

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Economic Research and the Development of Economic Science and Public Policy

Volume Author/Editor: NBER

Volume Publisher: NBER

Volume ISBN: 0-87014-115-5

Volume URL: <http://www.nber.org/books/unkn46-1>

Publication Date: June 1946

Chapter Title: Considerations by the Way

Chapter Author: R. H. Coats

Chapter URL: <http://www.nber.org/chapters/c9711>

Chapter pages in book: (p. 143 - 170)

Considerations by the Way

R. H. COATS

*Visiting Professor of Statistics,
University of Toronto*

Dominion Statistician, Canada, 1916-1941

I AM honored indeed to be invited from out our north country—the Scotland of America—to attend this celebration. By years, it is only the demi-semi-centenary of the National Bureau of Economic Research; by achievement, that might mislead. Mills on prices; King and Kuznets on the national income; Mitchell and his coadjutors on the business cycle; Macaulay, Wolman, Fabricant, in their spheres, have made statistical history. And these, if I may be lyrical, are stars

Not in lone splendour hung aloft the night,

but units in a constellation: I name only the ones I happen to have set my own endemic, workaday compass by in these twenty-five years. On our alien soil it has been your techniques as much as your figures that intrigued. May I add that five years ago, not uninspired by you, a Social Science Research Council was organized in Canada, which has continued to look admiringly, of course enviously, over the fence since; as its past chairman I bring you its cordial greetings. It is small: you budget as much in a month as we do in a year; but you will not be toplofty like Talleyrand who when the small Prince of So-and-So 'recognized' the French Republic, replied that the French Republic was pleased "to make the acquaintance" of the Prince of So-and-So.

Anniversaries, I confess, to one who has been retired on account of age, acquire a touch of poignancy. They suggest audits and stocktakings; and these—you never can tell—may light upon something. This is not a narrow, old-fashioned subjectivism: we are all scientists here I should hope.¹ We descend into

¹ 'Tough-minded', as William James would call us, i.e., in the line of Protagoras,

Avernus itself, like Aeneas, with the golden bough of Anthropology; eschatological futurism (from Dean Inge down or up) has pretty well banished those figures that used to lie uncomfortably in wait for us—Dante's captains of the rings, for example; Milton's hero; even the second-rate Apollyon who "straddled quite over the whole breadth of the way" for poor Christian. Medicine too has its new department of Gerontology, with its bright new journal—clinical, biological, sociological—to soothe the aging flesh.² Still, a certain thoughtfulness supervenes.

Let me be still more confidential. I myself spent the best years of my life helping build up a national central statistical bureau. Why? Well of course there was the salary; but to speak becomingly, it was because if you can get a unitary point of view in Government statistics, you can with the same or even fewer strokes get a larger, more diverse, and better output—the maximum from the overhead. Even a unit like the Census contrives a tabulator with no other ideal than to take off every possible cross-classification in that compendious inquisition. Again, why this Pelion on Ossa? But everyone knows why nowadays—even Great Britain and the United States almost last among the nations (a point to which I shall return). The extent to which state elephantiasis needs statistics as daily as knives and forks invades the speech of astronomy. Is it only a hundred years since Lord Melbourne conceived the whole duty of Government as to prevent crime and to preserve contracts? ("You'd better try to do no good", he told Queen Victoria, "then you'll get into no scrapes." The factory children? "Oh, if you'd only have the goodness to leave them alone!" The people? "Damn them! Why can't they keep quiet?")³ What with one thing and another Stuart Rice

Ockham, Hobbes, Locke, Hume, Comte, Russell, Dewey (see Herbert Feigl in *Twentieth Century Philosophy*, ed. by Dagobert D. Runes; Philosophical Library, 1945). The 'tender-minded' are of course Plato, Aquinas, Spinoza, Leibniz, Kant, Hegel, Royce.

² *The Journal of Gerontology*, which has just begun publication.

³ *Queen Victoria*, by Lytton Strachey (Chatto, Windus, London, 1921), Emerson (for America) was quite in accord: "The masses! The calamity is the masses!" (*Considerations by the Way*).

Considerations by the Way

surprised the United States Government in the act of sending out 150,000,000 statistical questionnaires last year, and that is only a phase. Clearly *that* multiplex needs looking into and after. General Walker found about 1890 that of all the millions spent on the United States Census till then a third had been thrown away.

But there is more to it than that. Elephantiasis is glandular, and only the most pervasive physiology can tell about glands. If the Government owes a geological survey to the mining industry, a soil survey to agriculture, and so on over the natural sciences, surely it owes a statistical survey to the social sciences whose 'engineers' and none other have brought it where it is. This is antique, but have you noticed two late straws in the wind? The Royal Statistical Society remarked the other day that the person to interpret statistics to the Government was—no, not an economist—a statistician. The Royal Economic Society of course did not take that lying down. Still, it was said, in the year 1945, *ex cathedra*. The second is free of all possible *ex-parte*, for it is the voice of popular philosophy itself—of an apriorist, of a seer

in a trance

Seeing all his own mischance,

—of Bernard Shaw no less, telling the political world What's What at ninety.⁴ Now Shaw it was who used to twit his friends the Webbs in their heyday that he knew perfectly well already, or at least well enough, what they were taking all that time and sweat to dig out. (The Webbs, of course, went statistical late.) But today, Shaw devotes a whole chapter to saying, every Government should have a Department of Statistics without whose imprimatur no correlation should be made the basis of a law or a policy! Selah!

