© Copyright, Princeton University Press. No part of this book may be distributed, posted, or reproduced in any form by digital or mechanical means without prior written permission of the publisher.

Introduction

The Dynamics of Change in Demography

Demography has often been contrasted with psychoanalysis. Both are studies of man and society: one is concerned with populations, the other with individuals. One makes use of mathematics, the other focuses on language. For one the individual is an anonymous and isolated gambler who draws the events of his life as in a lottery; for the other, society remains a shadowy multitude governed by the primary drives of life and death. To these differences I would add another that appears to me to sum them all up: demography has one and only one theory, one and only one paradigm, whereas the many competing schools of psychoanalysis defend rival and mutually incompatible theories. An analyst will be labeled as Freudian, Jungian, or Lacanian, and will invoke such and such a master when defining his or her position and clinical methods. A demographer will be described simply as a demographer and will make reference to no master.

One may object that the reason for this is obvious. Demography operates in the real world of people and places, psychoanalysis in the realm of interpretation. In demography, people are born, they get married, have children, migrate, not necessarily in that order, and finally they die. These events are real, factual; each one is unique. In psychoanalysis, individuals have dreams, commit slips of the tongue, suffer from psychoses or neuroses, recollect early or even infantile experiences. These are mental representations; they are countless. It is a science of nature versus a pseudoscience of the mind. Such a conclusion is inaccurate. Even though one of the two disciplines has a single theory and the other many, both are based on theory, and hence on a construction, a codification, an abstraction of reality—on conventions whose main rationale is coherence. For theory implies coherence. There is no such thing as an incoherent theory: at most there are theories that are incomplete.

In saying this I risk offending the positivism laid claim to by demographers and analysts alike—the former openly, the latter more discreetly. Both own to accepting a few conventions but both claim to have a strong grasp on reality. This is the reality of death or of dreams, of course, but most importantly the reality of their respective instruments and concepts: mortality, with its age-specific mortality rates and life expectancies, and the unconscious, with its desires and impulses. Yet instruments are not part of nature. They have not lain hidden since the dawn of time waiting to be discovered by demographers and analysts, like fossils by paleontologists or galactic clusters by astronomers. They possess a history, a rationale; above all, they have been

For general queries, contact webmaster@press.princeton.edu

© Copyright, Princeton University Press. No part of this book may be distributed, posted, or reproduced in any form by digital or mechanical means without prior written permission of the publisher.

shaped in relation to each other to produce a coherent whole. If this is the case, can we not simply say that theories are social constructions and that their instruments constitute the equipment? That would be to go from one extreme to the other and gain nothing in the process. Apart from the fact that all theoretical constructions, being mediated by language, are social by definition, the expression itself reveals a woolly cultural relativism. Clearly, the fact that demography and psychoanalysis existed in the twentieth century, rather than at the time of Athens, Rome, or Xian, was thanks to particular social—but also political, economic, and intellectual—conditions. But these do not explain why the disciplines have stabilized in their exact present form. The erratic evolutions of the economic, political, and social systems do not mysteriously create order in the form of demographic theory or a particular psychoanalytic theory. Theoretical order is achieved only after lengthy and collective intellectual effort during which the early propositions, formulated independently and giving rise to contradictions, are gradually solved by new conceptual choices, which in turn raise new difficulties. The remarkable point—and perhaps the one true mystery of nature—is that such a process results in virtually stable situations, theories that are few in number, and in some cases unique, for example, those by which we understand the evolution of living organisms, the formation of crystals, the Platonic solids, or the regular divisions of the plane.

Learning and understanding demography is thus to penetrate deep into the theory that it constitutes, and this is the necessary condition for its existence as an independent discipline; it means isolating its primary constituents and their basic relations, and highlighting the conceptual choices and the bifurcations that had to occur in the course of its elaboration for it to attain its current stability. Only with this approach can we identify the still-unresolved problems and trace the dynamic development of the theory faced in particular by the new social, economic, and political situations that gradually undermine its original foundations. The theory is not cut off from present reality, but its structure was achieved with difficulty and is highly resistant to change. A knowledge and understanding of the form taken by demography as an organized whole is the only way to make it evolve. But this is always difficult, since once a certain expertise has been established, the tendency is to protect and defend it like a capital, not to seek to reach beyond it.

