THE Mismeasure of Man

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Measuring Heads

Paul Broca and the Heyday of Craniology

No rational man, cognizant of the facts, believes that the average negro is the equal, still less the superior, of the average white man. And, if this be true, it is simply incredible that, when all his disabilities are removed, and our prognathous relative has a fair field and no favor, as well as no oppressor, he will be able to compete successfully with his bigger-brained and smaller-jawed rival, in a contest which is to be carried on by thoughts and not by bites. —T. H. Huxley

The allure of numbers

Introduction

Evolutionary theory swept away the creationist rug that had supported the intense debate between monogenists and polygenists, but it satisfied both sides by presenting an even better rationale for their shared racism. The monogenists continued to construct linear hierarchies of races according to mental and moral worth; the polygenists now admitted a common ancestry in the prehistoric mists, but affirmed that races had been separate long enough to evolve major inherited differences in talent and intelligence. As historian of anthropology George Stocking writes (1973, p. bxx): "The resulting intellectual tensions were resolved after 1859 by a comprehensive evolutionism which was at once monogenist and racist, which affirmed human unity even as it relegated the dark-skinned savage to a status very near the ape."

The second half of the nineteenth century was not only the era of evolution in anthropology. Another trend, equally irresistible,
swept through the human sciences—the allure of numbers, the faith that rigorous measurement could guarantee irrefutable precision, and might mark the transition between subjective speculation and a true science as worthy as Newtonian physics. Evolution and quantification formed an unholy alliance; in a sense, their union forged the first powerful theory of "scientific" racism—if we define "science" as many who misunderstand it most profoundly: as any claim apparently backed by copious numbers. Anthropologists had presented numbers before Darwin, but the crudity of Morton’s analysis (Chapter 2) belies any claim to rigor. By the end of Darwin’s century, standardized procedures and a developing body of statistical knowledge had generated a deluge of more trustworthy numerical data.

This chapter is the story of numbers once regarded as surpassing all others in importance—the data of craniometry, or measurement of the skull and its contents. The leaders of craniometry were not conscious political ideologues. They regarded themselves as servants of their numbers, apostles of objectivity. And they confirmed all the common prejudices of comfortable white males—that blacks, women, and poor people occupy their subordinate roles by the harsh dictates of nature.

Science is rooted in creative interpretation. Numbers suggest, constrain, and refute; they do not, by themselves, specify the content of scientific theories. Theories are built upon the interpretation of numbers, and interpreters are often trapped by their own rhetoric. They believe in their own objectivity, and fail to discern the prejudice that leads them to one interpretation among many consistent with their numbers. Paul Broca is now distant enough. We can stand back and show that he used numbers not to generate new theories but to illustrate a priori conclusions. Shall we believe that science is different today simply because we share the cultural context of most practicing scientists and mistake its influence for objective truth? Broca was an exemplary scientist; no one has ever surpassed him in meticulous care and accuracy of measurement. By what right, other than our own biases, can we identify his prejudice and hold that science now operates independently of culture and class?

Francis Galton—apostle of quantification

No man expressed his era’s fascination with numbers so well as Darwin’s celebrated cousin, Francis Galton (1822–1911). Independently wealthy, Galton had the rare freedom to devote his considerable energy and intelligence to his favorite subject of measurement. Galton, a pioneer of modern statistics, believed that, with sufficient labor and ingenuity, anything might be measured, and that measurement is the primary criterion of a scientific study. He even proposed and began to carry out a statistical inquiry into the efficacy of prayer! Galton coined the term “eugenics” in 1883 and advocated the regulation of marriage and family size according to hereditary endowment of parents.

Galton backed his faith in measurement with all the ingenuity of his idiosyncratic methods. He sought, for example, to construct a “beauty map” of the British Isles in the following manner (1909, pp. 315–316):

Whenever I have occasion to classify the persons I meet into three classes, “good, medium, bad,” I use a needle mounted as a pricker, wherewith to prick holes, unseen, in a piece of paper, torn rudely into a cross with a long leg. I use its upper end for “good,” the cross arm for “medium,” the lower end for “bad.” The prick holes keep distinct, and are easily read off at leisure. The object, place, and date are written on the paper. I used this plan for my beauty data, classifying the girls I passed in streets or elsewhere as attractive, indifferent, or repellant. Of course this was a purely individual estimate, but it was consistent, judging from the conformity of different attempts in the same population. I found London to rank highest for beauty; Aberdeen lowest.