Perhaps you will think it is talk like this, day by day getting taller and taller, that made me mention heart-searching a moment ago. You will ask me *à propos* did I not read in that same document of the Royal Statistical Society what are the qualifica-

⁴ *Everybody's Political What's What* (Dodd, Mead, 1944), Ch. XXVIII.

tions that must inform the statistical department by Shaw apotheosized.⁵ I have. They are 'tough'. They are three. First, a good, sound statistical technique—nothing 'eminent', but 'respectable'; second (stepping out and up), a wide and thoroughly catholic range of interests, social and economic; whilst for third, recourse is had appropriately to that purely statistical hand of cards, the genes—it must be what I may be permitted to call in a moment of relaxation like this a 'smooth worker'. Hard it looks to keep up three such knives and not often catch one by the blade. But that is not my special uneasiness, as you will see in the sequel. (There are some things a statistician can only brazen out when to be modest is so bad for the ego: I have drafted specifications for statistical jobs myself, and had to ease people into them.) As a matter of fact, epicyclidity is an *in hoc signo* of our time: epicyclidity, says Whitehead, must enter into every simplicity.⁶ No more than another can the Government Statistician live by bread alone. He too must live by every word that comes out of the mouth of the spirit. He too follows the thinkers, not nose to heel, but within hail (he must at least read *all* the reviews). Scratch him as mere artist and five times out of six you will find, if again I may pull out the lyrical stop, a sort of William Morris who designs furniture and wallpapers but is aware of the Red House and its architectonics, his own or another's it matters not which. If he is to speak in character on a day like this it will be with a certain 'largeness', for he is not fiddle or horn music so much as symphony—a blend, not a straight, as the distillers say. We are met in these exercises to give praise, "with the psaltery and an instrument of ten strings" (to quote the psalmist); also, I suppose, to look about a bit, from the clerestory as well as down in the nave. So at least I figure my part, leaving to others those feats of specific arms and skills which have already adorned our proceedings, as they did those commemorative games of heroes of which Homer and Vergil sing.

⁵ *Memorandum on Official Statistics*, 1943.

⁶ *Science and the Modern World* (Macmillan, 1925), Ch. XIII.

Considerations by the Way

To begin with, statistical horsetrader that I am, let me not stand in any *ad hoc* induction-deduction, quantitative-qualitative, empirical-a priori line-up of the social sciences today, though I do not mind (on business bent) visiting the stables of those redoubtable breeders. Only yesterday we had that line-up yet once more. The National Bureau itself bred the 'exhibit'—Mills' *Behavior of Prices*—the Social Science Research Council kindly holding the ring.⁷ It was grand debate. Mills came to it with neither script nor bread of theory, leaning only on his statistical staff (Mark VI, 8). He was cheerful as he had no business to be, for in the old saying, if you haven't a theory you become dilettante or worse, and if you are a dilettante you grow morose. But what happened? I did not notice that any one had his mind changed very much, or was even reduced to silence very long. The filly herself, betimes admired, was overlooked for whole pages! The truth is, you cannot settle a horse race—if it is a horse race—by talking horse flesh: you get off on how you are facing the track or some such relativism—if indeed there is a track. Even a straight three-dimensional race is hard enough to judge—that one in Homer had to divide the money. Never, if you are an empiric, get into an argument over the philosophy of method—that is walking straight into the a priori parlor. Must we then just go on breeding our 'fancy'? Are we all still just little Platos or Aristotles, Cartesian or Baconian from our cradles, 'invincibly' so, as the theologians say, as the psychologists now say in fact, that our temperaments govern our opinions?⁸ It would almost look like it when D. H. Robertson ends the Barbara Wooton affair in England a while ago with a majestic "back to our work"; yet Mrs. Wooton does not feel herself squelched. So Yule plucks the statistician away from the probabilistic universe itself. "Don't listen to words", says Albert Einstein, "examine achievements." But as I say, let us visit the stables.

⁷ *Critiques of Research in the Social Sciences*, Vol. II.

⁸ "Attitudes lie beyond logic and evidence." See notes I and 25. All philosophies take for their ultimate starting point either Cognition (Idealism) or Being (Realism).

There have been two great boom times in Statistics: Quetelet's, which sent Buckle off the deep end and so outraged the moralists of the Iron Law of Wages⁹ (but Quetelet's determinism turned out only an hyposticized abstraction); and Karl Pearson's, following on to sampling, business forecasting, etc. (the latter somehow didn't forestall the biggest financial binge and worse subsequent headache in history: it is an induction not a mathematical probability). We were, shall we say, exuberant, in those days. L. H. C. Tippett in his excellent little new book speaks of "disappointment" since.¹⁰ All he means is that the job is much bigger than we thought. But astronomy, another non-experimental though non-human science, pioneer of the probability calculus itself, shows no dismay over an expanding universe: she instals an unprecedented 200 inch reflector and goes on. So we. (May only Tertullian have his *credo quia impossibile?*) Of present-day methodology? let anyone consult those contributions by the scores and hundreds which both the American and the Royal Statistical Journal must now list annually—with such breadth, Neymann says, that conceptual depth is being threatened. Of matériel? but I have already glimpsed that Milky Way. And of course, in this presence, I salute our great Inductive Research Foundations, also our University Statistical Institutes not a few.

As to theory, I deprecate the snub of Talleyrand, but we Government statisticians must encourage custom everywhere. Father Adam did not think much of Political Arithmetic; and Ricardo, not Malthus, set the style for the nineteenth century. But neither did so economic a thing as women's dresses show any underpinning in those days (which I may mention because economics began with Xenophon in the home, *oikos*). And it is the fact that for longer than the life of this Bureau no bricklayer has called for bricks with more whippoorwill intermittence than the economist for statistics. A bad time is still had occasionally over

⁹ "Content to let original sin and the responsible ego divide the blame for social evils", as someone said. See R. H. Tawney's *Religion and the Rise of Capitalism* (John Murray, London, 1926).

¹⁰ *Statistics* (Home University Library, London, 1943).

Considerations by the Way

'verification'. The purely theoretical concept does not live in the statistical world—it is abstracted, "out of space out of time".¹¹ Let us admit that statistics cannot verify a methodological postulate, say static equilibrium. (Zeno proved motion to be impossible, and the new physics takes the dynamic out of dynamics.) Again, it disconcerts to find that you have only muddied the stream when you thought you were loading it with fructifying silt. (Laski asks of a recent town survey, Why statistics to prove that people live in better houses as they earn more money? The point is they don't, sometimes when you would most expect it—not at least in the Canadian Census.) But as said above, the modern economist, even Hayek, if he does not want bricks to throw, does want them to build up with. Pigou is authentic latter-day when he defines the goal as "to clothe the dry bones of theory with statistics", and gratefully it falls upon the ear that it is the *theory* that is dry. Wesley Mitchell sees the goal already approached in the new-scale incorporation of statistics into theory, Marshall the turning point. Jacob Viner, Canadian-born to our Canadian pride, confirms the classical theory of trade with Canadian statistics; when exports do not go down as they should with rising prices and capital imports, he takes a *statistical* stick to them and soon brings order. It needs theory, he thinks, to ask the questions, to which Statistics replies, like Information Please, that questions are the very thing it wants nothing else but, if indeed it cannot uncover a question or two for itself. Within the Government service, it is notorious that the pump primers will not go ahead without a whole universe of statistics. Now, the engineer turned garage mechanic should of course know his tools. It is one of the needs of our day, since the universities do it so unevenly, that the American Statistical Association take a leaf out of the actuaries' and accountants' books (as the Royal Statistical Society is on the eve of doing) and provide a stamp for the statistician. It might help the Government statistician to get

¹¹ "A mathematical result is not put to the test by what actually happens in nature", C. L. Lewis, *Mind and the World Order* (Scribner, 1929).

equal pay. There was once a commission on official statistics in Great Britain for which the Government Actuary was thought the best chairman—of all the indignities!

