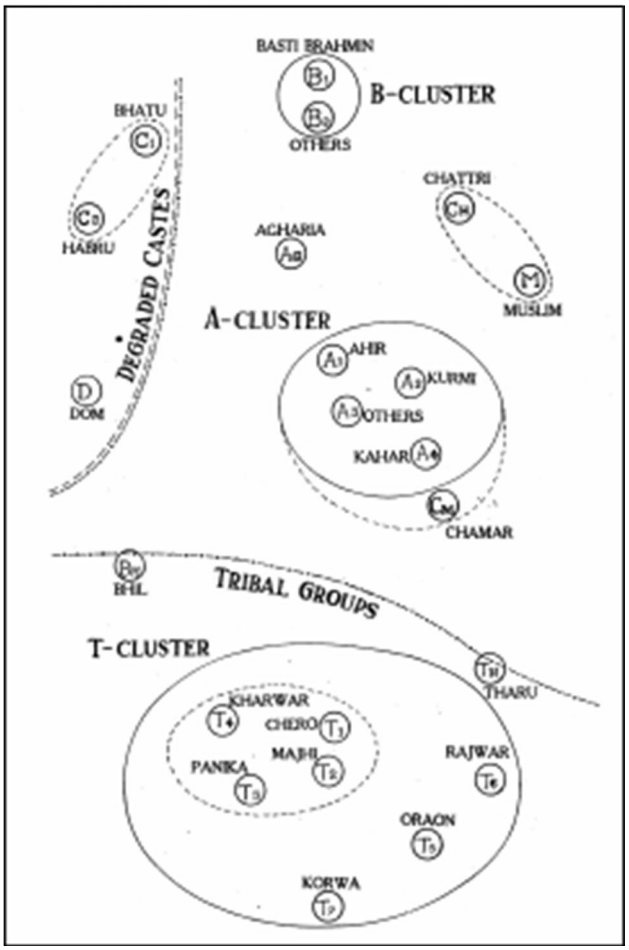

Figure 2. UP anthropometric survey – clustering of caste and tribal groups based on 12 measurements.

Muslim and Agharia, are between Brahmins and artisans; the Charmar cluster is between the artisans and the tribals. Whereas the groups like Bhatu, Habru, Dom and Bhil stand out of the general pattern of the clustering observed. Overall, the castes and tribes form separate clusters. Among the castes, there are four clusters with subclusters. The artisan (A-cluster) consists of A1-Ahirs, A2-Kurmis, A3-Other artisans and A4-Kahars. Within the tribal groups T-cluster, the T1-Chero, T2-Majhi, T3- Panika and T4-Kharwar form a distant subcluster, whereas T5-Oraons, T-6 Rajwars and T-7 Korwas differ from the above subcluster in accordance with their distinguished physical traits.

Some of the findings of the study are: 'sitting height is the best discriminating single character for the non-tribal groups, and other useful characters are head length, nasal length, stature and frontal breadth in order of importance'.

