such a country will have to make a proportionately greater reduction in individual fertility to reduce its population growth rate than would a country with an older population age structure.

Social Change Another important delay in population systems is the slow adjustment of social institutions, including the family, to changing external conditions. The primary evidence for this slow adjustment comes from data on the demographic transitions of various countries, to be discussed later. However, several observers have also reported such a delay on the basis of personal experience with the changing social norms of specific populations.

> Taiwan had a history of slowly but steadily declining mortality under Japanese rule, followed by very rapid mortality decline after the war. Average life expectancy is now more than 60 years. The probability has been high for some time that almost all children will survive to adulthood. . . . Under present mortality conditions in Taiwan a single son is very likely to survive to adulthood, so having additional sons as "insurance" is probably an anachronism, but the traditional preference for several sons persists. The family size and sex composition being sought are approximately what a traditional Chinese family might have achieved with luck under high mortality and high fertility. . . . [Freedman 1963]

> Karimpur's village companions have achieved marked success with their farming demonstrations, but have been able to accomplish much less where their suggestions for change touched domestic routine and relations among people. The slower response in matters of social organization is not unusual in the history of mankind—social patterns are generally less amenable to change than technological patterns. [D. G. Mandlebaum in Wiser and Wiser 1963]

> The supposed resistance of factors of high fertility to social and economic changes is also borne out by the observation that the levels of fertility, in most high-fertility areas, do not appear to have changed very much during recent decades, in spite of considerable progress in health and education, and of accelerating urbanization. [U.N. 1965, p. 6]

Slow social adjustment to changing conditions is certainly not limited to matters of reproduction. It probably occurs whenever an alteration in an accepted mode of behavior diffuses throughout a society. The apparent period of delay between the stimulating change and the ultimate response is actually a time of great dynamic activity within the society, when all the steps leading to a final observable behavioral change are carried out. These steps may include (1) perception of the new environmental conditions, (2) diagnosis of a problem, (3) identification of a suitable response, (4) confrontation with interest groups defending the status quo, and (5) integration of the response into reinforced social patterns. Donald Bogue has described the probable sequence of changes required before a population can adjust its birth rate to a new, lower death rate:

> If death rates fall, the population must sense the fact by realizing that average family size is increasing. Merely attaining this awareness would require a period of several years. . . . Next, the implications of this change for individual and group welfare must be appreciated, and defined as undesirable. Finally, some socially acceptable solution (mode of fertility control) must be devised, diffused throughout the population, and adopted as socially acceptable behavior. Even under the most favorable circumstances substantial time would be required for a population to go through these steps. If there are strong forces resisting the regulation of fertility, the process is slowed even more. [Bogue 1969, p. 52]

In the case of changes in the birth rate the social adjustment delay may be particularly long, for at least three reasons:

1. A change in reproductive habits must be practiced consciously by a majority of the population before an observable aggregate response can be generated. Universal acceptance is not so necessary for many death-control changes, such as purifying public water supplies or spraying for disease vectors, for these changes require the participation of only a small administrative and professional corps.
2. In many cultures, reproductive matters are not considered an acceptable topic for public discussion. Therefore, the message promoting change and any new techniques (such as contraception) facilitating change must be spread through individual rather than mass communication channels.
3. Strong forces that tend to resist change in reproductive patterns are already built into every social system in the form of the family itself.

> Individuals who are socialized in families will be likely to want families themselves, to enforce norms and sanctions regarding families, and to take pleasure in acting out familial roles. This means that the family complex is itself a goal—the utilities represented by children are not merely economic or affectional, but socially structured in a powerful manner. [Blake 1965]

Although the existence of a relatively long delay in the reproductive response to changing environmental conditions does not imply that social norms regarding reproduction are totally rigid, it does suggest that they change only slowly, probably over several generations. This slow response is usually a source of system stability, ensuring a fairly steady renewal of the population regardless of sudden, random environmental fluctuations. Conditions under which the long response delay may cause instability are discussed in section 2.6 and in Chapter 7.

The Demographic Transition

The "demographic transition" (Notestein 1945) is the change over time of birth and death rates as a population undergoes the process of industrialization. The pattern of this transition has so far been roughly similar for all nations that have become industrialized. Examples are shown in Figure 2-11 as a function of time and in Figure 2-12 as a function of rising GNP per capita. The demographic transition tends to follow four successive stages as per capita income increases (Heer 1968, p. 10):

1. High, irregular death rate, high birth rate, very slow rate of population growth.
2. Rapidly declining death rate, slowly declining birth rate, increasing rate of population growth.
3. Slowly declining death rate, rapidly declining birth rate, decreasing rate of population growth.
4. Very low, stable death rate, low but fluctuating birth rate, slow to moderate rate of population growth.