"Why do we measure mankind?": Marketing anthropometry in late-Victorian Britain

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Abstract:

In the late nineteenth-century, British anthropometrists attempted to normalize the practice of measuring bodies, as they sought to collate data about the health and racial makeup of their fellow citizens. As the country's leading anthropometrists, Francis Galton and Charles Roberts worked to overcome suspicion about their motives and tried to establish the value of recording physical dimensions from their subjects' perspective. For Galton, the father of the eugenics movement, the attainment of objective self-knowledge figured alongside the ranking of one's physique and faculties against established norms. The competitive tests at Galton's anthropometric laboratory were meant to help subjects identify their strengths and weaknesses, ultimately revealing their level of eugenic fitness. Roberts, on the other hand, saw the particular value of anthropometric data in informing economic and social policy, but capitalized on parents' interest in their children's growth rates to encourage regular monitoring of their physical development. While both Galton and Roberts hoped that individuals would ultimately furnish experts with their anthropometric data to analyse, they both understood that the public would need to be explained the practical purposes of such studies and to familiarise themselves with its methods. This article argues that while anthropometry did not become a fully domestic practice in this period, it became a more visible one, paving the way for individuals to take an interest in metrical evaluations of their bodies in the coming years.

Keywords: Anthropometry, Eugenics, Statistics, Medical reforms

In February of 1890, Francis Galton (1822-1911) published an article in *Lippincott's Magazine* entitled, "Why Do We Measure Mankind?"[1] The choice of a popular periodical for this work reflected his desire to explain the principles of anthropometry, the study of human measurements, to the general public. At the time, Galton was managing a specialist laboratory in South Kensington where trained surveyors recorded a plethora of physical measurements, from the dimensions of the limbs to the strength of

[1] Francis Galton, "Why Do We Measure Mankind?," *Lippincott's Monthly Magazine* 45 (1890): 236-241.

the senses.[2] In launching a public appeal, Galton hoped to convince volunteers to submit their bodies to the anthropometrists' callipers and tape. His inquisitive approach suggests there was nothing self-evident about the practice of human measurement in the late-nineteenth century. Instead, anthropometry entailed a set of largely unfamiliar techniques that needed to be justified to a population unused to considering themselves in quantitative terms. Professional anthropometrists such as Galton deliberately strove to explain to the public how to value the metrical data gleaned from their bodies. While their primary motive may have been to attract subjects for research related to racial or physical development, their appeals simultaneously helped to normalise basic self-measuring practices that would transform popular understandings of health and the body.

Prior to the mid-nineteenth century, there was comparatively little medical interest in recording physical dimensions within Britain. It was the rising preoccupation with physical culture, and its counterpart, physical degeneration, which encouraged the importation of anthropometry from its anthropological roots into the burgeoning nature/nurture controversy.[3] Concerns around degeneration proliferated by the closing decades of the century, fuelled by dramatic accounts of rising rates of stunted growth, alcoholism, venereal disease, and insanity that were particularly associated with urban poverty. Faced with increased military competition from the European continent and the United States, the British began to fear for their ability to defend their borders and commercial interests if their minds and bodies were weakening.[4] Similar anxieties attended the spread of the eugenics movement, based on Galton's theories of the 1860s that talent, character, and fitness were inherited. Armed with a nationalist agenda for public improvement, he favoured the reproduction of individuals whose superiority could

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[2] For a brief overview of the laboratory's operations, see Francis Galton, "Retrospect of Work Done at my Anthropometric Laboraotry at South Kensington," *The Journal of the Royal Anthropological Institute of Great Britain and Ireland* 21 (1892): 32-35.

[3] For a discussion of how anthropometric statistics were cited in debates over degeneration see Vanessa Heggie, "Lies, Damn Lies, and Manchester's Recruiting Statistics: Degeneration as an 'Urban Legend' in Victorian and Edwardian Britain," *Journal of the History of Medicine and Allied Sciences* 63 (2008): 178-216; Elise Juzda Smith, "Class, Health, and the Proposed British Anthropometric Survey of 1904," *Social History of Medicine* 28 (2015): 308-329; and Richard Soloway, "Counting the Degenerates: The Statistics of Race Deterioration in Edwardian England," *Journal of Contemporary History* 17 (1982): 137-164.

[4] For more on fin-de-siecle anxieties around degeneration, see Daniel Pick, *Faces of Degeneration: A European Disorder c1848-1918* (Cambridge: Cambridge University Press, 1989); J. Edward Chamberlin and Sander L. Gilman (eds.), *Degeneration: The Dark Side of Progress* (New York: Columbia University Press, 1985).

be established through statistical means.[5] Galton's eugenic interests meant his attraction to human measurement was perhaps inevitable, but anthropometry's appeal extended to medical campaigners who were more interested in health reforms than heredity. By the mid-1870s, a small coterie of statistically-oriented anatomists, physicians and anthropologists joined Galton in organizing a national survey "of Heights, Weights and other physical characters" for the British Association for the Advancement of Science.[6] This venture put him into contact with Charles Roberts (1835-1901), a surgeon who worked tirelessly to spread continental ideas about how and why the body should be numerically analysed. While Galton saw anthropometry primarily as an aid to eugenic assessments, Roberts saw the relevance of physical data to a wide variety of social and economic concerns, from the age children should commence factory labour to the amount of exercise required by a sedentary workforce. This article focuses on Galton and Roberts' efforts to promote measurement to the masses, and their encouragement of private data collection to enhance scientific knowledge.

Anthropometry in this period persisted as a specialist concern, but one that was entirely dependent on lay participation. Neither Galton's nor Roberts' anthropometrical aspirations could be realised without a broad consensus about the value of recording heights, weights, and other physical dimensions. Galton's attempt to relay the benefits of 'measuring mankind' described at the start of this article certainly conveyed this dependency. By learning more about one's physical proficiencies, Galton suggested that visitors to his laboratory would be able to rank themselves against their countrymen and learn which occupations they were best suited for. As vain self-assessments were replaced by the objective truths of hard data, subjects would be certain to receive "a good moral lesson from the results."[7] Although Galton's article ultimately communicated eugenic ideals, his framing helped to widen anthropometry's net by emphasizing the

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[5] For an overview of the early eugenics movement and Galton's role within it, see Stefan Kuhl, *For the Betterment of the Race: The Rise and Fall of the International Movement for Eugenics and Racial Hygiene* (Basingstoke: Palgrave, 2013), and Nicholas W. Gilham, *A Life of Sir Francis Galton: From African Explorer to the Birth of Eugenics* (Oxford: Oxford University Press, 2001).

[6] "Recommendations Adopted by the General Committee at the Bristol Meeting in August 1875," *Report of the Forty-Fifth Meeting of the British Association for the Advancement of Science, Bristol 1875* (London: John Murray, 1876): lii-lv, liv-lv.

[7] Galton, "*Why Do We Measure Mankind*," p.238 (note 1).

value of self-knowledge.[8]

The scientific initiatives discussed in this article constituted but one of several converging factors that encouraged the spread of anthropometric techniques. Scholarship on the history of health insurance has shown how actuarial assessments helped to cement the link between fitness and physique at the turn of the twentieth century.[9] Through this process excess weight in particular came to be redefined as a liability, and members of the British public grew more accustomed to using scales and monitoring their weight.[10] At the same time, the children's welfare movement promoted the practice of charting growth rates and evaluating young bodies against an ideal line of development.[11] Metrifying the body was thus consolidated in the new century as the health implications of height and weight became a household concern. The prehistory of this transition has received less attention, however, in part because physical measurement in the Victorian period were bound up in complex techniques that had little bearing on the kind of simple height and weight assessments that eventually caught on.[12] Yet professional anthropometrists of this period undoubtedly helped to legitimise measurement as a tool for evaluating health.

The opening section of this article examines the state of anthropometric

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[8] Frans Lundgren has particularly made this point in relation to Galton's Anthropometric Laboratory at the International Health Exhibition of 1884. Frans Lundgren, "The Politics of Participation: Francis Galton's Anthropometric Laboatory and the Making of Civic Selves," *British Journal for the History of Science* 46 (2013): 445-466.

[9] Dan Bouk, *How Our Days Became Numbered* (Chicago: University of Chicago Press, 2015); Amanda M. Czerniawski "From Average to Ideal: The Evolution of the Height and Weight Table in the United States, 1836-1943," *Social Science History*, 31 (2007): 273-296.

[10] Roberta Bivins and Hilary Marland, "Weighting for Health: Management, Measurement and Self-surveillance in the Modern Household," *Social History of Medicine* 29 (2016): 757-780; Ina Zweiniger-Bargielowska, "The Culture of the Abdomen: Obsesity and Reducing in Britain, circa 1900-1939," *Journal of British Studies* 44 (2005): 239-273.