3.2 *Bengal anthropometric survey, 1945*

To investigate the ethnic composition of the populations of the Bengal province, DN Majumdar undertook a anthropometric study during 1945, soon after the Second World War. The study was a collaborative effort between an anthropologist and a statistician (Mahalanobis and Bose 1941; Majumdar and Rao 1958). It was conducted in 14 out of 29 districts in Bengal, but, e.g., Chittagong division was not covered. Altogether 3240 individuals aged 18–30 years, belonging to 41 social groups, were measured for 14 traits. All the 70 castes and tribes were covered. A total of 2114 samples of blood groups of children and students from a college were also taken. About 16 total measurements taken; 12 were common: (1) stature, (2) sitting height, (3) head length, (4) head breadth, (5) minimum frontal breadth, (6) nasal length, (7) nasal breadth, (8) nasal depth, (9) total facial length, (10) upper facial length, (11) bizygomatic breadth and (12) bigonial breadth. In some areas, orbito-nasal breadth and orbito-nasal arc, auricular height and span and weight and along with personal and social status of the individuals were also taken. Generalized D^2 distance, size and shape factors were used for studying the affinities or classification of social groups of people living within the same state. The study considers the estimates of size and shape factors to compare the social groups between states. The study showed clearcut distinctions between states especially with respect to the shape factor, possibly indicating the Brachycephalic element in Bengal, likely supporting the view considered by previous anthropologists. A majority of the Muslims have common features with the non-Muslim groups. Generally, the Bengal groups have a smaller face size compared to other surveys. Bengal Brahmans resemble the other Bengal castes more closely than they resemble the castes outside Bengal, including Brahmans (Mahalanobis 1925a, b). The anthropometric affinity among castes and tribes has been shown by following clustering analysis (figure 3). Important findings of the study are: (1) There are regional differences within a social group, that is, between individuals of the same caste, or tribe, but living in different areas or districts; (2) there is a closer resemblance between caste groups within a district than between individuals of the same caste group belonging to different districts; (3) stature differs significantly from tribal and non-tribal lower caste groups and (4) D^2 analysis shows clustering of most of the tribal (Mongoloid and Proto-Australoid) and semi-tribal groups constitute a cluster and are distinct from the higher castes (Brahmin, Baidya, Kayastha and Baisya). The Muslims do not affiliate themselves to the higher castes in Bengal (similar to UP study). Muslims and Namasudras are closely related (figure 3). The study also highlights the limitations of anthropometric data in the classification of racial types among diverse castes and tribes, etc. There were also anthropometric studies of caste and tribes of Bengal province by Mahalanobis with others (Mahalanobis and Bose 1941).

3.3 *Other regional anthropometric studies*

3.3.1 *Biology of the People of Tamil Nadu – 1981:* Dr Sanghvi and his group had undertaken a major multi-

