

Introduction to Brass Tacks

Griffith Feeney

Most of us who pursue research for a sustained period have the satisfaction of discovering something new and of sharing it with others. But to discover and populate a vast new frontier in the world of knowledge, as William Brass has done, is given to very few. Serendipity plays a role, as Bill would readily admit. But to seize the opportunity requires ability, stamina, vision and courage. Bill could not, because it would require a wholly alien immodesty. outline his achievement and celebrate the virtues that made it possible. This happy task falls to those of us who have followed him.

When Bill joined the East African Statistical Department in 1948, the world was divided, as it is today, between richer and poorer countries. One aspect of this divide lies in the availability of demographic data. Rich countries had population censuses and vital registration systems that provided reasonably complete and accurate demographic statistics. Poor countries had little demographic data, and what little they had was often of poor quality.

Yet the need for demographic information in poor countries was if anything greater than in rich countries, for their attempts to develop were being complicated by rapidly growing populations. As a nascent demographer, Bill recognized this quickly enough—but so did every other demographer who paid attention to the matter. The divide was easy to see. The challenge was to do something about it.

Where others saw merely a deficit and a nuisance, Bill saw an intellectual challenge of the first order. He saw that the eminently practical problem of securing demographic statistics for developing countries could be resolved into a series of scientific problems, that demographic measurement could be conceived in far more general terms, and that in this way useful estimates could be obtained in the absence of established census and vital registration systems. He responded with an extraordinary and sustained outpouring of effort—of ideas and methods, teaching and research, fund-raising and institutional development, international travel, lecturing and consulting—that ceased only when illness prevented further work.

On return from East Africa in 1955 Bill spent a decade at the University of Aberdeen. While his ideas were stimulated by the experience in East Africa, here they matured and were spread in the academic world. A year's leave spent at the Office of Population Research at Princeton University in 1961 played a key role in this process. In 1965 he moved to the London School of Hygiene and Tropical Medicine, where he remained until retirement in 1988. He began as a Reader, was awarded a personal Chair in Medical Demography in 1972, and in 1974 founded the Centre for Population Studies with support from the Overseas Development Administration. In time the mission of the Centre was broadened to incorporate the demography of developed countries, to which Bill made numerous distinguished contributions. The Centre remains today one of the pre-eminent institutions of world, to say nothing of British, demography.

Most demographers know that 'Brass techniques' are a means of getting demographic estimates when 'standard' sources, most often a mature vital registration system, are lacking. But to know this is to know very little. A detailed enumeration of techniques is certainly not wanted here, but we ought to try for a less superficial understanding of Bill's achievement.

Bill saw more or less from the beginning that in demography as in war, frontal assault is not always the best strategy, that demographic data collection should take account not only of what we would like to know, but of the information respondents are best able to provide. This is not merely a matter of suitable phrasing of questions, an issue familiar to every census taker and survey statistician, but of recognizing and exploiting deep relationships that must be expressed in mathematical form and which involve empirical regularities as well as formal demographic tautologies.

This is illustrated by the most famous ‘Brass technique’, which estimates mortality from information on children born and surviving. Life-tables are what we would like to have, but direct calculation requires a mature vital registration system to supply numbers of deaths. Vital data may in principle be obtained, with some limitations, by retrospective questions on a census or survey, but experience shows that respondents are often unable to respond accurately to these questions.

An alternative is to recognize that census or survey questions on numbers of children born and surviving contain information about life-table survival probabilities, and that respondents may be able to answer these questions more accurately. But to move from information on children ever born and surviving to life-table survival probabilities is no simple matter. It requires both non-trivial mathematics and models of the age pattern of fertility and mortality. Perhaps the best evidence of the complexity of the problem is the stream of methodological research it has generated. The earliest published work seems to be the paper Bill presented to the 1961 conference of the International Union for the Scientific Study of Population. Every subsequent decade, going on 40 years now, has seen further contributions, most recently the paper by Collumbien and Sloggett in the present volume.