[11] See for example D'Arcy Wentworth Thompson, *On Growth and Form* (Cambridge: Cambridge University Press, 1917). For an historical perspective on early metrical evaluations of children's health, see Carolyn Steedman, "Bodies, Figures and Physiology: Margaret McMillan and the Late Nineteenth-Century Remaking of Working-Class Childhood," in Roger Cooter (ed.) *In the Name of the Child: Health and Welfare, 1880-1940* (London: Routledge, 1992), pp.19-44; Lawrence T. Weaver, "In the Balance: Weighing Babies and the Birth of the Infant Welfare Clinic," *Bulletin of the History of Medicine*, 84 (2010): 30-57.

[12] A notable exception to this absence is the anthropometrist J. M. Tanner's study of human growth from antiquity to the twentieth century, although as his principal focus is on height—an area he helped to define through the development of the Tanner scale, charting growth in puberty—it forms but one part of this story. J. M. Tanner, *A History of the Study of Human Growth* (Cambridge: Cambridge University Press, 1981).

knowledge in the late nineteenth century, showing how it was primed to be converted from a technical enterprise into a popular one amidst contemporary anxieties over degeneration. It next turns to Charles Roberts' efforts to champion anthropometric methodology in the public sphere through his work linking physical data to issues of 'national interest' such as working conditions, military efficiency, and child welfare. The spread of medical statistics in this period bolstered Roberts' contention that physical measurements could decisively establish the welfare of the general population. If Roberts' ambitions were lofty, the technical complexity of his methods curtailed their adoption. Instead, as the final section reveals, it would be Francis Galton who finally managed to market anthropometry to the masses through public laboratories, printed appeals, and outright bribery. While neither Roberts nor Galton were able to normalise detailed anthropometric surveys that required trained supervision, their careers provide competing perspectives on why humankind became increasingly interested in their own measurements.

Demography and statistics

At the start of the nineteenth century, the recording of human measurements was a rarity in Britain, with the notation of heights for military recruitment being an occasional exception.[13] By the mid-century a limited impetus for measuring bodies came from anthropologists who endeavoured to construct a 'science of man' from the comparative study of racial traits. Yet with much of their attention directed at skeletal materials, the inspection of the living body was generally neglected. The case for anthropometry was ultimately established abroad. The Belgian mathematician Adolphe Quetelet (1796-1874) produced a convincing model for relating physique to categories such as age and class, and his statistical methods spurred the growth of the social sciences across Europe. In Britain, interest in Quetelet's ideas peaked in the late-Victorian era as anxieties over degeneration sparked an interest in gauging the fitness of the population.

While the uses of anthropometry fluctuated in the nineteenth century, some aspects remained constant. When a group of British practitioners were questioned in 1903 about their primary research interests, it emerged that one of anthropometry's oldest

[13] Tanner, *Human Growth*, pp.98-121.

uses was its most enduring. Much of their work concentrated on race.[14] The notion that physical dimensions could be considered representative of racial difference had been first posited in the late eighteenth century, and was the chief expression of racial science in the nineteenth. The methods of comparative anatomy were employed to identify the 'varieties of man' found across the globe, and entailed a focus on skeletal structures, particularly the skull. Slight variations in cranial form were detected through measurement, and the invention of detailed indices and precision instruments allowed physical anthropologists to echo the positivism of the exact sciences. The perception that skeletal structures were the most meaningful designators of racial type meant that there was little incentive for anthropologists to measure living bodies, either at home or abroad.[15] Instead, the collection of demographic data offered a basis for quantifying health in live subjects. Anatomists, who had long been interested in human measurement as a means of comparing skeletal types, gradually came to consider whether size was a product of both nature and nurture.[16]

The rise of medical statistics can be tied to the positivist drive towards objectivity in the nineteenth century, which saw numbers being cited as the arbiters of public health matters.[17] In Britain, the General Register Office (GRO) was established in 1834 to record vital statistics, and its 'life tables' offered a national perspective on morbidity and mortality rates.[18] Sanitarians such as Edwin Chadwick (1800-1890) and William Farr

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[14] "Anthropometric Investigations in Great Britain and Ireland—Report," in *Report of the Seventy-Third Meeting of the British Association for the Advancement of Science*, *Southport 1903* (London: John Murray, 1904), pp.389-401.

[15] Contemporary perspectives on the anthropological neglect of live subjects may be found in John Beddoe, "On the Headform of the Danes," *Memoirs Read Before the Anthropological Society of London* 3 (1867-1869): 378-383, 378 and Ales Hrdlicka, "Anthropometry B: Introduction to Anthropometry," *American Journal of Physical Anthropology*, 2 (1919): 175-194. On the difficulties of live measurement during fieldwork, see Warwick Anderson, "Hybridity, Race, and Science: The Voyage of the Zaca, 1934-1935," *Isis* 103 (2012): 229-253.

[16] It is notable that many prominent physical anthropologists were anatomists by trade, including William Turner (1832-1916), Professor of Anatomy at the University of Edinburgh, and Alexander Macalister (1844-1918), Professor of Anatomy at the University of Cambridge.

[17] J. Rosser Matthews, *Quantification and the Quest for Medical Certainty* (Princeton: Princeton University Press, 1995); Gérard Jorland, Annick Opinel, and George Weisz (eds.), *Body Counts : Medical Quantification in Historical and Sociological Perspectives* (Montreal : McGill-Queen's University Press, 2005); Ulrich Tröhler, "'To Improve the Evidence of Medicine': Arithmetic Observation in Clinical Medicine in the Eighteenth and Early Nineteenth Centuries," *History and Philosophy of the Life Sciences* 10 (1988): 31-40.

[18] Edward Higgs, "The Annual Report of the Registrar General, 1839-1920 : A Textual History", in Eileen Magnello and Anne Hardy (eds.), *The Road to Medical Statistics* (Amsterdam : Rodopi, 2002), pp. 55-76 ;

(1807-1883) helped to consolidate the use of quantitative data in their public health endeavours, and Parliament increasingly turned to statistical evidence when considering medical reforms.[19] Yet the British could not lay claim to any particular innovation when it came to either the development of statistical techniques or their medical applications. Farr, who organised the GRO's registration data, was inspired by the 'numerical method' of the French epidemiologist Pierre-Charles-Alexandre Louis (1787-1872), and the 'social physics' of Adolphe Quetelet. It was in response to Quetelet's demographic work that the both the Statistical Section of the British Association and the Statistical Society of London were launched in the early 1830s.[20] The importance of quantitative methods to both the development of the sciences and social sciences in the nineteenth century has been well documented.[21] Yet if data collection was increasingly pivotal to health policies, it was a process in which the general population played a passive role. Births and deaths were registered without any personal benefit; it was in the evaluation of aggregate figures that such information became meaningful for theories and legislation. However transformative these developments were, they were entirely in the domain of experts; the greater part of the public was not privy to where their information went or how it was used.

Anthropometric analysis, which entailed a thorough physical examination, demanded far more from its subjects. Quetelet emerged as the chief architect of this practice—while his emphasis on the normal ('bell') curve of distribution proved influential across disciplines, his study of heights and weights offered particular support to those seeking to correlate health to material conditions. A mathematician by training, Quetelet became absorbed in the study of human measurements in 1831 when he

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Simon Szreter, "The GRO and the Public Health Movement in Britain, 1837–1914," *Social History of Medicine*, 4 (1991): 435–63.

[19] Lawrence Goldman, *Science, Reform and Politics in Victorian Britain: The Social Science Association, 1857-1886* (Cambridge: Cambridge University Press, 2002), pp.174-200.

[20] Quetelet was elected a foreign member of the Statistical Society of London and credited as a founder. Tanner, *Human Growth*, p.122.

[21] See for example, Ian Hacking, *The Taming of Chance* (Cambridge: Cambridge University Press, 1990); Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press, 1995); Simon Schaffer, "Metrology, Metrication, and Victorian Values," in Bernard Lightman (ed.), *Victorian Science in Context* (Chicago: University of Chicago Press, 1997), pp.438-474.

investigated how the heights and weights of schoolchildren increased with age.[22] This prompted further investigations into physique, much of it related to the adult population. In his first major anthropometrical treatise, *Sur l'homme et le développement de ses facultés* (*On Man and the Development of his Faculties*, 1835), he attempted to delineate the average dimensions of men and women at different ages so that they might be fixed for medical, moral and artistic purposes.[23] As he explained in the preface to the 1842 English edition, it was only by establishing the "the type constituting the normal and healthy condition" that the anomalous effects of disease could be recognised.[24] The book's entire second section was devoted to a description of heights and weights in different age and sex categories, alongside sundry measurements of strength, pulse and the rate of inspiration.[25] It also demonstrated how the height-to-weight ratio varied with age, presenting a table of averages that could be used to designate an individual as unusually "heavy in proportion to his stature."[26]

Quetelet's exploration of the concepts of normality and deviance was 'intellectual' and 'moral' as well as physical: he included a long analysis of criminal and disorderly behaviours—from drinking to duelling—and compared rates of crime and insanity in different European countries.[27] The implications were clear: statistics offered a means of determining the literal and symbolic 'health' of nations, a focus that led him to focus on internal population dynamics rather than international and racial comparisons. Quetelet's conclusions were always drawn on the basis of averages; his approach particularly emphasised the 'mean' as an accurate representation of any collective quality. When it came to physique, the identification of *l'homme moyen* ('the average

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[22] Adolphe Quetelet, "Recherches sur le poids de l'homme aux différens âges," *Nouveaux mémoires de l'Académie Royale des Sciences et Belles-Lettres de Bruxelles* 7 (1832): 1-44; Adolphe Quetelet, "Recherches sur la loi de la croissance de l'homme," *Nouveaux mémoires de l'Académie Royale des Sciences et Belles-Lettres de Bruxelles* 7 (1832): 1-32.