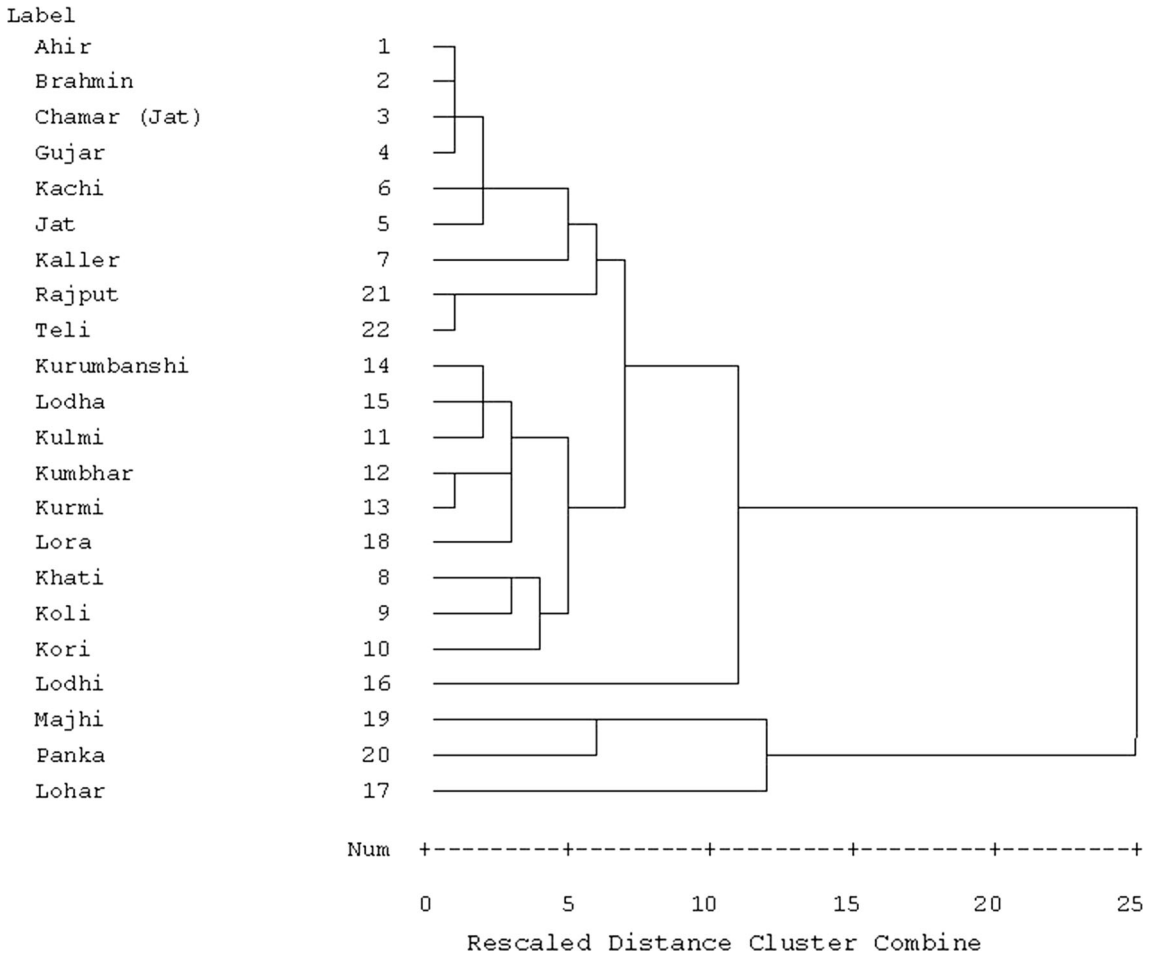

Figure 3. Clustering of castes and tribes of Bengal province based on anthropometric characters.

disciplinary project on a single cultural linguistic region of Tamil Nadu, in the southern region for its importance to the Dravidian culture and also its possible influence on and relationship with the Harrappan culture. The study conducted during 1959–1970 included 15 major populations groups from nine (out of the 12) districts. Of the 15 populations, 12 were the major populations groups, especially, (1) Brahmin – Iyer and Iyengar, (2) Non-Brahmin groups of high rank – Vellalah, Naidu, Mudaliar and Chettiar, (3) Non-Brahmin lower rank group such as Vanniyan, Kallan and Mutraha, (4) Harijan group – Parayan, Chakkiliyan, and (5) Tribe – Irulan.

Overall, 15 measurements of head and face and 12 somatoscopic observations were recorded on 1150 adult men from 5 districts and 11 populations (Sanghvi *et al.* 1981). Information on parental consanguinity and blood and saliva samples, haemoglobin variants, ABH secretion test, PTC taste, and red-green colour blindness were collected from 2254 individuals, mostly from school children.

The traits included were: Stature ST, Head Length HL, Head Breadth HB, Minimum Frontal Breadth FB, Bizygomatic Breadth BZB, Bigonial Breadth BB, Orbital Breadth OB, Nasal Length NL, Nasal Breadth NB, Total Facial Length TFL, Upper Facial Length UFL, Orbio-nasal Breadth ONB, Orbito-Nasal Arch ONA, Auricular Height AH, Horizontal Circumference of Head HCH. The anthropometric study included 11 indices: Cephalic CI, Nasal NI, Upper Facial UFI, Total Facial TFI, Length-Height LHI, Breadth-Height BHI, Fronto-Parietal FPI, Cranio-Facial CFI, Fronto-Zygomatic FZI, Gonio-Zygomatic GZI, and Orbio-Nasal ONI. The blood group traits tested were: A1A2BO, MN, Rehusus RH, P, Secretion status ABHS, and HbAS haemoglobin variants. Overall, the data have suggested 2 or 3 waves of immigration with consequent mixing, supplanting and adjustments in social rank (Sanghvi *et al.* 1981) among the diverse caste and tribes of the people of Tamil Nadu.

3.3.2 *Indo-Soviet collaborative study:* Apart from the above, other studies were conducted in different regions, although the details of these studies are not readily available. A collaborative study between Indian and Soviet scientists was conducted between 1971 and 1983 by the Indian Statistical Institute, Kolkata, and Institute of Ethnography, Moscow. The study measured about 5500 individuals