With good humor, he suggested the following method for quantifying boredom (1909, p. 278):

Many mental processes admit of being roughly measured. For instance, the degree to which people are bored, by counting the number of their fidgets. I not infrequently tried this method at the meetings of the Royal Geographical Society, for even there dull memoirs are occasionally read. ... The use of a watch attracts attention, so I reckon time by the number of my breathings, of which there are 15 in a minute. They are not counted mentally, but are punctuated by pressing with 15 fingers successively. The counting is reserved for the fidgets. These observations should be confined to persons of middle age. Children are rarely still, while elderly philosophers will sometimes remain rigid for minutes altogether.
Quantification was Galton's god, and a strong belief in the inheritance of nearly everything he could measure stood at the right hand. Galton believed that even the most socially embedded behaviors had strong innate components; "As many members of our House of Lords marry the daughters of millionaires," he wrote (1909, pp. 314-315), "it is quite conceivable that our Senate may in time become characterized by a more than common share of shrewd business capacity, possibly also by a lower standard of commercial probity than at present." Constantly seeking new and ingenious ways to measure the relative worth of peoples, he proposed to rate blacks and whites by studying the history of encounters between black chiefs and white travelers (1884, pp. 338-339):

The latter, no doubt, bring with them the knowledge current in civilized lands, but that is an advantage of less importance than we are apt to suppose. A native chief has as good an education in the art of ruling men, as can be desired; he is continually exercised in personal government, and usually maintains his place by the ascendancy of his character shown every day over his subjects and rivals. A traveller in wild countries also fills, to a certain degree, the position of a commander, and has to confront native chiefs at every inhabited place. The result is familiar enough—the white traveller almost invariably holds his own in their presence. It is seldom that we hear of a white traveller meeting with a black chief whom he feels to be the better man.

Galton's major work on the inheritance of intelligence (Hereditary Genius, 1869) included anthropometry among its criteria, but his interest in measuring skulls and bodies peaked later when he established a laboratory at the International Exposition of 1884. There, for threepence, people moved through his assembly line of tests and measures, and received his assessment at the end. After the Exposition, he maintained the lab for six years at a London museum. The laboratory became famous and attracted many notables, including Gladstone:

Mr. Gladstone was amusingly insistent about the size of his head, saying that hatters often told him that he had an Aberdeenshire head—"a fact which you may be sure I do not forget to tell my Scotch constituents." It was a beautifully shaped head, though rather low, but after all it was not so very large in circumference (1909, pp. 249-250).

Lest this be mistaken for the harmless musings of some dotty Victorian eccentric, I point out that Sir Francis was taken quite seriously as a leading intellect of his time. The American hereditarist Lewis Terman, the man most responsible for instituting IQ tests in America, retrospectively calculated Galton's IQ at above 200, but accorded only 195 to Darwin and a mere 100-110 to Copernicus (see pp. 183-188 on this ludicrous incident in the history of mental testing). Darwin, who approached hereditary arguments with strong suspicion, wrote after reading Hereditary Genius: "You have made a convert of an opponent in one sense, for I have always maintained that, excepting fools, men did not differ much in intellect, only in zeal and hard work" (in Galton, 1909, p. 290). Galton responded: "The rejoinder that might be made to his remark about hard work, is that character, including the aptitude for work, is heritable like every other faculty."

A curtain-raiser with a moral: Numbers do not guarantee truth

In 1906, a Virginia physician, Robert Bennett Bean, published a long, technical article comparing the brains of American blacks and whites. With a kind of neurological green thumb, he found meaningful differences wherever he looked—meaningful, that is, in his favored sense of expressing black inferiority in hard numbers.