[23] Quetelet expanded on his studies of schoolchildren to create height and weight tables for males and females into adulthood. Adolphe Quetelet, *Sur l'homme et le développement de ses facultés* (Paris: Bachelier, 1835), pp.34-60.

[24] M. A. Quetelet, *A Treatise on Man and the Development of His Faculties*, trans. into English by unknown (Edinburgh: William and Robert Chambers, 1842), p.vi.

[25] Quetelet, *Sur l'homme*, pp.1-90.

[26] The height to weight ratio that Quetelet used divided body mass by the square of the body height, and was known as the 'Quetelet index' before the term 'body mass index' took precedence. Quetelet, *Treatise on Man*, p.66.

[27] Quetelet, *Sur l'homme*, pp.97-249.

man') had the contentious side effect of designating outliers, such as the undersized or disabled, as aberrant. In this sense, it is unsurprising that Galton would later seize on the potential for anthropometry to reveal the 'unfit' within society.[28] For other British statisticians, it was Quetelet's method of metrifying social phenomena that offered the most potential; his epigram "numbers rule the world" became programmatic.[29]

For medical purposes, Quetelet's anthropometric studies offered an enduring means of charting healthy development. While his mapping of heights and weights along a normal curve gave an impression of constant growth that proved misleading (rapid increases during puberty were more irregular than his graphs implied), his numerical approach was widely adopted.[30] His contributions to anthropometry were not only statistical, but also encompassed the practical business of physical measurement. Quetelet's 1870 text *Anthropométrie* included a list of no fewer than 82 measurements, with a table of mean values provided for males and females at birth and at age 30.[31] These ranged from the length of the nose and ear, to the circumference of the neck and hips, to the size of the hands and feet. As Quetelet believed that most individuals in each age bracket conformed closely enough in size, he only measured ten subjects in each category to produce his representative figures.[32] He did not explain who his sample subjects were or under what conditions they agreed to be measured, but noted that they were chosen for being "regularly formed"—a selection bias which tautologically justified his use of small data sets. Given the comprehensive naked examinations he proposed, it may well have been difficult to secure broader participation for these studies. As it was, the only named subjects in his anthropometric work were his two children, Ernest and

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[28] Recent scholarship has shown how Quetelet and Galton's championing of the 'average man' as an exemplar helped to define disabilities as 'abnormal' in the nineteenth century. See Peter Cryle and Elizabeth Stephens, *Normality: A Critical Genealogy* (Chicago: University of Chicago Press, 2017), pp.212-255; Lennard J. David, "Constructing Normalcy: The Bell Cuver, the Novel, and the Invention of the Disabled Body in the Nineteenth Century," in Lennard J. David (ed.) *The Disability Studies Reader*, 2nd ed. (New York: Routledge, 2006), pp.5-6.

[29] A. Quetelet, *Instructions populaires sur le calcul des probabilités* (Brussels: Tarlier and Hayez, 1828), frontispiece.

[30] J. M. Tanner has critiqued Quetelet's over-reliance on the normal curve and how it skewed his growth studies—a point that was also made by some of his contemporaries, including Francis Galton. Tanner, *Human Growth*, pp.130-140.

[31] Adolphe Quetelet, *Anthropométrie, ou mesure des diffèrents facultés de l'homme* (Brussels: C. Muquardt, 1871), pp.196-199.

[32] Quetelet, *Anthropométrie*, pp.23-24.

Isaure, and two of Isaure's friends, whose growth he was able to monitor from youth to adolescence.[33] Despite his limited samples, Quetelet was able to draw novel conclusions about the progress of height and weight during maturity owing to the near absence of pre-existing research on the topic.

That Quetelet's anthropometric analyses were deemed radical is indicative of the lack of any tradition of measuring the masses when his career began. Even in the context of medical examinations, patients were not asked to stand on a scale or up against a measuring stick. While interest in Quetelet's ideas meant that anthropometric surveying became more common by the mid-nineteenth century, prospective subjects often remained ignorant of the process.[34] When the Bristol-based physician and anthropologist John Beddoe (1826-1911) sought to obtain comparative measurements of the population in the 1860s for his pioneering study on "the stature and bulk of man in the British Isles", local doctors informed him that their patients would be wary of requests for even basic measurements.[35] A fear that data would be used for conscription warranted suspicion at a time when only the army was known to record heights. Further difficulties arose because few physicians owned a weighing apparatus, and "heel size" had to be subtracted from height assessments as patients would not readily remove their shoes.[36] Beddoe was able to send a scale around Britain, but lamented the reluctance of his countrymen to be measured, which he attributed to superstition, carelessness, political feeling, and stupidity.[37] Although his intention as an anthropologist had been to establish a link between physical traits and racial origin in different parts of the country, his published results on 1868 ultimately revealed that physique was more closely connected to occupation.[38]

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[33] Quetelet, *Anthropométrie*, p.185.
[34] Some notable forays into human measurement took place in the wake of Quetelet's first publications, including the measurement of British factory children for a Royal Commission in 1833, and the systematic recording of Union soldiers' statistics during the American Civil War. See *Royal Commission on Employment of Children in Factories: First Report* (London: House of Commons, 1833); John S. Haller, "Civil War Anthropomery: The Making of a Racial Ideology," *Civil War History* 16 (1970): 309-324.
[35] See for example "Letter from George Duncan to John Beddoe, 5 December 1866," John Beddoe Papers, University of Bristol Special Collections, DM2/3.
[36] John Beddoe, "Instructions for measuring natives of the district (undated 1860s)," John Beddoe Papers, University of Bristol Special Collections, DM2/5
[37] John Beddoe, "On the Stature and Bulk of Man in the British Isles," *Memoirs Read Before the Anthropological Society of London* 3 (1867-1869): 384-573, 389.
[38] Beddoe, "*Stature and Bulk*," p.561 (note 37).

When the Anthropological Section of the British Association organised a national anthropometric survey from 1875 to 1883, its organizing committee (which included Beddoe) also gravitated towards measurements that would help to "establish a law of growth and development" as well as to encourage periodic record-keeping that would help solve "many difficult problems in relation to race, occupation, climate, culture, &c."[39] This intermingling of intentions shows that there was no single motivating purpose for 'measuring mankind' in the late nineteenth century. However, in its final report of 1883, the Anthropometric Committee notably structured its conclusions around social categories rather than race.[40] This approach reflected the growing application of measurements to public health matters, as well as the ascendency of one of the most pressing medical questions of the day: whether or not the British population was degenerating in physique. While the Committee's statistics effectively showed the relationship between build and occupation, social stability was such that the relative influence of heredity and environment in this process went unanswered. Certainly, the two figures spearheading the work, Francis Galton and Charles Roberts, remained split on the issue.

As the following sections illustrate, Galton and Roberts both played a part in reorienting the Anthropometric Committee's work towards class issues. As their interests shaped the survey, the practical experience it provided in turn influenced their subsequent anthropometrical endeavours. While the Committee obtained measurements from more than 9,000 people, this was no triumph of volunteerism; instead, only subject populations such as schoolchildren, soldiers, and postal workers were examined with the assistance of their superiors.[41] Anthropometric studies were exceedingly difficult to recruit for because they offered no benefits to participants while necessitating invasive and intimate contact. It may have been obvious to anthropometrists why the mass recording of human measurements was essential for health assessments, but the statistical approach they

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[39] "Report of the Anthropometric Committee," in *Report of the Forty-Ninth Meeting of the British Association for the Advancement of Science, Sheffield, 1879* (London: John Murray, 1879), p.175.
[40] "Final Report of the Anthropometric Committee," in *Report of the Fifty-Third Meeting of the British Association for the Advancement of Science, Southport 1883* (London: John Murray, 1884), pp.253-300. For the significance of the Anthropometric Committee's use of class categories, see Simon Szreter, *Fertility, Class and Gender in Britain, 1860-1940* (Cambridge: Cambridge University Press, 1996), pp.130.
[41] "Report of the Anthropometric Committee," in *Report of the Fifty-Second Meeting of the British Association for the Advancement of Science, Southampton 1882* (London: John Murray, 1883), p.225.

employed devalued individual contributions in favour of broad generalisations. If they wanted to extend the reach of anthropometric analysis, practitioners increasingly recognised the need to attract volunteers by actively selling them on the merits of being measured.