The various technical assumptions made by this and similar methods have bothered many people, since they are never perfectly satisfied and are a source of error in the estimates. In application, however, the important questions are, firstly, how serious the errors are, and secondly, how the estimates compare with available alternatives. Census or survey questions that attempt to obtain vital registration data retrospectively are simpler to analyse because they make only one assumption—that responses will be reasonably complete.

Unfortunately, this one assumption often fails disastrously, whereas the numerous technical assumptions made by the ‘indirect’ method—so called because the information collected is only indirectly related to the quantities estimated—come fairly close to the mark.

Nearly as fundamental as the idea of indirection in data collection is the idea that errors in data act as a kind of filter, blocking the transmission of certain information while letting other information pass. One of the most elegant and enduring of Bill’s methods exploits a remarkable complementarity of such filtering in questions on children ever born to women at the time of a census or survey and births to these same women during the immediately preceding year (or other period). Numbers of births in the recent past are likely to be under- or overstated, but the extent of this distortion will usually be similar for women at different ages. Thus the error blocks information on numbers of births but lets the percentage distribution by age through relatively unscathed. Numbers of children ever born are generally reported reasonably accurately by younger women but may be seriously underreported for older women. The obscurely named ‘P/F ratio

method’—i.e. the comparison of cumulated current fertility and average parity—utilizes both sources of data, exploiting their complementary errors to extract from them an estimate of fertility that neither source alone could supply.

A third fundamental idea is deceptively simple, reminding one of Samuel Johnson’s adage that we ‘need more often to be reminded, than informed’. Bill once expressed it as the principle of ‘no rule’, observing that

There is no method which functions at all times and in all situations. All are based on certain suppositions about how errors are made; it is very difficult, if not impossible, to anticipate patterns of error. While there is only a single truth, there is an infinite number of ways to make errors.

What this means in practice is that producing estimates when data are deficient requires always the exercise of intelligence and judgement beyond that which is incorporated in the estimation procedure.

Obvious, you say, but a persistent tendency in statistics at least since Neyman-Pearson theory has been to maximize the intelligence incorporated in statistical methodology and minimize that required in application. This tempts us to think that, having made the often considerable effort necessary to learn a method, we should have only to apply it in one case after the other to get sensible estimates. Would that it were this easy. Unfortunately, this is more or less equivalent to thinking that ordering up a pile of building materials and a shed full of fancy tools should somehow result in the construction of a house, without the necessity of further effort on our part.

Learning the various methods that Bill and others have developed is one thing. Learning to apply them is a different and considerably more difficult thing. Learning the methods may be non-trivial, but with sufficient effort one masters them, and that is that. Learning to apply the methods is a matter of experience, and the more experience one has the more one learns. New situations raise new challenges, and success in past applications does not assure future success. Most who have pursued such work over a career will have had the experience of deploying with satisfaction several highly sophisticated methods only to obtain drastically inconsistent results. And have been humbled by being at least temporarily mystified as to what precise constellation of errors could have resulted in this outcome.

Bill was famously quick on his feet. One of his minor methods was discussed in detail at a meeting, with many lamentations over the various assumptions made and how they might go wrong. As the discussion wore on an impartial observer might have been forgiven for wondering if the thing were really worth pursuing. At length Bill rose to speak, and one sensed a growing but well-tempered impatience. ‘This’, he said, ‘is a *desperation* method’, a method to be used when nothing else is possible, when one is desperate. Of course there are problems, but the method gives results where nothing else would, an imperfect but possibly useful answer in place of no answer at all. With a single sentence he restored perspective to the discussion and, not incidentally, a suitable modicum of respect for his methodological child.

On another occasion, following a tendentiously long enumeration of all the things that could go wrong in applying another of his methods, Bill cut characteristically to the quick by observing that ‘not everything that can go wrong, will’. Were this not true, social data collection of all kinds would be far more problematic than it is. The observation is so

fundamentally true and important that I take the liberty of christening it 'Brass's Law'. Of course it calls to mind Murphy's Law, 'If anything can go wrong, it will'. It is left as an exercise for the reader (as mathematics textbooks are fond of saying) to show that the contradiction between the two is only apparent.