As you observe, I am only upon a stroll, for enjoyment, not exercise. And may we not stroll whithersoever we please on a day like this—climb a hill, visit the neighbors, even drop into church? A blessing upon the Science that can write not only clearly but delightfully! Jeans, Eddington, Dingle go back to the tradition of Galileo, Bacon, Lyell, Huxley, in this. What got into the heads of Newton and Laplace to be crabbed of malice prepenes lest they be read! That is intellectual fascism! Let the “little smatterers”, as Newton called them, live dangerously if they please. The biologists—Haldane, Hogben, Huxley, Sherrington, Needham—keep us up of nights. In philosophy the mantle of James has fallen upon Santayana, Ogden, Joad, Bertrand Russell—artists all. Alexander, Smuts, Whitehead, great exponents of a metaphysics based on science, are not simple, but they are not past finding out. Even the sociologists have discovered human speech. I am the more astonished that Wesley Mitchell should seem to condone a certain stodginess in statisticians, as if it were like the ‘gobbledygook’ of Government reports—inevitable; that F. H. Knight should tell Homan not to make jokes when describing some schools of economics (smiling on Sunday, you will recall, was similarly proscribed by the Scottish Church, but that was in the seventeenth century).¹² Now we want no part of that degradation of the aesthetic standard which is listed with things like urbanization and the decay of craftsmanship in our modern inheritance. *Aliis laetus, sibi sapiens*. Not all books can be written as it were *virginibus puerisque*, but more should be. Thanks to scientists (and historians) who are also men of letters, even a statistician, like a house cat, may have his starry loves (especially when it is toward evening), and go upon the prowl.

¹² Buckle, III, Ch. 4. Hesketh Pearson quotes an ingenious argument of Shaw on the thesis that “all genuinely intellectual work is humorous” (*G.B.S. A Full-length Portrait*, Harper, 1942).

Considerations by the Way

What statistical heart, for instance (Yule be hanged!), has not leaped up when it beheld that new rainbow in the sky, the statistical universe? Physics is our fundamentalist! (Religion itself needs a cosmology, says Whitehead, for it is only a 'loneliness' that hungers after a 'world-loyalty'. So Plato must have his *Timaeus*, a poet's dream, but a scientist's nightmare.¹³ (Schweitzer thinks we act irrationally "because we have no theory of the universe".) Biology, which was Marshall's natural science analogue, is still *in statu quo*, still unable to tell a live body from a dead one—Needham's integrative levels, holistically-minded, still perhaps the best continuity from the sub-atomic to the atom, to the molecule, to the living cell, to the organ and the organism, to the psychological and social entity. Biology itself, however, is drawn after the new portent, Haldane exploring bridges, Hogben claiming for the methods of physical science "the whole field of what can properly be called knowledge."¹⁴ The new universe, unlike the *Timaeus*, is verified, and brings even greater grist to the 'mouth-openers': Relativity's Space-Time Marriage (which stretches like ours though never so far as Reno); the 'point-event' (no more of the tiny, round billiard ball); the 'interval' (whose analysis has no objective validity); matter, light, force—all one: not since Copernicus was such an upset. Our statistical star performer, however, is *micro*-physical—the electron leaping from loop to loop from no cause, in fact without passing between, but

¹³ The *Timaeus*, says A. E. Taylor (*A Commentary on Plato's Timaeus*; Oxford, Clarendon Press, 1928) was "an attempt to graft Empedoclean biology on the stock of Pythagorean mathematics". It may be reckoned as Plato's best at a scientific treatise.

¹⁴ Old-time mechanism has failed to explain life, but neither has neo-vitalism made good. The new physics, in J. B. S. Haldane's view (*Philosophy of Science*; Philosophy of Science Association, Baltimore, 1934, I), emphasizes the failure of mechanism; but its concept of phenomena as functional relationships offers a bridge to biology: resonance phenomena have suggestions for the analysis of mind. R. A. Fisher finds the new indeterminism in harmony with the theory of natural selection, which in its statistical nature resembles the second law of thermodynamics: aggregative deviations from the expected average represent the 'creative' component in natural selection. "Teleology can be analyzed as a form of macro-causal relation typical of organized systems" (Feigl). "Modern evolutionary-genetic theory, on the rigorous mathematical basis, is proving as exact and as fruitful as modern physical theory" (Julian Huxley).

predictable statistically à la Heisenberg. "The most certain of all certainties is the principle of uncertainty"; we cannot look at an object without changing it. Whereat Eddington—and this is the deep part—declares the universe to be subjective (selectively) and mental, probability, unlike causation, being a function not of things but of our *knowledge* of things. The cosmic number itself, N, can be derived a priori, epistemologically, infallibly: for proof, it is $2.136.2^{256}$. (If we counted N up and found it right, it would be wrong, just as some economic theorems might hang their heads if proved empirically.)¹⁵ The deep part of this again is the 'lift' it is said to have given to idealism hard pressed by pragmatism and neo-realism (our two other clamant philosophies of 1946), for the older school does not seem able to pin Eddington down on his mathematics—the judge abashed before the expert witness! Axiology, too, a new word for a very old problem—Values—has sprung to new life, goaded by Nietzsche; and we have the tremendous panpsychic synthesis of Whitehead. Are values humanistic (Science), or are they cosmic (*Philosophia Perennis*, Personalism)? . . . Now, Relativity is not cosmology, and at that we may not have the last on Relativity (de Sitter, Lemaitre). Also, to some that new 'mind' looks very like a traveling camera. Nor has Einstein nor Planck given up the causal electron, whose causality may not be in the singular atom but in a broader dynamism. ("No probability without causality", says Struik, Bertrand Russell's gloss being that there is no alchemy

