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A child takes part in a cognitive-development experiment at Birkbeck University of London's Babylab.

ETHICS

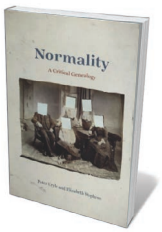
Perfectly normal

Andrew Solomon hails a study on how conflating 'ideal' and 'average' spawned flawed concepts of identity.

In the village of Bengkala on the Indonesian island of Bali, a hereditary strain of deafness has persisted for generations. Although it affects only a small part of the population, everyone here knows the local sign language, and deaf and hearing individuals marry without regard to either party's ability to hear. It is normal to sign and to fraternize across languages; it is in many ways normal to be deaf. The aberrant becomes a norm when it occurs with sufficient frequency in any population.

In *Normality*, Peter Cryle and Elizabeth Stephens further the conversation about normality instigated in the twentieth century by philosophers Georges Canguilhem and Michel Foucault, then expanded by race studies, queer theory and disability rights. Cryle and Stephens introduce a needed precision, examining the divide between normal as an average and normal as an ideal to which we should all aspire. They point to the real consequences — from eugenics to heteronormativity to genocide — of this prevalent concept.

Their ambitious book pursues the emergence of statistical thinking from the eighteenth century onwards, the relationship between qualitative and quantitative, and the ways in which normality has been a locus of social control. They examine the word's nearly simultaneous emergence in mathematics and medicine in the nineteenth century; and they trace its entry into popular culture in the mid-twentieth century, when it was the tool of those with commercial interests seeking to standardize mass-produced consumer goods. The authors reckon with the divide between statistical measurements and the language of moral superiority.



Normality: A Critical Genealogy
PETER CRYLE & ELIZABETH STEPHENS
University of Chicago Press: 2017.

Their language veers from the erudite to the recondite, with lapses into academic desiccation. But their fastidiously gathered evidence proves that normality has always been riddled with internal contradictions. Thus Cryle and Stephens present the etymology and genealogy of a word, the history of an idea, the cultural linguistics through which those threads have become entwined and the sociological ramifications of those subjectivities.

The book, spanning the past two centuries, is structured chronologically: we meet in sequence the major envisagers of 'normality'. Among them are zoologist Isidore Geoffroy Saint-Hilaire, who studied anatomical abnormality in humans and other animals; the statistician Adolphe Quetelet, theoretician of the 'average man'; criminologist Cesare Lombroso; eugenicist Francis Galton; founder of psychoanalysis Sigmund Freud; and sexologists Richard von Krafft-Ebing, who formulated the concept of 'perversity', and Alfred Kinsey, who questioned it. Interwoven with these episodic intellectual biographies are the emergence of modern medicine, the study of congenital abnormality, the nature and uses of statistics, the cruelty of eugenics, the advent of modern psychiatry and early stirrings of the sexual revolution.

In medicine, the concept of normality pertained to the ideal — organs and tissues functioning at their best. The mathematical idea refers to a situation in which data tend to cluster in the middle of a range. Thus, one aspires to normal blood pressure because it is a requisite of health — but to normal sexuality because of the pressures of social conformity. It was around the turn of the twentieth century, as the medical ideal met the mathematical idea, that people began to conflate the typical and the optimal. Cryle and Stephens trace how the meaning of the term 'normal' shifted, and how the statistical average became an aspiration.

The medical world long resisted the quantitative. Those such as Quetelet, who supported bringing numbers to the 'art' of medicine, were castigated throughout the early nineteenth century — implausible as that seems in today's era of precision medicine and big-data health care. Although measurement has been conducive to better medicine, it has had troubling uses. It underlaid the pseudosciences of phrenology and craniometry, deployed to rationalize racism. Idealizing the average — which is oppressive to those who represent diversity — is a cruelty that exploits the rhetoric of normality. But vilifying the average led to eugenics, in which Galton used mathematics to theorize that social stability involved encouraging breeding of the 'above average' and suppressing those 'below'.

Cryle and Stephens describe how in 1945, newspaper *The Plain Dealer* in Cleveland, Ohio, sought the perfectly average woman, eventually awarding their dubious prize to one Martha Skidmore while admitting that she was not precisely average. Vanishingly few can embody that state. The normal, the authors note, is thus paradoxical; Alfred Binet, a pioneer of intelligence testing, observed that "everyone is ignorant of how much intelligence a child needs in order to be normal". It's that very precariousness, the authors argue, that can reinforce the power ▶

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of the normal, as people constantly try to approximate it. Yet the construction is a modern invention. Norms have been set by both valid and specious science, as well as by society, and those who deviate from them are deviants.

The tension between the qualitative and the quantitative emerges as the central narrative of this book. The ascendancy of the normal is part of the overall move towards statistics, that tendency to dictate human behaviour by quantifying it. It is the story of how breadth, ostensibly represented by aggregate numbers, came in many contexts to displace narrative depth, which is often based in anecdote. There can be specious work in either mathematics or storytelling, but each has value and neither mode can, or should, replace the other.

