1972

Introduction to *Population Growth: Anthropological Implications*

Brian Spooner  
*University of Pennsylvania, spooner@sas.upenn.edu*

Follow this and additional works at: [http://repository.upenn.edu/anthro_papers](http://repository.upenn.edu/anthro_papers)  
Part of the [Anthropology Commons](http://repository.upenn.edu/anthro_papers) and the [Demography, Population, and Ecology Commons](http://repository.upenn.edu/anthro_papers)

**Recommended Citation**  

Proceedings of a colloquium in general anthropology entitled 'Population, resources, and technology;' held at the University of Pennsylvania, March 11-14, 1970, under the combined auspices of the Near East Center, the University Museum, and the Department of Anthropology of the University of Pennsylvania, in association with the Wenner-Gren Foundation for Anthropological Research, Incorporated.

This paper is posted at ScholarlyCommons. [http://repository.upenn.edu/anthro_papers/75](http://repository.upenn.edu/anthro_papers/75)  
For more information, please contact repository@pobox.upenn.edu.
Introduction to *Population Growth: Anthropological Implications*

**Abstract**
The relationship of agricultural development and population growth has long been debated by social scientists. In 1965 an economist, Ester Boserup, entered this debate with the proposal that population growth should be treated as the independent variable in technological and cultural change (*The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure* [Chicago: Aldine]). This proposal was not entirely new, although Malthusian respect for the limits imposed by the inelastic carrying capacity of resources and rigid technologies is still implicitly dominant in the literature. However, Boserup's thesis had not before been so comprehensively and logically worked out. In economics-the disciplinary context from which it arose—it has had a mixed reception, largely according to the ideological inclinations of the critics; and its implications for other disciplines, including anthropology, have been slow to percolate.

**Disciplines**
Anthropology | Demography, Population, and Ecology | Social and Behavioral Sciences

**Comments**
Proceedings of a colloquium in general anthropology entitled 'Population, resources, and technology,' held at the University of Pennsylvania, March 11-14, 1970, under the combined auspices of the Near East Center, the University Museum, and the Department of Anthropology of the University of Pennsylvania, in association with the Wenner-Gren Foundation for Anthropological Research, Incorporated.

This book chapter is available at ScholarlyCommons: [http://repository.upenn.edu/anthro_papers/75](http://repository.upenn.edu/anthro_papers/75)
Population Growth:

Anthropological Implications

edited by Brian Spooner
The Boserup Model

The relationship of agricultural development and population growth has long been debated by social scientists. In 1965 an economist, Ester Boserup, entered this debate with the proposal that population growth should be treated as the independent variable in technological and cultural change (The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure [Chicago: Aldine]). This proposal was not entirely new, although Malthusian respect for the limits imposed by the inelastic carrying capacity of resources and rigid technologies is still implicitly dominant in the literature. However, Boserup's thesis had not before been so comprehensively and logically worked out. In economics—the disciplinary context from which it arose—it has had a mixed reception, largely according to the ideological inclinations of the critics; and its implications for other disciplines, including anthropology, have been slow to percolate.

As an economist Boserup is concerned primarily with agriculture and the economics of development. Her book is based on the directly anti-Malthusian assumption that the main line of causation in the relationship between population growth and agricultural development is from the former to the latter: she treats "population growth . . . as the independent variable which in its turn is a major factor determining agricultural developments" (Boserup 1965: 11). Moreover, she extends her thesis from the recent decades of agricultural development to a much broader theoretical and historical context and expresses the hope that "this approach is conducive to a fuller understanding of the actual historical course of agriculture, including the development of patterns and techniques of cultivation as well as the social structures of agrarian communities" (Boserup 1965: 12).

A central feature of her approach is her rejection of traditional taxonomies of land use in favor of the concept of frequency of cropping. Uncultivated land thus ceases to be a category opposed to land under cultivation and becomes rather one end of a continuum, of which the other end is multicropping, where as soon as one crop is reaped another is sown. All other types of primitive land use take their place between these two extremes, and population growth is seen as a prime mover in the evolution (in both pristine and secondary conditions) from one stage
to the next. If this at first sounds simplistic, there is a range of variables to be borne in mind, in particular the effects of capital investment and external political constraints. The exposition is sophisticated in the consideration of these, and the model is meant as an explanation of internal dynamics only.