Questions of national importance

One of the most active anthropometrists of the late nineteenth century, Charles Roberts drew particular attention to the social and economic relevance of human measurements. Roberts' reputation has largely rested on his authorship of the Anthropometric Committee's final report, a work so authoritative it became the "criterion by which other collections of data were judged."[42] Despite this success, his ambitions were not satisfied; he believed that physical data should be collected at regular intervals to serve the state. To this end he published pieces in both the popular and medical press connecting anthropometry to a broad array of social concerns, from child labour practices to the on-going degeneration debate. He also produced a technical manual to promote Quetelet's measuring techniques, and partially anticipated the domestic practice of measuring children's growth rates. While Roberts always envisaged anthropometry as the purview of specialists, he recognised that its viability depended on the support of the British public.

Originally hailing from Yorkshire, Roberts trained at St George's Hospital in London, where he assisted Henry Gray in the production of his monumental *Anatomy of the Human Body* (1858).[43] After a period working at the Yorkshire County Hospital and Country Prison, he returned to London as an Assistant Surgeon at the Victoria Hospital for Sick Children. It was there that he developed an interest in children's growth rates, which expanded into a broader concern with charting the relationship between physique

[42] S. Rosenbaum, "100 Years of Heights and Weights," *Journal of the Royal Statistical Society, Series A*, 151 (1988): 276-309, 278. See also Szrerter, *Fertilty, Class and Gender*, pp.132-148.
[43] There is scant information about Roberts' early life available, although a sketch may be found in his obituary in the *British Medical Journal*. "Charles Roberts, F.R.S.C.," *The British Medical Journal* (January 18, 1902), p.181.

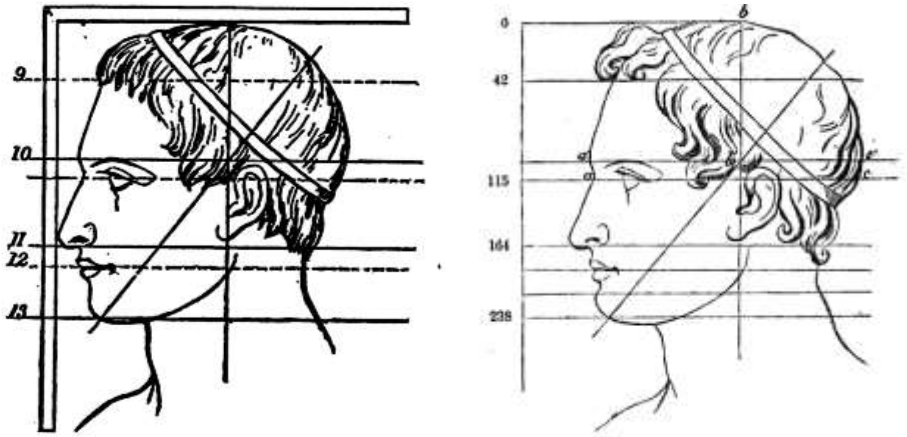

Figure 1: Head mesurements from Robert's *Manual of Anthropometry* (left), copied from Quetelet's *L'Anthropométrie* (right). The horizontal lines demarcate key facial features, with the vertical axis providing a guide to recording (at least) five distinct measurements, correlated to textual descriptions, between them.
[Charles Roberts, *Manual of Anthropometry* (London: J. & A. Churchill, 1878); Adolphe Quetelet, *L'Anthropométrie, ou mesure des différents facultés de l'homme* (Brussels: C. Muquardt, 1871)]

and health. In 1871, around the same time that he became a Fellow of the Royal College of Surgeons, he began developing his expertise in human measurement. This change of direction was precipitated by an encounter with Quetelet's writings, and his conversion was absolute. When Roberts failed in an attempt to interest publishers in a translation of Quetelet's 1870 treatise *Anthropométrie*, he penned *A Manual of Anthropometry* as an homage in 1878.[44] Although he faced criticism from the medical press for replicating many of Quetelet's ideas and illustrations without advancing an original thesis, he defended this quasi-plagiarism by insisting that measuring processes had to be uniform across nations.[45] A comparison of images such as the classical bust they both used to illustrate facial measurements reveals not only Roberts' close adherence to Quetelet's work, but also the level of quantitative detail their approach entailed (**figure 1**). By propounding a standard system of measurement, Roberts envisaged meaningful data comparisons amongst practitioners and across borders.

[44] Charles Roberts, "Anthropometry," *The Lancet* (January 11, 1879): 66-67, 66.
[45] For a critique of Roberts' *Manual*, see "Reviews and Notices of Books," *The Lancet* (January 4, 1879), pp.15-18. Roberts' explanation of his close adherence to Quetelet's system can be found in Charles Roberts, "Practical Anthropometry," *The British Medical Journal* (April 7, 1888): 740-741, 741.

As Roberts noted, the collection of human measurements was being more actively pursued across the United States and Europe than in Britain.[46] It would only be through sustained collective effort that enough data would be gathered to shed light on Britain's social problems. Diverging from Quetelet, he believed that population samples needed to be far larger than ten individuals to offer meaningful results, and personally measured thousands of individuals to this end. Roberts' conviction that labour and welfare policies ought to be guided by scientific exactitude conveyed a characteristically positivist outlook. In an age when numerical evidence increasingly underpinned medical practice, this approach was unquestionably timely. Unlike many of his British colleagues, who chiefly saw anthropometry as an aid to racial anthropology, Roberts seized on the wider possibilities of Quetelet's growth studies. In particular, he became interested in gauging the effects of external stimuli on the body, arguing that such information might resolve whether the population "looked at from a physical point of view, is stationary, improving, or degenerating."[47] Metrical analyses persuaded him that any signs of deterioration were attributable to environmental factors, and he would routinely cite statistics to support this claim. Until his death in 1901 he evinced a missionary zeal to convince statisticians, physicians, and lawmakers to accord human measurements a primary role in resolving public health debates. While Roberts never denied the significance of anthropometry to racial research, he thought the practice could more fruitfully be applied to "questions national importance."[48]

Roberts' familiarity with paediatric medicine meant that his first foray into practical anthropometry came in connection with a local government inquiry into the effects of factory labour on children's physique. In 1872 and 1873, he weighed and measured 'many thousands' of factory children employed in the manufacturing centres of Lancashire and Cheshire, and compared the results with those of children living in rural districts of West Yorkshire.[49] While the study was intended to inform changes to the age

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[46] Charles Roberts, "Anthropometry as Applied to Social and Economic Questions," *The Humanitarian* 3 (1893): 422-429, 426.
[47] Roberts, "*Anthropometry as Applied*," p.427 (note 46).
[48] Roberts, "*Anthropometry as Applied*," p.426 (note 46).
[49] Roberts was employed as one of five medical surveyors charged with recording children's height, weight and chest measurements, as well as to examine them for signs of dental problems, rickets, scrofula, skin diseases and flat foot. See J. H. Bridges and T. Holmes, *Report to the Local Government Board on*

and working conditions of child labourers, for Roberts it represented a prime opportunity to test the theory that urban migration and industrialisation were contributing to a national decline. Although he found that the factory children were at a disadvantage compared with their agricultural brethren, with "bodies too old for their heads (and ages)", he concluded that their poorer physique was due to reversible social influences rather than progressive decay.[50] When he compared the measurements of factory children across time, using weight statistics recorded in 1833, his findings validated this optimism: the modern average boy labourer was heavier and healthier than his predecessor. Roberts deliberately presented this metrical evidence, arrayed in neat tables, when counteracting claims of urban decline to both the British government and the wider medical community.[51] In an expanded report presented the Statistical Society in London, he further demonstrated how medical inspections could yield data to determine the optimal size at which boys could commence factory labour—arguing that age was too arbitrary an indicator given the unpredictability of growth spurts.[52]

At a time when child welfare was a growing concern of the state, Roberts recommended that anthropometric data, rather than sentiment, be the arbiter of decisions regarding their rights and protections. The principle that "that science rather than morals" should guide public policies informed many of Roberts' later interventions into parliamentary inquiries—from establishing the age at which girls attained sexual maturity in the context of the 1885 Criminal Law Amendment Bill, to arguing for improved physical recreation in secondary schools for the 1895 Royal Commission on Secondary Education.[53] Underlying all these contributions was the sense that anthropometry should

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Proposed Changes in Hours and Ages of Employment in Textile Factories (London: Eyre and Spottiswoode, 1873), p.45.