Bean took special pride in his data on the corpus callosum, a structure within the brain that contains fibers connecting the right and left hemispheres. Following a cardinal tenet of craniometry, that higher mental functions reside in the front of the brain and sensorimotor capacities toward the rear, Bean reasoned that he might rank races by the relative sizes of parts within the corpus callosum. So he measured the length of the genu, the front part of the corpus callosum, and compared it with the length of the splenium, the back part. He plotted genu vs. splenium (Fig. 3.1) and obtained, for a respectably large sample, virtually complete separation between black and white brains. Whites have a relatively large genu, hence more brain up front in the seat of intelligence. All the more remarkable, Bean exclaimed (1906, p. 290) because the genu contains fibers both for olfaction and for intelligence. Bean continued: We all know that blacks have a keener sense of smell than whites; hence we might have expected larger genu in blacks if intelligence did not differ substantially between races. Yet black genius are smaller despite their olfactory predominance; hence, blacks must really suffer from a paucity of intelligence.
Moreover, Bean did not neglect to push the corresponding conclusion for sexes. Within each race, women have relatively smaller genus than men.

Bean then continued his discourse on the relatively greater size of frontal vs. parietal and occipital (side and back) parts of the brain in whites. In the relative size of their frontal areas, he proclaimed, blacks are intermediate between "man (sic) and the orang-outang" (1906, p. 386).

Throughout this long monograph, one common measure is conspicuous by its absence: Bean says nothing about the size of the brain itself, the favored criterion of classical craniometry. The reason for this neglect lies buried in an addendum: black and white brains did not differ in overall size. Bean temporized: "So many factors enter into brain weight that it is questionable whether discussion of the subject is profitable here." Still, he found a way out. His brains came from unclaimed bodies given to medical schools. We all know that blacks have less respect for their dead than whites. Only the lowest classes of whites—prostitutes and the depraved—would be found among abandoned bodies, "while among Negroes it is known that even the better classes neglect their dead." Thus, even an absence of measured difference might indicate white superiority, for the data "do perhaps show that the low class Caucasian has a larger brain than a better class Negro" (1906, p. 409).

Bean's general conclusion, expressed in a summary paragraph before the troublesome addendum, proclaimed a common prejudice as the conclusion of science:

The Negro is primarily affectionate, immensely emotional, then sensual and under stimulation passionate. There is love of ostentation, and capacity for melodious articulation; there is undeveloped artistic power and taste—Negroes make good artisans, handicraftsmen—and there is instability of character incident to lack of self-control, especially in connection with the sexual relation; and there is lack of orientation, or recognition of position and condition of self and environment, evidenced by a peculiar bumptiousness, so called, that is particularly noticeable. One would naturally expect some such character for the Negro, because the whole posterior part of the brain is large, and the whole anterior portion is small.

Bean did not confine his opinions to technical journals. He published two articles in popular magazines during 1906, and attracted
sufficient attention to become the subject of an editorial in *American Medicine* for April 1907 (cited in Chase, 1977, p. 179). Bean had provided, the editorial proclaimed, "the anatomical basis for the complete failure of the negro schools to impart the higher studies—the brain cannot comprehend them any more than a horse can understand the rule of three. . . . Leaders in all political parties now acknowledge the error of human equality. . . . It may be practicable to rectify the error and remove a menace to our prosperity—a large electorate without brains."

But Franklin P. Mall, Bean’s mentor at Johns Hopkins, became suspicious: Bean’s data were too good. He repeated Bean’s work, but with an important difference in procedure—he made sure that he did not know which brains were from blacks and which from whites until after he had measured them (Mall, 1909). For a sample of 106 brains, using Bean’s method of measurement, he found no difference between whites and blacks in the relative sizes of genu and splenium (Fig. 3.3). This sample included 18 brains from Bean’s original sample, 10 from whites, 8 from blacks. Bean’s measure of the genu was larger than Moll’s for 7 whites, but for only a single black. Bean’s measure of the splenium was larger than Moll’s for 7 of the 8 blacks.