Bill was quick on his feet in part because he spent a great deal of time there and so had a great deal of practice, not only in formal teaching, but in conferences, workshops and lectures around the world. Once after a particularly tedious conference session he confided to me that he would 'rather talk for six hours than listen for one'. I recall with particular fondness a phrase that shows skill in rhetoric rather than demography. In response to complex and long-winded questions Bill would often begin with a measured pause followed by 'Yes, and no'. This is a wonderfully polite way of saying that the issue is more complicated than perhaps the questioner realized. It prepares listeners for an extended reply, to which they must listen carefully to discern which points are on which side. And has the added bonus of giving the speaker a few extra moments in which to compose his or her thoughts.

Bill once told me of receiving a telephone call whose purpose was to ascertain informally whether he would accept a certain honour from the British Government if it were proffered. This was to avoid embarrassment, he explained (to an ignorant American), for from time to time potential recipients had declined the award. Chasing after awards would have been wholly alien to Bill's character, but so would the arrogance required to decline any reasonable honour.

Some honours come free and clear, or even net a small profit, while others come with a requirement of *corvée* labour that disciplines impose on their best members. Bill had a surfeit of both. In 1978 he received the Mindel C Sheps Award from the Population Association of America. He was elected a Fellow of the British Academy in 1979 and received the CBE in 1981. In 1984 he was elected Foreign Associate of the United States National Academy of Sciences, the highest honour the Academy can bestow on a foreigner, and in 1985 he was elected President of the IUSSP.

Much has changed in the more than half century since Bill first set foot in the East African Statistical Department. Considerable resources have been expended on collecting better demographic statistics in developing countries, and we certainly have more and better information now than we did then. In the face of this progress we might be tempted to flatter ourselves that the principles and methods Bill worked so assiduously and ardently to create and promote are fading in importance.

In fact, nothing could be further from the truth. Mature vital registration systems are still the exception in developing countries, and populations covered by such systems have generally grown much more slowly than countries not covered. As a result, the fraction of the world's population covered by such systems has probably declined over the past 50 years, for there are relatively few countries whose vital registration systems have matured over the same period.

The limited development of vital registration systems has to some extent been offset by the widespread deployment of sample surveys, but these cannot replace vital registration. The obvious contemporary instance is the glaring absence of information on the demographic impact of HIV/AIDS in many of the countries that suffer most severely from it.

But to think in this way is to look backward into the past, and we ought to attempt to peer into the future, the emerging brave new world of global digital computer networks. We have lived for some time in a world in which—this is an actual case—a resident of the Hawaiian Islands in the middle of the Pacific Ocean can buy a book at Blackwell's in Oxford, England, using a small piece of digitally encoded plastic, with payment, including foreign currency exchange, effected transparently, almost instantly, and at negligible cost.

How long can decennial population censuses, which provide data which is, averaged over time, typically six to seven years out of date, survive in such a world? How long, in such a world, can vital statistic systems continue to issue annual reports that are years, sometimes many years, out of date? Demographers routinely project population forward many decades into the future. What will demographic data collection systems look like in 2050? Already some countries have abandoned traditional population censuses, sometimes for reasons that have as much to do with non-cooperation of respondents as with superior alternatives provided by new information technology.

Population censuses and vital statistics systems will not disappear any time soon, but our use of them may be transformed almost beyond recognition over the next few decades by the availability of alternative sources, commercial, private non-profit and governmental, that contain much of the information we now get from censuses for much of the population. How these matters will play out is a pretty puzzle. One suspects that the developed country statistical systems that developing countries are aiming for will be obsolete in developed countries long before they arrive in developing countries.

In the face of these imponderables, and with the usual risk of looking silly in the future if anyone pays attention, I suggest that demographic data collection will become more complicated rather than simpler in coming decades, that the problems we face everywhere will look more like the current and past situation in developing countries than the familiar and comfortable situation of developed countries. If so, the most important lessons Bill has taught us will be as relevant for the world as a whole in the future as they are for the developing world of yesterday and today.