[50] Charles Roberts, "The Physique of Factory Children," *The Lancet* (August 21, 1875): 274-275, 275.

[51] In addition to publishing his evidence in *The Lancet* Roberts forwarded his findings from the Local Government Board investigation to the Parliamentary inquiry on factory work. See Charles Roberts, "The Physique of Factory Children," *The Lancet* (August 21, 1875), pp.274-275; Charles Roberts, "On the Physique of Factory Children," in *Report, Appendix, and Index*, Vol. I of *Report of the Commissioners Appointed to Inquire into Working of the Factory and Workshops Acts* (London: Eyre and Spottiswoode, 1876), pp.181-182.

[52] Charles Roberts, "The Physical requirements of Factory Children," *Journal of the Statistical Society of London* 39 (1876), 681-733.

[53] See Charles Roberts, "The Physical Maturity of Women," *The Lancet* (July 25, 1885): 149-150, 149; and Charles Roberts, "Memorandum on the Medical Inspection of, and Physical Education in, Secondary Schools," in *Memoranda and Answers to Questions*, Vol. V of *Royal Commission on Secondary Education* (London: Eyre and Spottiswoode, 1895), pp.352-374.

be a lynchpin of evidence-based legislation. More than any other anthropometrist, Roberts believed that human measurements should be recorded for the public good.

Roberts's work on factory children in the 1870s certainly reinforced his environmental determinism, which in turn informed his support of social reforms amidst the nation's rising health crisis. In the closing decades of the nineteenth century, high morbidity and mortality rates combined with poor military recruitment figures to produce waves of uncertainty about the state of the 'national physique.' For Roberts, this was precisely the sort of issue that was ripe for anthropometric investigation. A self-described 'sanitarian', he became convinced that while a certain amount of decline was apparent amongst the urban poor, it was always attributable to material deprivation rather than hereditary decay. From his earliest anthropometric studies onwards, his opposition to the degeneration thesis was ground in statistical evidence. As he explained to a general readership in the *Fortnightly Review*, the "physical condition of the masses" was dependent on "food, exercise, and sanitary surroundings", and with steady improvements in these areas there were "good grounds for congratulating ourselves on the future of our national physique."[54] In a meticulous deconstruction of the data that had previously been cited to support the hereditarian position, Roberts noted that morbidity rates were falling in most categories, and that physical defects were becoming less common. As he had done in his factory study, quantifiable changes in weights and heights across decades were used to prove that the average British body was under no threat whatsoever.[55] For Roberts, measurements were not only an objective tool for resolving the degeneration debate, they also offered a justification for his preferred solutions to the problem: improving the diet, exercise and sanitary surroundings of the poor and regulating the conditions under which children were raised, educated, and made to toil. Only the lack of extensive anthropometric data prevented him from making these points more effectively. For Roberts, this lacuna was seemingly a product of British ignorance of not only *why* humans should be measured, but also *how*.

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[54] Charles Roberts, "The Physical Condition of the Masses," *Fortnightly Review* 42 (1887): 482-490, 490.
[55] Roberts used recruitment figures from the 1860s to show the favourable condition of the British population in the 1880s. See Roberts, "*Physical Condition*," pp.484-486 (note 55).

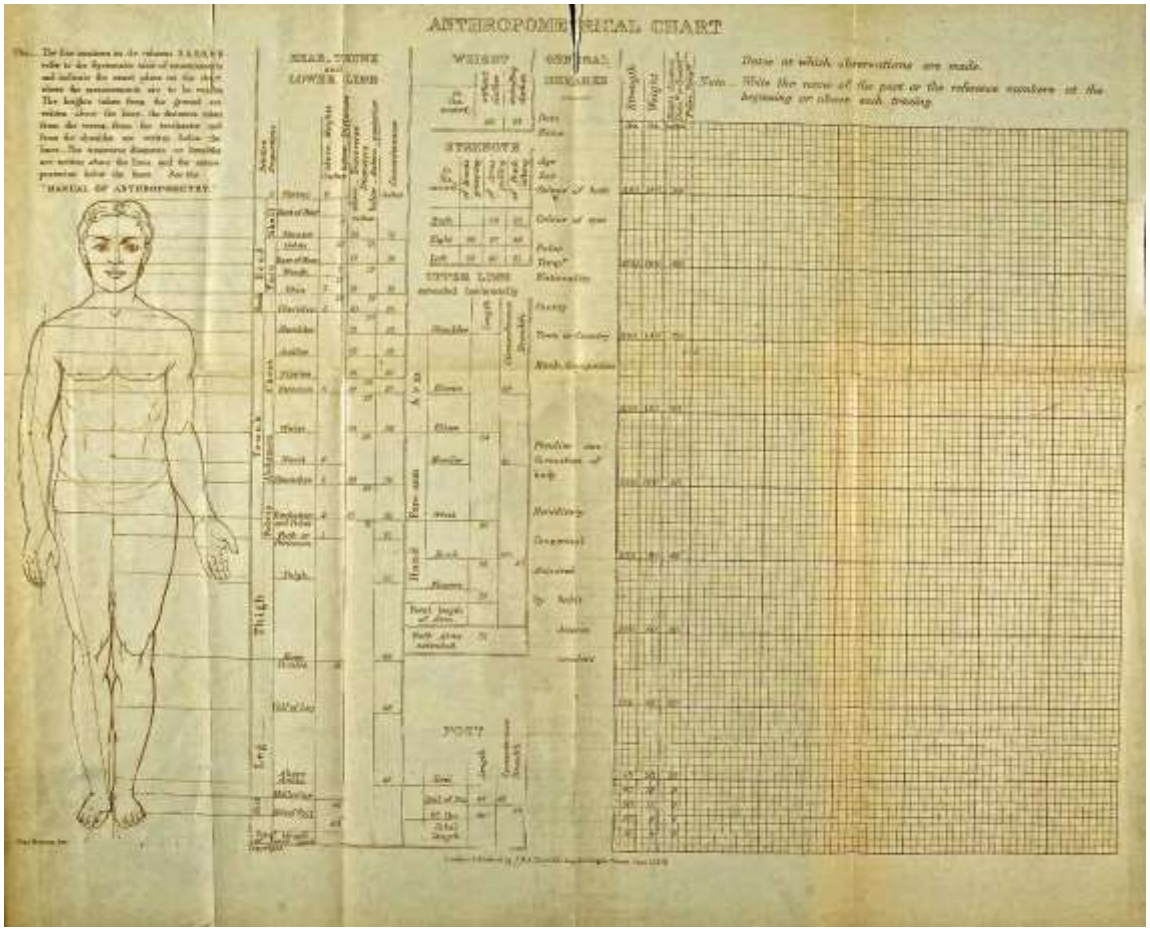

Figure 2: Anthropometric Chart [Charles Roberts, *Manual of Anthropometry* (London: J. & A. Churchill, 1878)]

Roberts' 1878 *Manual of Anthropometry* was the first comprehensive guide to measuring the body written in English.[56] Despite his dependency on Quetelet's similar work, he pared his list of measurements down to 61 from Quetelet's 82—declaring these sufficient for the "proper study of the subject."[57] Although Roberts implied in the text's introduction that some of these would be important for "the diagnosis of many diseases, accidents, and deformities of the body" he offered no explanation for the inclusion of specific measurements such as "the length of the middle finger from the knuckle to the tip of the finger", "the circumference of the leg above the ankle joint" or "the height from the sole of the foot to the navel."[58] He, did however, highlight the height/weight index

[56] Charles Roberts, *A Manual of Anthropometry* (London: J. & A. Churchill, 1878).
[57] Roberts, *Manual*, p.vi.
[58] Roberts, *Manual*, p.2.

championed by Quetelet, and provided practical information about instruments and procedures to ensure a uniformity of methods. Roberts explained that he had experience compiling a large number of figures recorded by disparate institutions and regretted the "imperfection" of these records; his goal was to ensure that results from different observers could be compared and combined in an effective manner.[59]

One of the more innovative elements in the book was the inclusion of a large, fold-out chart on the inside cover that its owners could fill in with the measurements they recorded of themselves (or others), with the object of monitoring their physical changes over multiple years (**figure 2**). This growth chart preceded the graphs used to measure children's development by well over a decade, and represents the earliest example of one designed for individual use in Britain that I have been able to identify.[60] Unlike later charts that were intended for heights and weights, Roberts envisioned that any combination of his list of 61 different measurements could be mapped onto the same graph, with unique numbered codes to match tracings to the relevant figure. To help individuals unfamiliar with the more unusual measurements, a drawing of a naked male body was included with the intervals clearly marked, albeit with genitals absent—perhaps demonstrating that the figure could also guide the measurement of women; or simply to avoid including explicit material on a graph intended for general use. Despite the guidelines provided, the complexity of Roberts' design would likely have appeared daunting to anyone unfamiliar with anthropometric methods, including those procuring the book for home use. Certainly most later charts were less flexible in guiding users to map only their heights and weights against age, but they were undoubtedly easier to read and use. Managing his own expectations of useful figures against the public's abilities and interests was a constant tension within Roberts' various efforts to promote human measurement.