Is this not a commonplace situation that all disciplines know how to deal with? A look at the recent treatises and encyclopedias of demography—whose quality is not in question, merely their epistemological orientation—makes this seem doubtful. What they frequently have in common is a preference for practical formulas—which the seminal work by Graunt and Petty (1661) had already described as "shopkeeper's arithmetic"—and a conviction that the established instruments will remain forever. After reading such books, leaving aside the standard typologies such as longitudinal/cross-sectional, first- and second-order rates, renewable and nonrenewable events, you do not know what constitutes the discipline, or the position of its

For general queries, contact webmaster@press.princeton.edu

© Copyright, Princeton University Press. No part of this book may be distributed, posted, or reproduced in any form by digital or mechanical means without prior written permission of the publisher.

boundaries. Demography's general form, its overall structure, in a word, the coherence that is the fundamental reason for its existence—these remain concealed. Yet there is no reason why a set of formulas and typologies should coalesce as a particular discipline. And to say, as is customary, that demography is the scientific study of populations, solves nothing. Populations are everywhere and nowhere. Ironically, it could be argued that their discovery came after that of demography (this is true of the term "population," which did not come into use until a hundred years after publication of Graunt's and Petty's works). The geographer Hartshorne (1939) chose an admirable and simple title for his book *The Nature of Geography*. We would gladly adopt it for our purposes and say that what we are seeking to capture here is the nature of demography, not from esthetic or philosophical motives, but on the contrary from practical necessity. To engage in the major contemporary debates over demographic issues—population aging, exploding birth rates, abortion, retirement pension systems, urban concentration and dispersion—one needs to know exactly how they are interrelated and how they are formalized. The weapons of critique must be forged before they can be used.

This does not mean that we shall have our heads in the clouds. Even if demography uses numbers and mathematical reasoning, it need not take this to excess. Its objective is not to become a part of the corpus of mathematics but to use it in the simplest and most concrete way, along the lines Richard Feynman sets out in his treatises on general physics. When all is said and done, demography employs mathematics to handle problems that in essence come down to those of taps, tanks, and bathtubs. There is no point in adopting technically tortuous methods to resolve them. Every now and then a major mathematical theory will be encountered and pointed out, but the rest of the time we shall be working at the level of a secondary-school student in his/her final year. What matters is to make the approach used comprehensible, not to fix demography in the camp of mathematics.

To address these theoretical preoccupations and practical intentions, the book is divided into three parts, corresponding to three stages of increasing complexity: individuals, populations, and networks. We begin by setting up a simple and general model of behavior, personified by *homo demographicus*. He is a gambler who must contend with various risks—those of dying, having a child, migrating, getting married. He and the lifeline linking the events he has experienced are the necessary starting point for demographic analysis: aggregating individual behaviors represented by a probability set, we get results at the population level which are summarized in the form of indices such as life expectancy or total number of children ever born, before subjecting those changes of behavior to analysis. The more precisely analysis relates behavior to observations, the greater its capacity in the other direction to infer changes in behavior from variations in observations. This will be verified in the last two chapters of part I, which are given over to changes in the pace—in the timing or tempo to use English demographic terminology—of fertility and mortality, the effects of which are far from obvious.

For general queries, contact webmaster@press.princeton.edu

© Copyright, Princeton University Press. No part of this book may be distributed, posted, or reproduced in any form by digital or mechanical means without prior written permission of the publisher.