¹⁵ Eddington's calculation of N (by quantum arithmetic) is fitted only to uncountable things like the electron which is not discrete but just a 'smear of probability'. Classical physics is a 'closed system', governed by 'identical' laws: we take out only what our minds have first put in: Quantum laws are 'transcendental' (*Nature of the Physical World*; Dent, London, 1935). For a sample of the acrid but absorbing controversy this has let loose between the 'Aristotelian' and 'Galilean' physicists, see *Nature* for May and June 1937—Dingle the protagonist of battle. Jeffery's statement that "Eddington and Milne are only using special axioms for which no need has been shown" may be taken as the question to which Eddington's final *Philosophy of Physical Science* (Macmillan, 1939) is addressed. The blessed Damozel herself "from the gold bar of heaven" would need, in Eddington's phrase, to be a bit of a bluestocking to follow him everywhere. Though the objective is spiritual, subjective and objective are apart for working purposes: mind being 'all', you cannot well have a priori evidence of an objective world.

Considerations by the Way

by which probability can produce regularity in the individual case.)¹⁶ And again because we do not know what the electron will do next, it is not therefore 'free'. Even if it were, *homo sapiens* is not an electron: he is not even a molecule: he is molar—half-way up the ladder of Heaven in fact.¹⁷ We recall Dingle's rudeness to the lady of "the stars she whispered blindly move" line in *In Memoriam*—that she might have been comforted by remembering that she was not a star. (Certainly not a movie star, wilful to the naked eye: compulsion, not determination, is the antithesis to free will.) And yet one thing comes out in all the headlines—the physicists and the social scientists have been drawn together. Under quantum, whole squadrons of physicists have gone speculative—autonomists, finalists no more. The fishers of fish are fishers of ideas too: Milne can make a universe almost while you wait. We should stop to note, however, that the new International Council of Scientific Unions, which before the War was moving for a unity of all the Sciences (the Social Sciences were at least on a committee)—encyclopaedist in true eighteenth century style¹⁸—is not monist, though its language is inter-scientific: rather is it in the vein of neo-realism, which is Science writ large and rounded out, but Science bit by bit.¹⁹

We might leave quantum to the idealists if idealism were all. Unfortunately 'pure' science does not stay 'pure' very long in our pure but acquisitive society, if 'pure' be not a verbalism to begin with. As steam and electricity (classical) increased the family by a billion in a hundred years, so now, in a hundred minutes almost, the quantum bomb, dreadful Nemesis!—but who would try to better H. G. Wells' horripilations, albeit only on the old bomb. Politics, which is the most a priori of the social

¹⁶ 'On the Foundations of the Theory of Probability', by D. J. Struik in *Philosophy of Science*, I; *Religion and Science*, by Bertrand Russell (Home University Library, London, 1936).

¹⁷ 10^{27} atoms = 1 man: 10^{29} men = 1 star.

¹⁸ The projected *Encyclopaedia of United Science* is already beginning to appear.

¹⁹ Neo-realism is atomistic but synoptic, pluralist in its metaphysic but taking tradition and metaphysics "when there is nothing better". It would subscribe to Newman's advice to all the sciences, including theology. "to go on quietly and in a neighborly way".

sciences, ordered up the genie, and would now coax him back into the bottle with the old double-talk. Hiroshima, it seems, was only the one bite every dog is entitled to—it saved lives! Why, the bomb, of which a wheelbarrow load would blast a continent, will take the profits out of armaments! which Herbert Spencer at least would be glad to hear (budgets please take notice!).²⁰ And so forth. We should have Socrates back on this Thrasymachus. And no doubt state-sovereignty is not the only apriorism that has had to be bombed out, though gunpowder on feudalism sounds anticlimax. The physicists are keen to advise on this. True, their technocracies and social credits of the past did not amuse. What they are now going in for, more sensibly, is Axiology (cornerstone of ethics), remembering no doubt how Leonardo in 1500 A.D. refused to divulge his submarine—it would be “assassination” he said. But if politics cannot be too proud to fight, perhaps it can be too frightened—bigger and better bombs may be the physicist’s part. It is what a great poet moved by science, Francis Thompson, hints—that we should “learn from fears to banish fears”, as more scientific, i.e., more in the line of least resistance (though less Pauline) than to love the brotherhood exterritorially. By the same token, what is a statistician doing longer in the epistemological galley? Statistical laws may or may not be ‘ultimate’, but statistical methods are very *pen*-ultimate. Yule was right: we statisticians are on ‘local’, not ‘cosmic’ time. “Because a man works in a laboratory”, says Eddington, “it does not follow that he is not an incorrigible metaphysician.” But Rutherford scotched that for the disciple of *homo faber* when he used to bluster: “don’t let me catch anyone talking about the universe in *my* laboratory”. Titillated, and properly impressed, let us scurry back to Yule’s maternal apron strings and his quiet “get on with the job” now so vastly more portentous. It is not very different with another comet whose tail is across

²⁰ The morning’s paper, however, announces the 1947 defense budget of non-combatant Sweden as four times that of 1939. This is Nationalism, which has been defined (without intentional humor) as “objectified creativeness for exterior purposes”.

Considerations by the Way

our sky, the new logic—the realist logic, at which we must stand a moment and gaze, for logic is only how to tell a good argument from a bad one, or what to think when we think about thinking, or how to get knowledge of knowledge. Bell's *Search for Truth*, another of those readable books, puts Lucasiewicz and Tarski up beside Lobachewsky—Lobachewsky being the blasphemer who discovered (Gausse saw it first but was too frightened to tell) that the parallel-lines postulate was just one of those things that the mind of Euclid had put into geometry—poor, verbose, obscure, pedantical, nonsensical Euclid (these are not *my* adjectives). And Lobachewsky begat Riemann and Riemann and Minkowski begat Einstein. The Lucasiewicz blasphemy is that, almost as with geometry, logic is not a one but a many. The logical empiricists (latest of the logical positivists—behaviorists methodologically, neither monist nor dualist on the mind-body relation) are concerned not with mental processes, still less with epistemological origins, but with the object of such processes. (Of course, prior to 'how do we know?' is 'what do we mean?'—semantics, pragmatics, syntactics is the order.²¹ Dewey's and Bridgman's test of the meaning of a statement is how you verify it. If your doctor does not know, first, what will happen if you take his medicine, and second, what will happen if you don't, what you are taking is a chance. A hedonism that includes the martyr is meaningless because it means too much—science may be 'pure' after all.) Mathematics is the matrix, concerning which it is no news that, in less than a century, from Boole's algebra per Frege and Peano to Whitehead and Russell's *Principia*, a "proletariat under the knout of axioms" has emerged a democracy of only four postulates, five definitions, and two rules of

