

Measurement and Human Life

Mensuration

By HENRY D. HUBBARD

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The Greek philosopher Protagoras begins one of his books with the words "Man is the measure of all things." Truly man is the measurer, and measurement is his master art. The very word "man" from the Sanskrit means "mind" and "measure." Measurement is more than an art—it runs through all arts, sciences, industries—it is man's master art.

Measurement is a pioneer. Early history writ on trees or rocks marked by notches the height of flood and the passing days. Man measured the earth—Geometry; the turning shadows of the day—Chronometry; the stars and their motions—Astronomy; the seasonal migrations of the sun—Chronology. Early life depended upon measuring the turn of the year, when the sun starts north and seed-time nears. The pyramids of the Pharaohs were great Sundials of the Seasons, the length of whose noon shadows fixed the best planting time to assure needed crops on which wealth and even survival depended.

Here is a shoe factory with a houseful of wooden shoe forms or lasts. The shoe last sums up ages of shoemaking art in a group of measures—length, width, instep, ankle—by which the shoe is built, classified, sold, and worn. Foot comfort is built to measure on the last and foot measures dictate every step in shoemaking. However strong, durable, or artistic the shoe, correct measure is the one demand which cannot be ignored.

A dress pattern sums up an age-old art—clothing the body. The pattern is a complex of measures. In every line is the skill of garment maker and fitter. The word "mode" means "measured" for the clothier's art is a measured art. Artists of the mode build their creations on measures of the body. Every cut of the shears or stitch of the needle is measured to ensure perfect fitting for comfort, taste, or health.

Feeding the race, a primary need, creates countless recipes which set to measure the skill of the cook, and thus make reproducible a host of delectable dishes. The success of every feast depends upon the measurements which assure perfection in the culinary masterpieces. We measure calories and nitrogen for bodily energy and repair, for dietetics is

a measured art. With the calorimeter to measure bodily need and food values we may feed scientifically and thus open a new era for man as we have for motors.

What is true of the shoe last, the dress pattern, and the recipe is true of a hundred thousand products of industry. Everywhere perfect service means measured service. Measures are the scaffolding, quality is the structure. The machine knows only the measures, the user only the quality. The automobile connotes not the forty thousand measurements by which it is made but rather it connotes easy, and rapid transport.

The role of measurement in medical research and practice would make a fascinating volume. Measurement is the greatest means of diagnosis and treatment. We measure man, his muscles—their size and strength, his reaction times, respiration rate and volume, blood pressure and the density of its corpuscular population; his senses, their acuity and defect. These measured data are the matrix for prescriptive regime. They help perfect the human body and normalize its powers. Measurement is its chief aid in this supreme task. The white rat, probably the best measured animal, is being used to measure a thousand vital facts and factors of life itself, and the measured results are being used to perfect human life.

Through measures our houses may be heated or cooled, the air moistened or dried, and air movement made optimum. The complete control of indoor climate through measurement is a coming art which will bring amazing conditions of comfort, health, and personal efficiency for rest, work, or recreation.

The mariner still hitches his wagon to a star, for measurement was born among the stars. The star-gazing dreamers of yesterday gave us astronomy, chronometry, the calendar, surveying, geometry, and the art of navigation.

Modern science began with measurement. We measure the work to recreate the time-table of geology. We measure tree rings to learn the life story of the tree, and through such measures these tongues in ancient trees retell climatic history centuries past.

To science measurement is a means to discovery, prophecy, control. To industry it is the tool of creation. The

measured curves of every tool are alert with the treasured skill of a race of craftsmen. The machine itself is a complex of measures which set each craft to cosmic power.

All industry measures to serve. Its every deed fits a measured need, whether of size, strength, color, or whatever gives utility to things. Industry is service set to measure. We measure the body to clothe it with measured apparel. Our life itself fits into measured schedules of time and place.

Measures are the life of the fine arts—poetry sings in measures, sculpture carves them into inspirations, architecture enshrines them, and the measured periods of tone and silence, their sequence and concord, transmute the soul of the master musician into harmonies for the joy of the world.

Measurement is miracle worker. We give a measured curve to glass to match a measured defect of the eye and restore sight to the aged and perfect the vision of youth. Everywhere measurement is busy creating the tomorrow of our dreams. Man's miracles multiply, break the chain of time, place, and circumstance to give him vast degrees of freedom and new and limitless powers. Little wonder that Emerson, facing the new age of science and its possibilities, declared "I have never known a man as rich as all men ought to be."

Measurement is truth and sets men free. Everywhere it has one true purpose, the maximum happiness for all.

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Who Carnot Was

History of Science

Sadi Nicolas Leonhard Carnot, whose classic on thermodynamics is reprinted in this week's SCIENCE NEWS-LETTER, was born in Paris on June 1, 1796, and died there August 24, 1832, of cholera. He started his career with a commission in the army, but his father's political connections prevented the young man's achieving any but minor posts, so he resigned his commission to devote himself to mathematics, chemistry, natural history, technology and political economy. His only published work, on the motive power of heat, contains only a fragment of his scientific discoveries, but it puts him in the very foremost rank, though its full value was not recognized until pointed out by Lord Kelvin.

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