While the manual itself was largely intended as a reference work to encourage professionals such as physicians, military recruiters, and schoolmasters to standardise their measuring techniques, Roberts also proposed to issue the chart separately for private

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[59] Roberts, *Manual,* p.vi.
[60] For more on the introducion of children's growth charts in the 1890s, see Weaver, "*In the Balance*," pp.46-49 (note 11).

use.[61] Although he generally favoured the collection of anthropometric data by trained surveyors to improve scientific and national knowledge, his *Manual* also recommended that parents could adopt a chart for each of their children to "record from year to year on their birthdays some of the principal proportions of the body." A single chart could cover anywhere from eight to sixteen years, enough to cover the entire growth span from infancy to maturity. Continual vigilance in recording figures on an annual basis would help resolve the questions that motivated Roberts' entire promotion of anthropometry: "to determine the influence of race, climate, food, occupation, and sanitary surroundings on the development of the human body."[62] It was telling that he framed his advice to parents by stating that the data they recorded would be "exceedingly interesting… to the individual and to Science."[63] The implication was that any data accrued in the home should be shared beyond it. Roberts certainly recognised the potential value of measurements to the individual or family it concerned, but his insistence on precision and uniformity suggests that the preferred destination for any information generated by the *Manual* was a statistician such as himself.

Given his advice about procuring specialised equipment such as callipers and a dynamometer, Roberts undoubtedly envisaged his *Manual* as a professional aide more than a home companion. The long and involved list of measurements provided reinforces this impression, although he noted in the book's preface that it was written as a shorter version of a planned (but never published) definitive text, *Physical Development and Proportions of the Human Body*. It was hoped the smaller *Manual* would incite wider interest in anthropometric methods, which Roberts admitted were "much neglected."[64] Yet he never paused to consider why this might be the case, nor bothered to address the difficulties of attracting volunteers for such studies.[65] Certainly the complexity of Roberts' complete examination, like Quetelet's, was unlikely to evoke much enthusiasm. The 'ideal' survey described in his *Manual* not only entailed recording dozens of

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[61] I have been unable to ascertain if separate copies of the chart were ever produced. Roberts, *Manual*, p.viii.
[62] Charles Roberts, "The Proportions of the Human Figure," *The Magazine of Art* 4 (1881), p.467.
[63] Roberts, *Manual*, p.viii.
[64] Roberts, *Manual*, p.v.
[65] For more on the popular reluctance to being measured in late-Victorian Britain, in part owing to the associations of such practices with military recruitment and criminality, see Juzda Smith, "*Class, Health*," pp.322-328 (note 3).

measurements, but stipulated they be taken off the completely naked body. Roberts maligned the "absurdity and false modesty" that made this impossible in the course of public surveys, but noted that children could be examined in their natural state without any fuss.[66] As Roberts largely examined children in hospitals, factories, and schools, it is possible he had little experience with autonomous adult subjects or the limits of their tolerance. Certainly, when he became secretary of the British Association's Anthropometric Committee in 1878, he was persuaded that in institutions such as hospitals, prisons, and the military, heights and weights were all that could be reasonably recorded.

Despite his spirited marketing of measurement in all its forms, Roberts would constantly have to temper his aspirations for anthropometry given its low visibility in late-Victorian Britain. His letters to the medical press reveal a sense of isolation in trying to normalise anthropometric surveying. He bemoaned his colleagues' lack of interest in his endeavours, and complained that anthropometry's promise would not be realised until medical school accepted its importance "as equal at least to […] comparative anatomy, chemistry, and botany, and indeed, as superior to them in its education value" given its numerical foundations.[67] Roberts' unwavering belief in anthropometry's potential to transform the nation was not matched by an ability to install measurement as a fixture of medical practice or routine state investigation. Not only was his own comprehensive approach seemingly too impractical to fully implement, but 'national interest' was apparently a less compelling inducement to be measured than self-interest—as Galton's later success demonstrates.

Roberts' work alongside Galton on the British Association's anthropometric survey from 1878 to 1883 arguably came closest to realising his vision for human measurement. As the Committee's secretary, he designed a hierarchical system of social classes, organised "according to their Social Position and Sanitary Influences", to evaluate of the physique of children and their fathers.[68] Simon Szreter has described

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[66] Roberts, *Manual*, p.46.
[67] Roberts, "*Practical Anthropometry*," p.740 (note 45).
[68] Roberts had already recommended dividng subjects by occupational categories in his anthropometric manual of 1878, which was published just before he joined the BAAS Anthropometric Committee. See Roberts, *Manual*, pp.42-43.

Roberts' measurement of groups such as bankers, shopkeepers, soldiers, miners, artisans, and factory workers as the first 'scientific' effort to analyse class in the United Kingdom.[69] Roberts' interest in social categories arguably came from Quetelet, but he was unusual in Britain for deemphasising race within anthropometric studies. In charting the disparity in heights and weights between the country's richest and poorest people, his report revealed how social and sanitary conditions imprinted themselves on the body. Yet because he shared Quetelet's vision of the natural regularity of types (within a 'race'), Roberts saw no reason why every British child could not attain the healthiest possible adult size given the right circumstances.

In the aftermath of the survey, Roberts strove to communicate to both legislators and the public how anthropometric data could help identify the factors that favoured optimal physical development. In the years preceding his death, he campaigned for children to be given ample opportunities for play and sport in schools to nourish their growth, and recommended the routine monitoring of their proportions.[70] These ideas were slightly before their time—several of the Liberal reforms of the early-twentieth century, including the institution of school medical inspections, rested on the same rationales. Certainly his creation of individual growth charts provided a model for both their private and public use in subsequent years. Yet in his lifelong adoption of an interventionist position, Roberts found himself at odds with the country's other leading anthropometrist, Francis Galton, with whom he had collaborated on the British Association's survey. Given his full confidence in the reversible effects of physical decline, it is notable—but not surprising—that Roberts took little interest in Galton's subsequent anthropometric activities given their eugenic overtones. Yet as the next section will demonstrate, Galton was far more successful than Roberts in promoting human measurement to the masses, even if he also believed that their results should be subject to expert analysis.

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[69] Simon Szreter, "The First Scientific Social Structure of Modern Britain, 1875-1883," in Lloyd Bonfield, Richard M. Smith and Keith Wrightson (eds.) *The World We Have Gained: History of Population and Social Structure* (New York: Basil Blackwell, 1986): 337-354, 337-338.

[70] For an appeal to Parliament, see Roberts, "Memorandum," pp.352-374 (note 53). For a popular account, see Charles Roberts, "The Physiology of Recreation," *The Contemporary Review* 68 (1895): 103-113.

Marks for physical efficiency

Galton stands as a somewhat anomalous figure in the history of British anthropometry. Although he was by far its most visible proponent, his methods were so idiosyncratic that he drew criticism from fellow practitioners for producing data that was almost meaningless.[71] His numerical fluency, on the hand, could not be faulted; his statistical work on correlation, variation, and regression led him to produce some of the most accurate height studies of the late-nineteenth century.[72] If Galton's mathematical prowess and eugenist ideology meant that he careened between the measurable and the intangible, his anthropometric work displayed the same tendencies. Driven by a desire to measure every human faculty, Galton devised novel apparatuses to gauge the physical and sensory abilities of the British public. The extraordinary range of 'tests' he offered at his anthropometric laboratories evoked enough curiosity amongst the public that they paid threepence to have themselves assessed.[73] As a result Galton commoditised anthropometry to unheard degrees, even if his "measurements of sensitivity" bore little resemblance to the physical examinations favoured by his contemporaries.[74] For Galton, however, measuring abilities was as important as measuring bodies, and his interest in measuring 'fitness' led him to favour dynamic tests over static ones. Almost all of his investigations into heredity required a large pool of data, and from the 1870s until the 1890s, he joined Roberts in trying to extend anthropometry's reach into schools, public service, and the home. While he certainly paid lip service to the 'private' or 'individual' benefits of self-measurement, Galton's intentions were not entirely altruistic. Instead, his focus on statistical analysis meant that he saw domestic recordkeeping primarily as a means of generating information for his own research. Far from desiring the public to make measurement a personal affair, he contrived various 'bribes' to obtain duplicates of their data. While Galton emphasised the value of physical and psychical self-knowledge,