²¹ Montague, Richards, Ogden, Stuart Chase. A sample from Bertrand Russell: "Meinong maintained that, since we can say truly 'the round square does not exist' there must be such an object as the round square, although it must be a nonexistent object. . . . The present writer . . . discovered in 1905 how to escape from (this) by means of the 'theory of descriptions', from which it appears that the round square is not mentioned when we say 'the round square does not exist'. It may seem absurd to spend time on such a ridiculous topic, but . . . absurdities are the experiments of the logician" (*Twentieth Century Philosophy*).

inference.²² To put it romantically, logic after twenty-three centuries' bed and board with Aristotle, unbroken by even a flirtation with Descartes or Leibniz, has eloped with the new demiurge, Aristotle left forlorn as Euclid before him. The new marriage is already consummated: the infinitesimal has disappeared from continuities, infinity (with Cantor's help particularly) is being harnessed again and again to the usufruct of Science. The new 'algebra' logic is of course no more absolute than the old 'arithmetic' one. Bohr, for example, accepts the electron as both wave and particle and just puts the conundrum up to nature. Life cannot be analyzed into understandable processes—it will not let you. Pilate's question then was meaningless and well left unanswered: truth is relations, consistency, saved from anarchy by mutual dependencies. If an answer cannot be expressed meaningfully, says Wittgenstein, then the question cannot be asked meaningfully: moral, unless you know what you are talking about, be silent. Science adds that she is on the trail of *why* as well as *how* when she casts off verbal magic and introduces empirical laws as 'open', anticipatory of more to follow (we don't know *yet*). Are then aesthetic and ethical judgments useless unless you verify them? Well, values are 'instrumental', categorical imperatives 'emotive', and absolutes 'not grown up'. Is symbiosis the basis of ethics? G. E. Moore (in a value objectivity that involves a new intuitionism) remarks that good is just good, but that is *within* ethics. In politics we derive the 'ought' from the 'is' every day of our lives in the formula for living together: we put up with Hitler till he draws a gun, while the Yahoos of Nurenberg turn out unexpectedly to be *making* international law instead of merely *breaking* it.²³ In fine, to the Vienna school, deductions though experientially and factually expressed, are tautological and Kantian, mathematics being in the famous Russell apothegm

²² Many theorems are of course left undemonstrable. I do not divagate upon the formal and the intuitional schools of mathematics: to Science mathematics is "a tool to connect postulates with observations" (Jeffery in *Nature* for June 1937).

²³ See *Ethicogenesis* by C. D. Leake in the *Scientific Monthly* for April 1945 (with bibliography of the past quarter-century on 'Science and Ethics').

Considerations by the Way

"the science in which we never know what we are talking about or if what we are saying is true" (what mathematics knows is "structure"). As for induction, it is not much better. Induction is not "inference from particular to general", but "the construction of hypotheses to be tested by observation", meaningful but risky, "probability inferences, not truth inferences" (Eaton). On the validity issue the logical pragmatists go over to Hume almost lock, stock, and barrel.²⁴ But the solution is simple. In ordinary life we justify by deductive proof for some things, and by inductive evidence for others—duogladial Pope and Emperor once more. What rule of life is inculcated? Just to try and try and try again to find 'laws', with all the experience and materials we can muster, and by the simplest possible means.²⁵ Thus by latest authority we official statisticians, keeping in with both kinds of logicians, have been canny all along. Aristotle and Port Royal are being pushed around but not 'out'. No more is Euclid 'out' in a world where the θ angle is so small we cannot see it.

But still another bit of cotton flutters on the hunter's gun barrel for the inquisitive little antelope. It is History—which, said Schlosser, friend of Achenwall, is "statistics in motion". Economic historians, to bring the saying to date, are just "tourists among statistics". But the little antelope soon discovers how deceitful this is, crying "statistics, statistics" where there are no

²⁴ A passage from "the terrible David" not quoted so often as some others: "When we run over our libraries, . . . what havoc must we make? If we take in our hand any volume of divinity or school metaphysics, for instance; let us ask, Does it contain any abstract reason concerning quantity or number? No. Does it contain any experimental matter concerning matter of fact and existence? No. Commit it then to the flames, for it can contain nothing but sophistry and illusion."

²⁵ Induction is not a piece of knowledge but a rule of procedure, while probability reflects neither human ignorance nor a preordained regularity; it is a generalization based on observed stabilities of frequencies. See *The Logical Character of the Principle of Induction*, by Herbert Feigl (Philosophy of Science, Vol. I), also *Logical Empiricism* (in *Twentieth Century Philosophy*, with bibliography and historical sketch from which most of the above pronouncements are taken). On the Social Sciences, Feigl adds: "There are no other methods or aims in the social and cultural sciences than exist in the natural sciences . . . The role of sympathetic 'understanding' or 'empathy' is certainly not to be minimized. . . . But to what extent sociology, economics or history are capable of discovering reliable laws is an empirical question and therefore cannot be decided a priori on logical grounds."

statistics, for the historians are presently seen crossing the ice in far longer leaps than Eliza's.²⁶ The grand old man of jurisprudence, Mr. Justice Holmes, whom the artists are already making into a myth by putting him in a play, sends an authentic growl to Sir Frederick Pollock across the Atlantic: "The trouble with explanations of historic causes is the absence of quantification: you can never tell how much of a given cause is necessary to produce how much effect. . . . I always say no general proposition is worth a damn." Henry Adams, he forgot (or did he?) had once attempted a formula—"the law of phases"—worked out by least squares and geometrical progressions. Henry Adams, the too lightly forgotten 'Hamlet', sometimes only the 'shipwrecked Sinbad' of American letters, was a Victorian, of classical physics, Darwinian biology and mathematical economics, though the false-dawn of our irrationalism was in the sky. In 1912 he warns of "catastrophe" as definitely, inevitably "at hand", "revolution" to follow in 1917. After 1921 an "ethereal" stage was sighted, "when only a few highly gifted men would be able to understand each other"—perhaps the National Bureau of Economic Research.²⁷ Adams came to this (I repeat for his philosophy of history) *via* nineteenth century rationalism—epistemological, ethical, monist—its origin Hellenistic, its basis Immanence. It was the stream in which Leibnizean monodology (not to go back to Averroes) had become the Hegelian dialectic and panlogism, Schopenhauer and Kierkegaard kicking against the pricks in vain, to broaden out into French and German romanticism (Carlyle and Emerson to us) and oh yes, Feuerbach and Karl Marx, the despiritualizers and economizers. Turbulently intermingling, the positivism and institutionalism of Comte, Mill, Spencer, Wundt, Lamprecht had not prevented a surge back to idealism

