



NORTH-HOLLAND

Longevity and Life Expectancy

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ABSTRACT

The increase in life expectancy at all ages during the last two centuries is in need of a quantitative model capable of resumming the whole process under a single concept and simple mathematics. The basic hypothesis was that through improved hygiene, medicine, and life-style, the stumbling blocks to the full expression of longevity were progressively removed. The mathematics of learning processes was then applied to the secular evolution of life expectancy at various ages. The hypothesis proved very fertile. Logistic equations fit long strings of statistical data, covering the evolution of life expectancy at various ages, for both sexes, and in many European nations for almost two centuries. These life expectancy increases seem to move progressively to a common asymptote of about 79 years for men and about 84 years for women. It is suggested that these values are taken as a definition of longevity, presumably explicating a coding in DNA. The evolution of life expectancy during the last couple of centuries appears to follow consistent paths precisely mapped with simple mathematics. This opens the way to more integrated and holistic theories. . © 1997 Elsevier Science Inc.

Introduction

The evolution of hygiene, nutrition, and medicine during the past two centuries has brought spectacular results in reducing infant mortality, in controlling infectious diseases and other ailments, and in increasing life expectancy, not only at birth, but in different measures at all ages.

In this article the evolution of life expectancy is examined historically for various European nations, at various ages, and according to sex. Appropriate logistic equations describe the facts and extrapolate into the future giving the doctor an indication of what is still to be accomplished and the demographer the tools with which to evaluate the aging of European populations in the next 20 years.

Methods

This analytical technique has been applied in many areas of sociology and economy, but as far as I know, not yet to the subject of life expectancy. In a nutshell, I posit that the increase in life expectancy is the product of a learning process to remove the accidents and obstacles on the way to the full life potential of an individual: longevity.

Learning processes follow precise mathematical guidelines, and one of them, the learning of language by a child, is reported in Figure 1. This figure is important because

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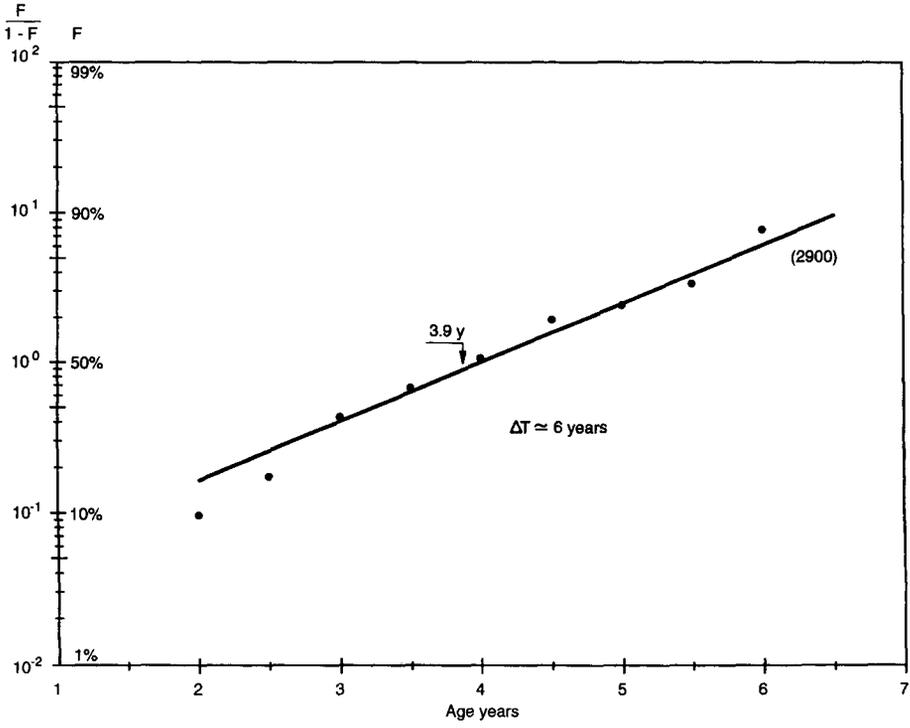


Fig. 1.

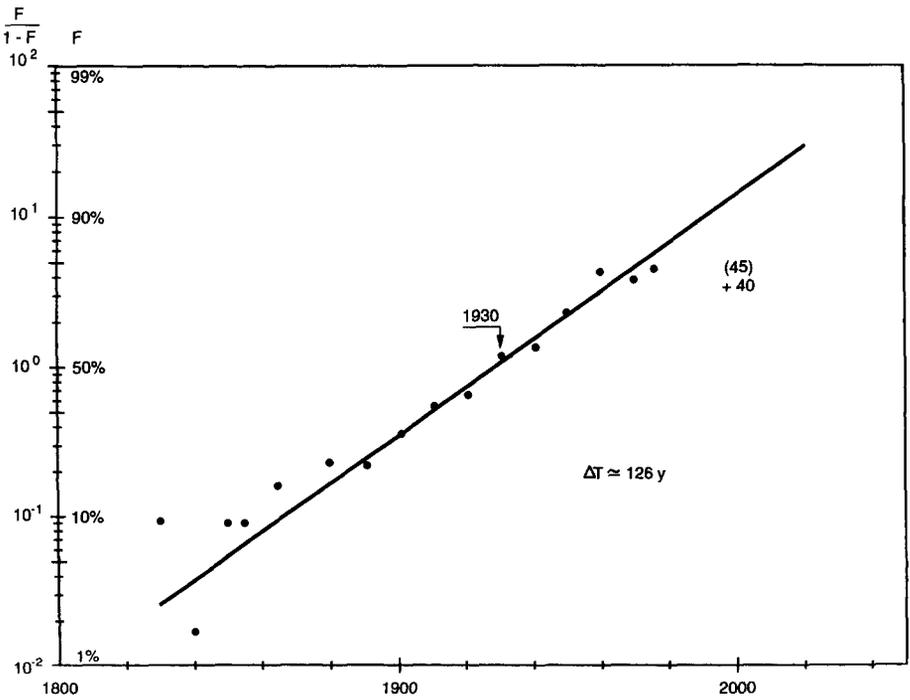


Fig. 2.

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