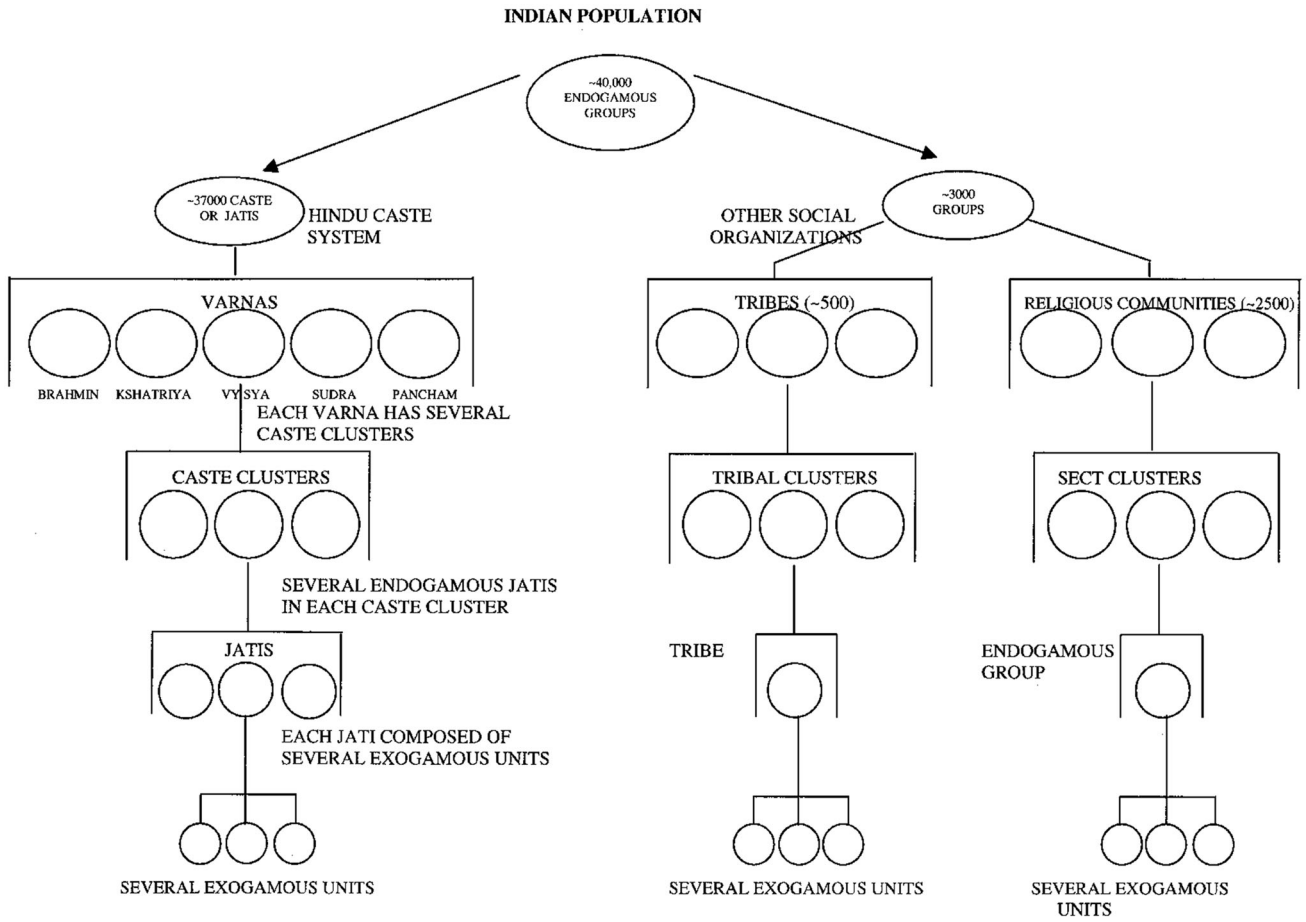

Figure 4. Indian population structure model (after Malhotra 1984).

belonging to 55 populations. Anthropological Survey of India conducted an All India Anthropometric Survey during 1963–1967 which included 195 groups and measured 46,789 individuals. The details of the measurements by region and trait have been published in 11 volumes by the Anthropological Survey of India.

3.3.3 *Central India study:* Morphometric variation among the people of the central Indian region has been recently published (Gautam *et al.* 2013) based on the data from the Anthropological Survey of India by Basu *et al.* (1994). The study included 6663 individuals (males aged 18–70 years) from 22 occupational caste group distributed in 38 districts. The sample size varied from 50 (12 groups) to a maximum of 114 (among Brahmins). Based on eight anthropometric traits, the study investigated the relative affinity and diversity among 22 castes by employing size, shape and generalized Mahalanobis distance statistics. Results of the coefficient of variation showed variation among the castes with respect to the nasal breadth, nasal length, nasal index and weight, but no marked variation with respect to other anthropometric variables. The clustering obtained showed four major clusters that included Ahir, Brahmin, Charmer (Jat), Gujar, Kachi and Jat as one cluster, and six other castes forming another cluster, whereas several others were separated.