²⁶ J. H. Clapham, pioneer of the quantitative and realistic approach in economic history (*Economic History of Modern Britain*), does not think the statistical and historical world co-terminous, though more so in the case of economic than of general history.

²⁷ *The Degradation of the Democratic Dogma* (Macmillan, 1919). But English disorderliness he thought was nearer truth than French logic. Brooks Adams foresaw another world war within a generation, but that was in 1919.

Considerations by the Way

in England as the century closed, which likewise saw the rise of realism—Lotze, Hartmann, Eucken. Pragmatism supervened; likewise Bergson essaying to pierce through mechanism to a mystical cognition. And of course, ceaselessly breasting the pantheistic “resignation to resistless nature”—holding it no more than a methodology of retrospective explanation—ran the religious-metaphysical dualism of Jewish prophetism and Christian salvationism, transcendental, Augustinian-Thomist-Pascalian, God *in* history not God *as* history, the God-man not the Nietzschean superman its worship, on its banner not *cogito ergo sum*, much less *volo ergo sum*, but *amo ergo sum*, revelation and apocalypse the goal of history as of old Isaiah saw in the Assyrians the rod of God’s anger. But logic is how to add to knowledge *without* revelation.²⁸ The Virgin in Henry Adams is the ideal of intellect, not of sex.²⁹ The Presidency had cost John Quincy Adams his faith in God.

How our three musketeers of psycho-analysis, biological materialism and logical positivism might have completed the education of Henry Adams it would be interesting to pursue. ‘Climate’ is the word of those to whom it is history that makes men; who call Gibbon historian of the Enlightenment rather than of the Antonine *Saturnia Regna* and the *Decline and Fall*; who know, as Mr. Truman knows, that it was Newton who wrote the American Constitution; or with the Bolshevists that Ivan the Terrible was not so terrible after all. What climate may we brew of today’s existentialism, personalism, phenomenology, against those broader backgrounds I mentioned, out of which come such varied voices as Max Weber the transformed dialectician, Croce the delirious liberal, Jacques Maritain the Thomist-Realist—each a synthesizer rising above events to judgment? *Cuique sua arte, credendum*—who shall synthesize the synthesizers? We of science only wish, I think, to subsume science to humanitarianism, not

²⁸ John Morley’s saying was that although truth might be born in the heart it should “go round by the head”.

²⁹ *Mont St. Michel and Chartres* (Houghton, Mifflin, 1936).

narrowing it to a "social objectivism in which the spirit freezes", rather transfiguring it by those three values which Carl Becker found supreme in history—*intelligence, integrity, goodwill*. Historicism like the rest of us is 'in crisis' since the Caesarist chaos into which Spengler about 1920 plunged the historiographers. Yet, to mention dominant preoccupations, it is to history we must turn on, say, Russia—heritor not of Rome but of democratic Byzantium (where the green-grocers battled in the streets over the homoousian and homoiousian of the primitive Church); who knows nothing of the Renaissance and the Reformation; whose gospel therefore is St. John, not the monarchical St. Matthew; whose very atheism is ethical, being born of Marcion's dilemma of good and evil, whereas ours is agnosticism chopping logic over dogma and Kant; Russia whose bad manners, says Harold Nicolson, reflect only the sense of messianism with which she seeks salvation in the secular arm—here, now—in a combination of politics and philosophy. Upon all which the West raises the skeptical eyebrows of experience both Greek and Roman, mediaeval and modern, and elects for the liberty of the subject, in community but liberty. ("Nothing not built on freedom of the spirit has permanence.") If Hellenism went West and is now returning East, little trace is yet to be seen in Russian mysticism, from Dostoevski under the Tsars to the prophet of today's union of communism and orthodoxy—Berdyayev, ex-Marxist, neo-orthodox, whose world is the Absolute in Becoming, Man its co-creator, History the meeting place of God and Man in Time. History thus conceived is *ιστορία* (the Greeks were always clear), the philosophy and order of Man as well as of 'events'. Henry Adams saw it going down into the 'ocean of statistics', though Adams' statistics were only those of the second law of thermodynamics. It is an ocean that must have larger measurements of motivations as well as of actions—even of changes in human nature itself—if it is to yield history. Leaving that to the future techniques, the latest issue of the *Royal Statistical Journal* has a minute on that very short-run history which is already sta-

Considerations by the Way

tistical. There is no trade cycle, say Kendall and Glenday echoing Sorokin and Irving Fisher, only oscillatory time series; not repetition but growth—organic, creative, emergent, new. We may leave that again to Burns and Mitchell, or (if it have any application on the grand scale) to Toynbee who has seen nineteen civilizations in their rise, apogee and decline. It will not stay the poets of the “sorrowful wheel” from Ecclesiastes and Whitman down.

All this is very *Caliban upon Setebos*, “letting the rank tongue blossom into speech”, though I have picked out merely a word or two from Prospero. (Schopenhauer thought poetry better reading for the ordinary man than philosophy, but Carnap says that most philosophy is poetry.) But from now on, statistical organization, my own breadwinner, shall be my “roses all the way”.