Cryle and Stephens describe *Middletown*, the 1929 study by Robert Lynd and Helen Merrell Lynd that established the idea of 'Middle America'. This canonized unity at a time of a burgeoning diversity that was spawned in part by immigration. Through such works, anthropometrics seeped into academia from prisons and hospitals, allowing 'normal' to advance into public life. But it was the Grant Study at Harvard University in Cambridge, Massachusetts — a longitudinal study of 268 undergraduate men started in 1938 — that defined normality in the modern sense by drawing on both medical and statistical data. In 1945, descriptions of the study were published simultaneously in Earnest Hooton's popular *Young Man, You are Normal* and Clark Heath's study *What People Are*, codifying the idea in both common parlance and academia.

Kinsey's mid-century studies on human sexual behaviour, known as the Kinsey Report, are covered in the final chapter. This was qualitative masquerading as quantitative, and relied on a punch-card system to reconcile stories that were in fact complex, nuanced and hard to quantify. Radical though it professed to be, it contributed more than incidentally to the hegemony of normalization in the 1950s. Cryle and Stephens recall that this postwar era was a time of "mass marketing and public surveys, of self-help and consumer culture … This normal emerged not from the prison but the office and suburban home." We did not dictate the values of industry and standardization, but became subject to them. Those who measured us, made us. ■

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TECHNOLOGY

The internet that wasn't

Sharon Weinberger weighs up a history of PLATO, a prescient but doomed 1960s US computer network.

"Imagine discovering that a small group of people had invented a fully functioning jet airplane capable of flying long distances at hundreds of miles per hour, decades before the Wright brothers". So writes Brian Dear in *The Friendly Orange Glow*, his history of a computer system that most people have never heard of, but perhaps should have. That system, Programmed Logic for Automated Teaching Operations, or PLATO, brought together dreamers, gamers and engineers in a network at the dawn of the 1960s, long pre-dating the Internet. But was this collective venture really as ahead of its time as Dear claims?

The story he tells is both intriguing and a familiar one in the history of technology: a set of determined visionaries break down barriers to make way for a brilliant advance. What differentiates *The Friendly Orange Glow* is that the vision behind PLATO ultimately failed. The product created was overshadowed, forgotten by all but its most devoted users, and shut down many years later.

As Dear relates, PLATO's origins go back to an unexpected source: B. F. Skinner. The pioneer of behavioural psychology was famous for his operant conditioning chamber (also known as the Skinner box), in which animals learned to receive food by pushing a lever. He believed that humans, too, would respond to such conditioning, and soon conceived of a 'teaching machine' that would allow students to learn through immediate feedback. His 1954 design, a wooden box housing a rotating-disc contraption, allowed users to move through questions at their own pace. It never quite caught on, but it laid the intellectual foundation for 'teaching' computers.

The concept got a second lease of life a few years later, when panic over the Soviet Union's launch of the Sputnik satellite fuelled renewed interest in education and the nascent field of computers. As Dear reveals, in the late 1950s, the Control Systems Laboratory at the University of Illinois at Urbana-Champaign — a military-funded facility eager to emerge from the shadows of covert work — sought to mesh the digital with learning. Scientists there, particularly physicist Chalmers Sherwin and lab head Daniel Alpert, seized on the idea of a "book with feedback".

In June 1960, the laboratory launched PLATO under the direction of forward-thinking engineer Donald Bitzer, known affectionately as Bitz. One of its key innovations was a graphics terminal: the "friendly orange glow" refers to the colour of its flat-panel gas-plasma display.

Students use PLATO computers in 1969.

COURTESY UNIV. ILLINOIS AT URBANA-CHAMPAIGN ARCHIVES, RECORD SERIES 39/2/20

PLATO was in some ways inadvertently revolutionary. The initial system relied on ILLIAC, a 5-tonne "formidable beast" of a computer that took up most of a room. Decades before personal computing, it was not feasible to have a classroom filled with computers, so students worked at terminals hooked up to a mainframe.

Thus PLATO was an early demonstration of time-sharing and networking. Yet in Washington DC, Dear notes, something even more intriguing was taking place. A defence organization, the Advanced Research Projects Agency (ARPA), was also working towards connecting computers on a single network. Their eventual system, ARPANET, rejected the mainframe paradigm and linked host computers called interface message processors into a network.

ARPANET and PLATO expanded in parallel in the 1970s — and in isolation. This was, Dear notes, "one of the great tragedies in PLATO's history". Incredibly, a PLATO terminal was sitting right next to an ARPANET terminal at the University of Illinois, as the

The Friendly Orange Glow
BRIAN DEAR
Pantheon: 2017.