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[71] For a contemporary dismissal of Galton's anthropometric work, see "Anthropology and Anthropometry," *The British Medical Journal* (9 February 1889): 314-315.
[72] Tanner, *Human Growth*, pp.184-185.
[73] Francis Galton, "Anthropometric Laboratory for the Measurement in Various Ways of Human Form and Faculty," in Karl Pearson (ed.), Vol. II of *The Life, Letters and Labours of Francis Galton* (Cambridge: Cambridge University Press, 1924), plate facing p.358.
[74] Francis Galton, "Outfit for an Anthropometric Laboratory" (1883), Francis Galton Papers, University College Special Collections, GALTON/2/13/3/4.

it was partially in recognition that much of the public "do not care for science, and do not intend to go out of [their] way to advance it."[75]

If both Roberts and Galton saw the British population as a mass of untapped subjects for their statistical research, there were significant differences in their approaches. While Galton admired Quetelet's statistical methodology, he never adopted the comprehensive physical examination characteristic of continental anthropometry. At his Anthropometric Laboratory at the London Health Exhibition, he only recorded seventeen measurements, and out of these only four (span of the arms, height sitting and standing, and weight) were physical dimensions. Indeed, his interest in eugenic 'fitness' meant that he took a greater interest in faculties and senses rather than the contours of the body. Roberts and Quetelet had measured 'strength' using a standard dynamometer, but Galton also tested such diverse abilities as 'keenness of sight and hearing', 'colour sense' and 'reaction time.'[76]

Galton's willingness to jettison elaborate physical dimensions was in evidence from his earliest proposal to collect measurements, which he drafted in 1872 to persuade the Anthropological Institute of Great Britain to measure schoolchildren to help establish whether the national physique was "distinctly deteriorating or advancing in any respects."[77] A belief in the inheritance of mental characteristics had informed his first book, *Hereditary Genius* (1869), and Galton became determined to acquire "exact measurements relating to every measurable faculty of body or mind, for two generations at least, on which to theorise."[78] For his school proposal, Galton suggested that only age, height, and weight be recorded, noting that a few simple questions were more likely to be answered than a complex list.[79] The perennial argument for simplicity also carried the day when the Anthropometric Committee instituted its national survey a few years later. Galton chaired the Committee from 1879 until the survey's completing, but felt his main contribution was to advise on "subjects and methods" while Roberts did most of the

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[75] Galton, "*Why Do We Measure Mankind*," p.236 (note 1).
[76] Francis Galton, *Memories of My Life* (London: Methuen & Co., 1908), p.245.
[77] Francis Galton, "Proposal to Apply for Anthropological Statistics from Schools," *The Journal of the Anthropological Institute of Great Britain and Ireland*, 3 (1874): 308-311, 308.
[78] Galton, *Memories*, p.244.
[79] Galton "*Statistics from Schools*," p.310 (note 78).

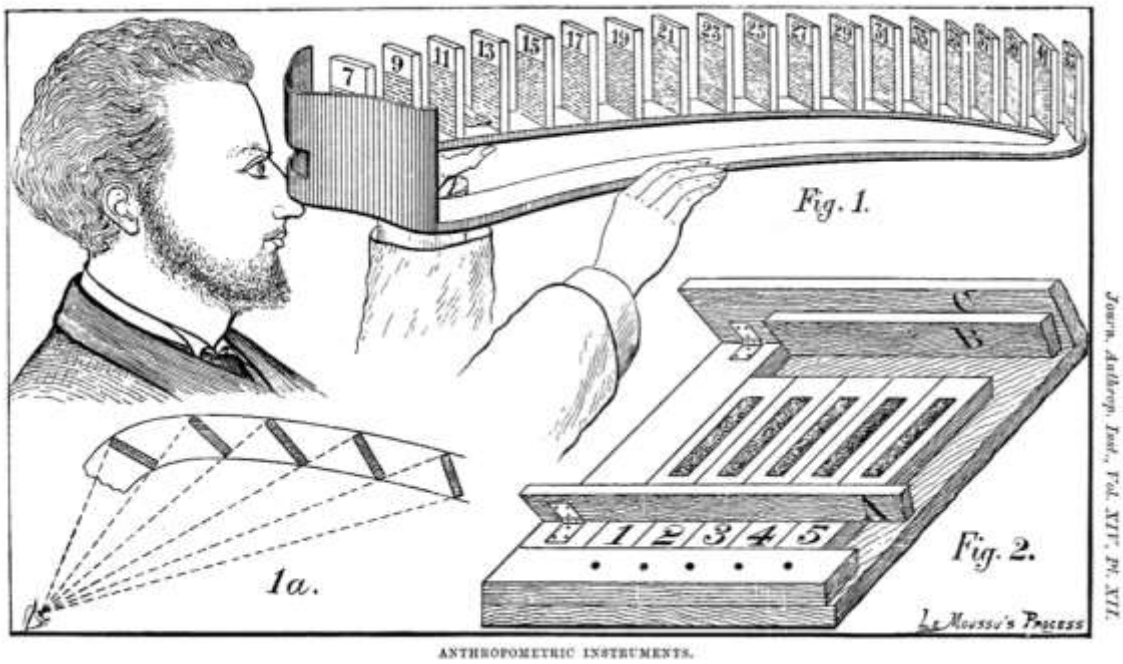

Figure 3: Galton's Anthropometric Instruments from the 1884 International Health Exhibition: Figs. 1 and 1a show his apparatus for measuring 'keenness of eye-sight' (distance), and Figs. 2 his instrument for testing 'colour-sense' with different shades of wool. [Francis Galton, "On the Anthropometric Laboratory at the Late International Health Exhibition," *Journal of the Anthropological Institute of Great Britain* 14 (1885): 205-221]

actual work.[80] As Galton almost exclusively focused his later anthropometric inquiries on questions of class, heredity, and fitness, it is highly likely that Roberts' decision to arrange results according to hierarchical occupational categories met with his approval.

At the same time that the Anthropometric Committee was gathering heights and weights from various sub-segments of the population, Galton was laying the groundwork for a study that would encompass psychical qualities as well as physical ones. In an article for the *Fortnightly Review*, he described the need for public facilities to measure qualities such as energy, agility, hand-eye coordination, and memory, which would help the citizens identify their innate strengths and weaknesses.[81] The 1884 London Health Exhibition presented Galton with an opportunity to empirically test some aspects of his

[80] Galton, *Memories*, p.214.
[81] Francis Galton, "The Anthropometric Laboratory," *Fortnightly Review* 31 (1882): 332-338.

new 'eugenic' theory, which saw racial decline as the outcome of the unfit out-propagating the fit.[82] He invested his own time and money into the venture, and invented an ingenuous array of instruments to gauge the physical and sensory abilities of participants (**figure 3**). These fanciful tests evidently appealed to the public, and 9,337 visitors paid to have their charts taken.[83]

During their visit to Galton's laboratory, participants were presented with a card to enter their measurements and guided through each station by a trained surveyor.[84] Galton stressed the efficiency of the system, but visitors clearly needed instruction and close supervision to complete the circuit. Similarly, the cost and complexity of the laboratory's equipment suggest that they were strictly intended for professional use. If Galton noted that subjects would derive personal benefits such as receiving "timely warning of remediable faults in developments" or learning about "their powers", the actual measuring process was mediated by experts.[85] Equally, while participants were given their card to take home with them (with the understanding that a carbon copy was kept at the laboratory), it is unclear if they were ever told about potential 'faults' or how their 'powers' might compare with others. No general or typical statistics were presented on the cards as a basis for comparison; subjects only received a numerical self-portrait abstracted from any larger picture. Such a souvenir was more reminiscent of the criminal identification cards invented by Alphonse Bertillon in 1879 than a eugenic evaluation.[86] Indeed, Galton only managed to complete a broader statistical analysis of the laboratory's work in 1885, after it had closed.[87] The actual arguments presented for 'self-knowledge' were thus scarcely realised.

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[82] For an early articulation of Galton's eugenic ideas, see Francis Galton, *Inquiries into Human Faculty and its Development* (London: Macmillan, 1883).
[83] Francis Galton, "On the Anthropometric Laboratory at the Late International Health Exhibition," *Journal of the Anthropological Institute of Great Britain*, 14 (1885): 205-221, 206.
[84] For more on the marketing and design of the laboratory and its practical functioning, see Lundgren, "*Politics of Participation*," pp.452-456 (note 8).
[85] Galton, "*Measurement in Various Ways*," plate facing p.358 (note 73).
[86] Galton did acknowlege the value of anthropometry for 'identification' purposes by 1890, when he suggested that it might prove useful indistinguishing respectable individuals from rogues. Galton, "*Why Do We Measure Mankind*," p.240 (note 1).
[87] Francis Galton, "Some Results of the Anthropometric Laboratory," *The Journal of the Anthropological Instiute of Great Britain and Ireland*, 14 (1885): 275-287.