It is a cheering retrospect, that of official statistics over the past twenty-five years. At last the United States and Great Britain, those great countries, have agreed that statistics should be ‘co-ordinated’. They still pale at ‘centralization’. I notice that some of those newfangled university Courses on Public Administration draw the same fine line (they are fuzzy on more than that). If centralization means government statistics all in one big building, nondepartmentalized, they are quite right. But you cannot be a good eye-doctor outside general medicine. Statistics are departmental, but they are departmental *plus*. Take production statistics: In Canada, if you will pardon the patriotism, we have a single scheme for that manifold of end product, materials used, capital, labor, power aspects, and what not. Over seventy departments, Dominion and Provincial, are contracted into it, and not production departments only, but trade, finance, labor departments—multilaterally and bilaterally, horizontally and vertically, group by group, but *e pluribus unum*. All had some hand in composing the score: the Dominion Bureau prints schedules, rounds out and ‘conducts’. Many collections and most compilations are done in the Bureau, others not—that is ‘practice’ not

'principle'. The Departments like it, and they are 'sovereign' as to their own needs (but only as to their own needs). The same for demographic and 'social' statistics, in fact all over the shop. I call it statistical centralization, but by any other name it smells as sweet. They used to say that only small countries could organize their statistics, though Germany and Russia were never small. It is no great 'stunt', except to get started: you can't do it bit by bit, making the plan as you go along. Government's little joke is to plant the tree and call round for the apples next morning.

The matter is at bottom constitutional, especially in a federation. Let us take a 'case'. We are at the moment setting up UNO—the Security Council, the World Court. We should 'put teeth' in these, say some. But that, surely, is getting the cart before the horse. I do not refer to our limping *jus inter gentes*, tugged at from Grotius (1625) to the Geneva Convention (1864); from Geneva to the Hague Court (1922); and until the Kellogg-Briand pact (1927) seeing war as 'natural' between nations—too natural it has turned out.³⁰ What I suggest is that with all the judges and policemen and jails in the world for bad countries, the power to command evidence, expert evidence, comes first. For UNO (notwithstanding that it may be settling down in the parish of Jonathan Edwards) this means the regular scientific measurement of world conditions known as statistics—especially on those ticklish interpenetrations where most quarrels incubate. (There may be no balm in Gilead, but there is oil in Iran and Iraq.) 'Teeth' yes, but let them be wisdom teeth.

Now, I have heard of the Social and Economic Council of UNO and its statistical plans, but may I be 'constitutional' a moment longer? An illuminating thing happened when our Canadian Constitution was on the anvil back in the eighties. The Census was of course made federal (as basis of parliamentary representation). But between two meetings someone

³⁰ As late as 1938, Ortega y Gasset could still pity the poor League of Nations as "a gigantic juridical machinery for the administration of a nonexistent law".

Considerations by the Way

slipped 'Statistics' into the same category. Not a Canadian historian, constitutional or other, knows who did it; and in fact our statisticians for thirty or forty years were like the cock with the jewel in the midden. It didn't mean of course that our Provinces were not to have statistics of their own. But it did proclaim a national statistic to be a national necessity to be tackled by specific national apparatus. Our resultant Bureau presents a very pretty catalyst of the dichotomy in federalism—the centrifugal that must somehow be centripetal, that must have variety within uniformity, flexibility within stability. "Sovereignty is indivisible", say the monists of Government; but the pluralists want things only in the 'each' form. Fortunately constitutions are not made by the philosophers but by the politicians, those hard *aposteriorists*. Dividing the indivisible is not easy even for politicians. It took twelve years to rough-hew the American Constitution (which was only the fourth true one, says Freeman, in all history), and eighty years more of pulling and hauling, and even then war followed words, a 'rebellion' the monists called it. As has been truly said, an autonomy that takes perpetuity for granted is an illusion. Well, I maintain that of most of the disharmonies and alienations that are bound to arise in any association of free peoples (which is all that a federation is), statistics are the best of prophylactics (though I do seem to have heard that they started the Civil War: the 1860 Census showed the South that time was running out unless they struck). No Bishop no King, said James I? Well then, no statistics no federalism; for the divine right of omniscient democracy needs statistics for the long pull as much as James did (or Stalin does) a bench of Bishops. There is no such provision in the United States Constitution? There could be a twenty-first amendment I suppose, but the will's the thing. "A federation does not create unity: it is created by unity" (Bryce). To unify statistics can vex the ghosts of neither the Hamiltons nor the Jeffersons, the Calhouns nor the Websters; and there shall be no more statistical wars, for the former things will have passed away. Addendum: Power is an

essential universalist, but it must work in distribution. Dictatorship is uniformity, not unity.

To return to UNO, which is not a federation or family, if it is even a boarding-house as yet in spite of its "open disagreements openly arrived at".⁸¹ As said above, UNO is taking thought for statistics. Indeed, the Social and Economic Council (significantly a child of San Francisco rather than of Dumbarton Oaks) is 'squaring away' quite resolutely. It has established a Central Commission on Statistics. Contrast this with 1920 when the League of Nations was held up by (of all people) the International Institute of Statistics, a body of scholars power-struck. Equally encouraging, those subsidiary international organizations now being born or reborn—ILO, FAO, UNESCO (the last having for object the internationalism of culture that characterized the mediaeval universities—Paris, Oxford, Bologna, Prague)—have learned not to want to do all the statistics they require. FAO, for instance, wants to see *omnibus* treatments of prices and trade on which agriculture can draw for what it needs, its own field being food production and supply. Contrast this again with the melancholy spectacle of the International Institute of Agriculture, David Lubin's magnificent inspiration. Here is a grave by which we might well stand a moment and ponder—a grave of ideals and of good deeds wrecked by foolish isolationisms. Meanwhile the International Institute of Statistics is rising again, a needed World-Mecca. Beside it stands the Inter-American Statistical Institute, academically conceived but now part of PAU. It has a popular assembly, which is democratic, though as an old official I like scholars to advise me rather than rule me. (The United States Census with its committee from the Statistical and Economic Associations has the right idea.) On the point of regionality in world statistics, we British Common-

⁸¹ The ILO, however, has been eminently successful on issues transcending state boundaries where diplomatic considerations were at a minimum. When we realize that war means self-destruction as well as enemy destruction, organization for general service may prove not so overwhelmingly more difficult than for state service.

Considerations by the Way

wealthers traversed that ground once even to the working out of a constitution for a Commonwealth Statistical Bureau, but decided against it. Canada wants world wheat figures, not merely British Empire or American figures. But we did endorse the holding of Empire Statistical conferences at intervals, and have actually held two. Canada has done more. She has lent statisticians to other countries on occasion, and so has the United States. That is genuine internationalism. I should like to lend a couple to Russia at this moment (not that she needs them); for though Russia is in UNO, she smilingly will not send agricultural statistics to FAO.