3.4 *General features of the regional study*

The regional studies examined affinities and diversity among castes and tribes. None of the studies have identified any of the racial types. All studies identified populations at the level of various castes, *varnas*, *jati*, tribes, and religious and migrant groups. All these studies used summary statistical estimates of various distance measures for investigating the affinity and were conducted by anthropologists and statisticians. The overall findings of the studies are: there is an enormous variation observed among diverse populations with respect to the anthropometric measurements and for the several observational traits. Populations within the state or region formed distinct clusters and the number of clusters varied in each region. In all regions, the tribal populations formed distinct clusters. There is a greater variation between individuals within a caste or subcaste than between castes. Tribal populations showed less heterogeneity in their physical traits than among castes.

3.5 *Biological affinities among the populations at the 'varna'/caste cluster level*

Continuing with the regional studies of affinity and diversity, some studies have considered the affinity among castes and subcastes based on the social structure of the Indian populations. The Indian population structure is composed of three broad divisions that include castes, tribes and religious groups (figure 4). Under each caste, there are several '*varna*s', and each *varna* is again composes of several caste clusters; each caste consisting of several '*jati*s', which consist of several exogamous units. The formation of castes and its several subdivisions is influenced by the fission–fusion process. The historical anecdotes also indicate that the formation of subcastes and castes is characterized by the fission and fusion process. Therefore, it is interesting to investigate the biological differences, e.g., the anthropometric differences, based on the social structure of Indian populations. One such study examined the social structure hypothesis of the fission and/or fusion, a characteristic aspect of regional castes and subcastes. This hypothesis has been tested with the anthropometric data among, e.g., Brahmins of Maharashtra, Kumbhars of Maharashtra, and Dhangars of Maharashtra (Karve and Dandekar 1951; Malhotra *et al.* 1996; Malhotra 1979). For example, the endogamous castes of the Dhangar caste-cluster has been studied for anthropological genetics (1970–1974). A total of 2380 individuals, the sample size varied from 50 (Gadhari-Nikhar, GN) to 449 (Hatkar HT) from 20 endogamous castes (177 villages spread over 82 tahils and 26 districts) of Maharashtra, were measured for 14 anthropometric characters. The clustering obtained from the D^2 distance analysis showed a geography-based clustering of the castes. The case of the caste-cluster consisting of several subcastes could be due not to fission, but to a lack of fusion, and this hypothesis was tested among eight endogamous groups of the same rank in Maharashtra, based on anthropological genetic traits (anthropometric, anthropomorphic, blood groups, colour blindness) of the total sample size that varied from 786 to 1580 of Brahmin subcastes. The clustering pattern obtained from distance measures suggested independent origins for five of the eight groups and those supported by the scanty historical records about these castes (Karve and Malhotra 1968). In general, these studies show insignificant differences in physical traits between castes and subcastes at the *varna* and *jati* levels.

4. Micro-evolutionary studies among the people of India

The third phase of the biological investigation of the population structure of India is mostly focused on the micro-evolutionary trends at the individual population level and the factors that influence the micro-evolutionary changes. Indeed, numerous studies have been conducted among castes, tribes and other endogamous, isolated, migrated and small populations across India by several anthropologists, human biologists and human geneticists. Some of these studies have also investigated genetic demographic aspects. Some have investigated the micro-evolutionary phenomena among regional populations based on physical traits (e.g., stature, cephalic index, nasal index and other facial and head measurements), observational traits (e.g., cleft chin, ear-lobe attachment, hypertrichosis, tongue pigmentation, shape of the nose, prognothism, hand clasping and hand folding, relative length of the index and ring finger, etc.), blood groups and biochemical traits, and was later followed by DNA studies. Some examples of these studies were carried out in different parts of the country: for example, studies by Crooke (1896), Chatterjee (1934), Chowdhuri (1936), Majumdar (1938, 1949), Chatterjee (1948), Majumdar (1950), Karve (1954), Das (1961), Rakshit (1975), Bhanu (2004), Reddy Chengal (1993), Basu *et al.* (1994), Gupta and Dutta (1966), Bhasin (2006), Ganguly (1976), Rao (1969, 1970a, b), Malhotra (1978a, b, c), Gadgil and Malhotra 1982, Bhasin (2006), Perkins *et al.* (2011), etc.

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