I use this small tale of zealotry as a curtain-raiser because it illustrates so well the major contentions of this chapter and book:

1. Scientific racists and sexists often confine their label of inferiority to a single disadvantaged group; but race, sex, and class go together, and each acts as a surrogate for the others. Individual studies may be limited in scope, but the general philosophy of biological determinism pervades—hierarchies of advantage and disadvantage follow the dictates of nature; stratification reflects biology. Bean studied races, but he extended his most important conclusion to women, and also invoked differences of social class to argue that equality of size between black and white brains really reflects the inferiority of blacks.

2. Prior prejudice, not copious numerical documentation, dictates conclusions. We can scarcely doubt that Bean’s statement about black bumpishness reflected a prior belief that he set out to objectify, not an induction from data about fronts and backs of brains. And the special pleading that yielded black inferiority from equality of brain size is ludicrous outside a shared context of a priori belief in the inferiority of blacks.
3. Numbers and graphs do not gain authority from increasing precision of measurement, sample size, or complexity in manipulation. Basic experimental designs may be flawed and not subject to correction by extended repetition. Prior commitment to one among many potential conclusions often guarantees a serious flaw in design.

4. Craniometry was not just a plaything of academicians, a subject confined to technical journals. Conclusions flooded the popular press. Once entrenched, they often embarked on a life of their own, endlessly copied from secondary source to secondary source, refractory to disproof because no one examined the fragility of primary documentation. In this case, Mall nipped a dogma in the bud, but not before a leading journal had recommended that blacks be barred from voting as a consequence of their innate stupidity.

But I also note an important difference between Bean and the great European craniometricians. Bean committed either conscious fraud or extraordinary self-delusion. He was a poor scientist following an absurd experimental design. The great craniometricians, on the other hand, were fine scientists by the criteria of their time. Their numbers, unlike Bean's, were generally sound. Their prejudices played a more subtle role in specifying interpretations and in suggesting what numbers might be gathered in the first place. Their work was more refractory to exposure, but equally invalid for the same reason: prejudices led through data in a circle back to the same prejudices—an unbeatable system that gained authority because it seemed to arise from meticulous measurement.

Bean's story has been told several times (Myrdal, 1944; Haller, 1971; Chase, 1977), if not with all its details. But Bean was a marginal figure on a temporary and provincial stage. I have found no modern analysis of the main drama, the data of Paul Broca and his school.

Masters of craniometry: Paul Broca and his school

The great circle route

In 1861 a fierce debate extended over several meetings of a young association still experiencing its birth pangs. Paul Broca (1824–1880), professor of clinical surgery in the faculty of medicine, had founded the Anthropological Society of Paris in 1859. At a meeting of the society two years later, Louis Pierre Gratiolet read a paper that challenged Broca's most precious belief: Gratiolet dared to argue that the size of a brain bore no relationship to its degree of intelligence.

Broca rose in his own defense, arguing that "the study of the brains of human races would lose most of its interest and utility" if variation in size counted for nothing (1861, p. 141). Why had anthropologists spent so much time measuring skulls, unless their results could delineate human groups and assess their relative worth?

Among the questions heretofore discussed within the Anthropological Society, none is equal in interest and importance to the question before us now. . . . The great importance of craniology has struck anthropologists with such force that many among us have neglected the other parts of our science in order to devote ourselves almost exclusively to the study of skulls, . . . In such data, we hoped to find some information relevant to the intellectual value of the various human races (1861, p. 139).

Broca then unleashed his data and poor Gratiolet was routed. His final contribution to the debate must rank among the most oblique, yet abject concession speeches ever offered by a scientist. He did not abjure his errors; he argued instead that no one had appreciated the subtlety of his position. (Gratiolet, by the way, was a royalist, not an egalitarian. He merely sought other measures to affirm the inferiority of blacks and women—earlier closure of the skull sutures, for example.)

Broca concluded triumphantly:

In general, the brain is larger in mature adults than in the elderly, in men than in women, in eminent men than in men of mediocre talent, in superior races than in inferior races (1861, p. 904). . . . Other things equal, there is a remarkable relationship between the development of intelligence and the volume of the brain (p. 188).

Five years later, in an encyclopedia article on anthropology, Broca expressed himself more forcefully:

A prognathous [forward-jutting] face, more or less black color of the skin, woolly hair and intellectual and social inferiority are often associated,