This is so satisfactory (upon the whole) to a cheerful soul, that I had almost forgotten the note of near elegy on which I started. To this I return. It is a 'double-stop', as the fiddlers say.

First, whilst descriptive Government statistics are rising mountainously, I still think they are not getting the attention they deserve outside. I could name a dozen large Canadian problem-subjects where if our statistics were a geological survey there would be prospectors on the ground in swarms. The government is partly to blame: the statistics should be easier to draw upon—they should be worked up with a greater sense of interpretive purposes. Hotelling has stated this with an eloquence that is final.³² Half of those problem-subjects are economic, but in the wanderlust of this paper let me take a social one. You are keen on criminal statistics for the whole United States? Well in Canada, as *decor* to that compelling literature of the pulp magazines, we have a record of every conviction back to 1876, with a dozen facts as to the criminal. The law and the judiciary are Dominion-made, so *that* norm is consistent.³³ We have good data on police

³² *Sankhya* (Indian Journal of Statistics, Calcutta Statistical Publishing Co., 1941), Vol. 5, Pt. I.

³³ An equally essential norm, however, is uniformity of legalistic interpretation. Lately, on juvenile delinquency, the judges have so taken the law into custody that court records have well-nigh lost meaning. Statistics cannot rise higher than their source.

activities and on jail populations. On the latter, for ten years past a card of thirty or forty rubrics has been punched annually for every inmate of a penitentiary. All this is subjective, agreed, but the objective is not wholly uncomeatable in that general statistical organization which is ours. But not till this late date, unless someone has been doing good by stealth, has there been any getting at the meaning or deficiency of meaning of these statistics, of developing them more and more to practical ends, the ends of etiology particularly—all the while that impressionism, it is crudely said, remains the badge of the hundreds of monographs and textbooks that have been written on crime since it was taken out of metaphysics, and that (here may be a clue) of all the murderers of statistics the criminologists have been the worst. (I suspect that the social sciences in more fields than this should be waiting for bio-psychology to blaze new trails.) My immediate plea (and remember this is only *exempli gratia*) is only for a processing of these statistics in the way the Sellin and Reckless bulletins of the Social Science Research Council tell how to begin.³⁴ This is a Canadian wail: I do not expect you to listen to it, especially when I add that the American-born in Canada are distinctly better behaved than the general population. Or is this merely that you cover up better? for in the higher skills of forgery, false pretenses, horse and cattle stealing, you stand out amongst us.

My second 'stop' is in harmony. The time has come, I believe, when relations between Government statistics and 'research' should be explicitly underwritten. I think we know what is and what is not 'research'. Under free enterprise we do not want the Government into it beyond a point, but we do want government in up to a point, and that point, as already said, should

³⁴ *Research Memorandum on Crime in the Depression* (Bulletin 27) by Thorsten Sellin; *The Etiology of Delinquent and Criminal Behaviour* (Bulletin 50) by Walter C. Reckless. But see the eight or ten related articles in the *Encyclopaedia of the Social Sciences*, with their references: also reports of Committees of IIS, ASA, etc., etc. Many sociologists have of course 'begun': E. A. Hooten, for eminent example (in *Crime and the Man*; Harvard University Press, 1939), has, as he says, "waded through" statistics in a very large way indeed, and how he hated it!

Considerations by the Way

include some smelting and metallurgy as well as mining.³⁵ Our foundational statistical survey must build from legislative and administrative opportunisms, but it will not stop short of any subject of first-rate public importance, on which the powers and the money of Government are essential to a good 'extractive' job. I hate to see the bricklayer making his own bricks in an improvised brickyard, even to digging out the clay—unless some point is involved. But you agree with this *in toto*. In that monumental *Report on Recent Economic Changes* there is a bristling section on official statistical gaps and inequalities. But why did you not in an appendix draw up an exact *schema* of that economic survey you want—the federalism of subject matter it comprises *plus* the federalism of departments that must execute it? You will say I am like David Copperfield's Mr. Dick who could not keep King Charles's head out of anything.

Is there no end to such contrivings? Well, the war enormously accelerated entropy, but

*That thou canst not stir a flower
Without troubling of a star,*

so moving in poetry, will for some time be one of those correlations that are called nonsense in statistics (though correlation is never a mere empiricism). In the life realm, which unlike entropy creates not disorder but order out of order, Mr. Churchill has well deleted the static termites, for all their 60,000,000 years start of us. The biological and anthropological millennium of Bernard Shaw (our Nicolas of Cusa) is better: it is static but also ecstatic—the contemplation of pure mathematics (with a few dumbbell exercises).³⁶ But this raises up values again, bane of the planner ("who shall plan whom?" as Lenin asks), for H. A. Smith from the sidewalks of New York calls it resigning from life, retiring into a cave and counting sand—the statistical concept, you will notice, pursuing the *a priori* even in Paradise.³⁷

³⁵ Government research is usually 'administrative': where the incidence is broader and political, Government is suspect.

³⁶ *Back to Methuselah*, last act.

³⁷ *Lost in the Horse Latitudes* (Doubleday, 1944).

We thought we had settled on at least *some* social values, until nineteenth century perfectionism and 'progress' went the way of the eighteenth century—Cronos devouring his children again before our eyes. None the less, though we may not know *all* we want (Heaven being so much harder to limn credibly than Hell), we resolutely know several things we do *not* want. Against war, pestilence and famine, for instance, we of this company are mounted on Science; and we will not dismount though we know as well as Albertus Magnus that the body of civilization is more than raiment, that the good life is of art as well as of knowledge.³⁸ The present is transparently, appallingly a weather-breeder. Yet I for one, like Induction, have faith in reason. For example, should you invite me to your semi-centenary, it is not bomb politics, I have a feeling, that will prevent me accepting. Trying to end these "multiloquious sermocinations" (John Graunt), I grasp at "raiment". We statisticians (*la statistique*) cannot go about like some others with nothing on but a thinking cap. We need raiment (*les statistiques*), and money to buy it, if we would pose as the flesh and blood of the social sciences. May it be with us always in this as with Christian when he met Apollyon; in the official vulgate, so long my native speech, may we increasingly subdue the Treasury to our perfect will.

³⁸ Science itself has been called only a form of aesthetic contemplation—art controlled by nature. Lin Yutang (*Between Tears and Laughter*; John Day, 1943) suggests Government by ritual and music.