Galton was aware that the laboratory's dependence on self-selecting, paying participants meant that its results could not be considered representative of the general population.[88] By creating tests in which some results were unequivocally 'better' than others (such as the acuity of vision and hearing, or the strength of the lungs and limbs), Galton also recognised that the experience was less enjoyable for the old and frail. As if anticipating the embarrassment of poor results, the laboratory offered some privacy in the form of screens, and all of its records were anonymised.[89] In framing anthropometric inquiries as a means of uncovering one's potential for different occupations (albeit without any written guidance), Galton offered an inducement to the 'strong' but not the 'weak.' Meanwhile, his eugenic insistence that most abilities were biologically determined offered little hope of improvement, whatever his platitudes about identifying "remedial faults."[90]

Galton's conception of anthropometric investigations as a series of 'tests' continued in subsequent years, as he moved his laboratory to a more permanent site in South Kensington and measured an additional 3,678 individuals.[91] His desire to metrically identify superior qualities led him to lobby for anthropometric testing to be instituted as a criterion for employment in the military and civil service—a focus of greatest benefit to professional elites rather than the masses.[92] The most useful application of anthropometry, he wrote, was to assign "marks for physical efficiency" for those vying for prestigious posts.[93] The results would form an 'objective' assessment of human worth: "man is a machine of flesh and bone, and a good machine of any kind is worth more than a bad machine."[94] For Galton, bodies that responded the most quickly and accurately to his metric tests of strength, vision, hearing, breathing capacity were

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[88] Galton, "*Some Results*," p.275 (note 88).
[89] The individual cards from the laboratory have not survived, making it difficult to generalise on the types of individuals who chose to be measured within the mass of visitors to the Heath Exhibition, but Galton assumed that younger and stronger participants would be most attracted to 'compete' in his tests. Francis Galton, *Anthropometric Laboratory Arranged by Francis Galton FRS* (London: William Clowes and Sons, 1884), p.7.
[90] Galton "*The Anthropometric Laboratory*," p.333 (note 81).
[91] Pearson, *Life, Letters, Labours*, p.378.
[92] Pearson, *Life, Letters, Labours*, p.386.
[93] Francis Galton, "Useful Anthropometry," in *Proceedings of the American Association for the Advancement of Physical Education at its Sixth Annual Meeting, Boston 1891* (Ithaca: Andrus & Church, 1891): 51-58, 52.
[94] Galton, "*Useful Anthropometry*," pp.56-57 (note 94).

objectively superior to those that lagged behind. Far from seeing anthropometry as a tool for self-improvement, Galton harnessed data to create standards of 'efficiency' that could be wielded against the unworthy.

Given Galton's belief that eugenics would be validated through statistics, he was never short on plans to acquire more facts. Alongside his laboratories, he edited two albums for home use, *The Life History Album* and the *Record of Family Faculties*, both of which were published in 1884.[95] These were the brainchild of the British Medical Association's "Collective Investigation Committee", led by Frederick Akbar Mahomed (1849-1884), a medical registrar who advocated "all-embracing and egalitarian" methods of data collection.[96] The statistical bent of the enterprise appealed to Galton, and he worked with the Committee (which included Charles Roberts) on their domestic registers. *The Life History Album* was designed to record the development of an individual from birth to old age, with space provided to record fifteen measurements on an annual basis, from chest girth, to 'strength of pull,' to acuteness of vision and hearing. Measuring instructions were provided, and charts were appended so that a subject's growth could be compared against standards for both sexes. Whereas Roberts' *Manual* had included only a single sheet (the anthropometric chart) for subjects to fill out, the entire volume of *The Life History Album* was filled with prompts and spaces for year-by-year data to be entered. Equally, its blank charts were explicitly designed for heights and weights only—not the full spectrum of bodily dimensions favoured by Roberts. In its clear and basic design it was thus more tilted towards amateur home use than its predecessor. The *Album*'s directions assumed that parents would faithfully document their children's measurements until they were mature enough to monitor themselves, but also noted that it was "never too late" to begin the process, for "even those who do so late in life have much to record that is of value to themselves and to their children."[97] The *Record of Family Faculties*, meanwhile, was designed to reveal an individual's biological inheritance, and posed a series of questions about their ancestors' strengths and

[95] Francis Galton, *Record of Family Faculties* (London: Macmillan, 1884); Francis Galton, *Life History Album* (London: Macmillan, 1884).
[96] Alun D. Hughes, "'On the Cards': Collective Investigation of Disease and Medical Life Histories in the Nineteenth Century," *International Journal of Epidemiology*, 42 (2013): 683-688, 683.
[97] Galton, *Life History Album*, p.1.

weaknesses. Heights were the only numerical information requested; the *Record* was principally designed to elicit mental, physical, and medical histories of relatives to enable inter-generational comparisons. While both books were intended for private use, the observations they comprised constituted a wealth of potential data for statistical analysis. Indeed, as the goal of the "Collective Investigation Committee" was to collect evidence for medical research, each book contained a printed appeal for copies of all information to be forwarded to Galton and the Investigation Committee at regular intervals.

In the event, *The Life History Album* was not much of a success; no publications were produced from its returns, and it was lambasted in the *British Medical Journal* for being too expensive and "over-elaborate."[98] By contrast, Galton received some 150 data sets copied from the *Family Faculties*, although only after he offered cash prizes amounting to £500 for the entries that best illustrated "the presence or absence of hereditary influences" on their personal characteristics.[99] Galton's resort to monetary incentives shows that the British public had little natural appetite to share their intimate details with outsiders, even if they could be persuaded keep such personal and family records. If Galton on some level wanted the British public to be more self-aware, it was not to his advantage that they be too self-interested. Whereas Roberts had idly hoped that parents might one day send him copies of their children's growth charts, Galton did everything possible to ensure that measurements recorded in the home did not remain there. While his protégé and biographer Karl Pearson might have described cash prizes for data as nothing short of a "bribe" to the public, one that was likely to appeal disproportionately to the impecunious, Galton clearly acknowledged the limits of persuasion. [100] For his purposes, measurements were a commodity worth paying for.

Conclusion

In late-Victorian Britain, human measuring was a practice growing in visibility owing to the efforts of professional anthropometrists such as Roberts and Galton. Not yet a general household concern, references to heights and weights nonetheless featured in

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[98] Thomas M. Dolan, "Collective Investigation," *The British Medical Journal* (November 29, 1884): 1096-1097.
[99] Francis Galton, "Medical Family Registers," *Fortnightly Review* 34 (1883): 244-250, 224.
[100] Pearson, *Life, Letters and Labours*, p.356.

discussions of heredity, degeneration, child welfare, and physical fitness. Government surveyors occasionally visited schools and workplaces, and members of the public could have their proportions and 'faculties' evaluated at one of Galton's laboratories. Laboratory cards and albums would have provided many citizens with their first numerical account of their bodies, at a time when the health implications of measurements were beginning to be drawn. If this process peaked their interest, they could purchase manuals with instructions on how to record their physical dimensions or albums to chart their children's growth. Human measurement was at the cusp of becoming a private, medical matter, even if statisticians such as Galton and Roberts believed it should remain a public, scientific one.

In this transitory period, the value of anthropometric data had to be constantly justified to laypeople unfamiliar with its processes or purposes. Many anthropologists still saw human measurement as a means of studying racial difference, even while the rise of quantitative methods in medical research in the mid-century meant that physical dimensions were ideally placed to play a role in health assessments within more racially homogenous populations. The degeneration debates of the fin-de-siècle offered a significant incentive to gather measurements to evaluate fluctuations across the 'national physique', and anthropometry emerged as a seemingly 'objective' approach to resolving the issue. Both Charles Roberts and Francis Galton embraced the potential of human measurement to uncover the relative influence of nature and nurture in shaping bodies—that they adopted the same methods, while reaching very different conclusions, reveals difficulties of obtaining decisive anthropometric data in this period. Little wonder that they both continuously yearned for more measurements to decisively make their case.

Roberts and Galton were not the only anthropometrists working in late-Victorian Britain, but they were the most energetic in explaining the purpose of human measurement to the public. Galton's question, "Why do we measure mankind?" ultimately had multiple possible answers, from defending health reforms, to studying heredity, to promoting self-knowledge. For both Galton and Roberts, self-measurement was but an offshoot of their wider projects to place physical data at the core of collective decision-making. For anthropometrists, measurements only took on real meaning in the aggregate, suggesting that private assessments had no real value. If it was necessary to

convince people to take an interest in their measurements, then it was all the more important to persuade them to provide experts with a copy. While both Roberts and Galton had some success instituting surveys and laboratories to collect thousands of figures for statistical analysis, neither of them managed to create a sustained interest in comprehensive anthropometric examinations. That they so often acknowledged that simple measurements such as heights and weights were the easiest to record proved prophetic. It was only in relation to these basic proportions, with their direct bearing on growth and development, that the public ever really understood why they should be measured.