At the end of part I we run up against two questions. First, how can change in the size and age structure of populations be related to the fertility and mortality behavior of *homo demographicus*? Second, how can the overly simple model for the life and death of *homo demographicus* incorporate marriage and migration, and how can these be associated with fertility and mortality? The answer to the first question constitutes the core structure of contemporary demography. Part II is thus devoted to the passage from the behavior of individuals to that of populations, a question that has been the focus of attention in demography for nearly a hundred years. This approach was adopted in the 1920s as a result of the first population projections. Its effect was to orient demographic theory strongly toward the mathematical theory of stable populations, of which projections were an application. There is no mystery about this latter theory's neglect of migratory movements (although it can accommodate them, it usually reasons in terms of "closed" populations) and especially of nuptiality (fertility is defined uniquely by the age of mothers at childbearing). Stable-population theory assured a coherent relation between mortality and fertility on the one hand, and between population growth and age structure on the other, by supplying a model of population change based on the measures of behavior defined in part I. Stable populations and their generalization to populations in which fertility and mortality vary over time can be used to analyze a wide variety of social and, particularly, economic phenomena. These include financial equilibria over the life cycle, sustained long-term fluctuations in fertility and in the size of the labor force or in local population structures, population aging, decisions over retirement pensions (pension schemes or pay as you go), population regulation, and the relationship between economic growth and population growth, to mention just a few examples that we shall be examining.

The second limitation of contemporary demography derives logically from the choice in favor of stable populations. These are fundamentally closed populations in which the pace of events is dictated by the age of the individuals, independently of the other people with whom they live or interact. *Homo demographicus* is a Robinson Crusoe-like figure, cut off from his fellow men. When we wish to take account of ties of family or locality, demographic theory quickly loses its effectiveness. The third and last part, however, will attempt to push back the limits set by the second by examining the domain of marriage, then that of internal migration, and, finally, the spatial distribution of population. Models of social ties based on competing choices under simple constraints will be proposed. The preferred partner is chosen from among a set of possible partners; the nearest migration destination is chosen from among several opportunities. But competition inevitably arises between those in a position to choose the same person or the same place. This brief description explains why research has turned toward marriage-market and spatial-allocation models. We review these and in a number of cases extend them by using documented examples. The final part will thus remain exploratory, for although nuptiality or "partnership formation" determines fertility and the influence of migration on numbers is greater

For general queries, contact webmaster@press.princeton.edu

© Copyright, Princeton University Press. No part of this book may be distributed, posted, or reproduced in any form by digital or mechanical means without prior written permission of the publisher.

at lower scales, there are still many obstacles to their integration into population theory.

An account along these lines produces a strong image of demography with its central core of stable populations and its potential for extension in the areas of nuptiality, migration, and spatial population distribution. But it must also be admitted that, like any theory, demography exists and can only exist as a result of major and deliberate restrictions. Outside the frontier of the discipline, therefore, we have left a fringe that contains, among other topics, animal populations, the family, and kinship. The reasons for these exclusions can be stated briefly.

The demography of animal populations is central to biomathematics but it has different objectives to human demography and uses different methods. The elegant models of predation, competition, and spatial dispersal have no equivalent in human societies except at the level of metaphor. Conversely, changes in behavior in respect of fertility, mortality, migration, and nuptiality are alien to biomathematics, which postulates animal populations that are history-less and species-bound, and envisages change only at the level of an evolutionary theory, hence of selection and of competition between species.

Family demography has been left aside for other reasons. It seems to me that it is still unsure about its choices and concepts, not due to vagueness in sociology or multiple theories in anthropology—we pass no judgment on other disciplines—but because its construction requires mastery of the formalization of nuptiality and migration, which is not realized at the moment, as will become clear in the course of part III. Valuable models for the simulation of kinship and family exist—and we have contributed to them—but they are not yet at the stage where they can account for very general regularities such as the relatively high proportions of both sexes never marrying in Europe since the Renaissance, or the reproduction of household structures across cohorts through their life cycle. In these areas we are still at the stage of observation. Demography might well extend in these directions in the years to come, but since all the elements are mutually interdependent this is likely to involve a challenge to its current form. For the present that eventuality is still remote. Accordingly, we will confine ourselves to the strong core theory that dominates the discipline today and not roam beyond its immediate extensions.

For general queries, contact webmaster@press.princeton.edu