As population grows, more people per unit of land are faced with the necessity of producing more food per unit of land, and they are able to do this by intensifying their relationship with the land—their technology—moving from hunting and gathering through stages of cultivation with ever shorter fallow periods to the final stage of intensification, which is multicropping with no fallowing. However, according to her thesis there is a penalty: with each increase in output per unit of land, output per unit of labor is more likely to decline than to increase. Therefore, according to the Law of Least Effort, cultivators do not normally intensify, or adopt technological innovations related to intensive agriculture, except when forced by the pressure of population on resources (Boserup 1965: 41). Two of the most essential elements of her thesis, therefore, may be characterized as (1) the elasticity of the limits of the carrying capacity of land, and (2) the Law of Least Effort.

Also implicit in her exposition is the idea that intensification in the use of land is accompanied by parallel processes of intensification in other aspects of culture and society. The effects of growing populations and this resulting process of intensification do not always constitute an unmixed good. The land itself may be spoiled for a time or forever. But nevertheless, the neo-Malthusian theories [that regard population growth as a variable dependent mainly on potential for food production] . . . are misleading, because they tend to neglect the evidence we have of growing populations which managed to change their methods of production in such a way as to preserve and improve the fertility of their land. Many tribes did not become nomads destroying the land by their herds of herbivorous animals, but used these same animals to cultivate the grass lands in short-fallow rotations with the result that soil fertility was improved by animal manure. Others irrigated the dried-up lands and prevented erosion by terracing of the land. It is true that some regions which previously supported a more or less dense population are barren today, but it is equally true that regions which previously, under forest fallow, could support only a couple of families per square kilometer, today support hundreds of families by means of intensive cultivation. Growing populations may in the past have destroyed more land than they improved, but it makes little sense to project past trends into the
future, since we know more and more about methods of land preservation
and are able, by means of modern methods, to reclaim much land, which
our ancestors have made sterile [Boserup 1965: 22].

In answer to the question whether it is realistic to deal with technical
change in primitive communities as a variable dependent on population
growth, Boserup asks how many examples can be found of nongrowing
primitive populations that advanced in technology. She discusses the
"vicious circle of sparse population and primitive techniques" (Boserup
1965: 70–76) and draws attention to those parts of Africa that never
pushed ahead in the past, because of low birth rates and high mortality
rates, which in turn were caused, not by limited availability of food, but
by conditions of slave trade, by tropical disease, and by many other
factors. Her model of population as "prime mover in society" is con-
structed precisely in order to bring out this difference between those
primitive societies that are growing and successful and those that are non-
growing and unsuccessful.

Finally, the obverse of her thesis should also be true: population decline
should logically result in "extensification" or technological "reversion"
to methods that are both less labor-intensive and less land-intensive.
And in fact, "in cases where population density was reduced by wars or
other catastrophes there often seems to have been a relapse into more
extensive systems of cultivation" (Boserup 1965: 62).

The Colloquium and the Following Essays

In converting the contributions to the colloquium into the chapters of
this volume, the essays have been arranged according to the type of data
they deal with. The first eight chapters are concerned primarily with
agriculture as a subsistence base. The first two concern ancient Mesopo-
tamia, though dealing with different geographical units and time ranges
and, consequently, with different problems. Chapter 1 offers a survey of
the development of attitudes toward population within anthropology
before proceeding to a discussion of the origins of food producing in
Greater Mesopotamia. Chapter 2 treats the urban revolution in the same
area. Chapter 3 is concerned generally with the formation of the state
without geographical or temporal referent. Chapter 4 moves from pre-
historic to historical archaeology and reconstruction with a discussion
based on the analysis of burial populations in ancient Egypt. Chapter 5 presents the Mesoamerican situation. Chapter 6 brings us much closer to the present and into the temperate zone of Europe, and is followed in Chapter 7 by our first ethnographic set of data—from East Africa. Chapter 8, which ends the agricultural half of the volume, is cross-culturally and theoretically oriented and argues (against the Boserup model) for a multilinear model of agricultural evolution with special attention to environment as a variable independent of population.

The second half of the volume, Chapters 9–17, leaves the exclusively agricultural emphasis of the first half of the volume and treats broader problems of intensification in the context of technological diversity, and beyond the technological plane. Thus, Chapter 9, while based on the consideration of primarily agricultural West African societies, looks at the evolution of ritual and political roles, which peacefully articulate potentially competing groups in the context of the pressure of population on resources. Chapter 10 presents a case of demographic interaction and ideological opposition, based on difference in technology (for example, peasant versus nomad) in the "marginal" environment of the deserts of the Iranian plateau, where, generally, no one technology suffices for subsistence. Chapter 11 is concerned with the demography and technology of nomads in Tibet against the background of their interaction with the agricultural majority of the total society. Chapter 12 explores the political implications of population growth without technological or geographical referent and constructs a model, the first stage of which is then tested in Chapter 13 against data from the maritime and terrestrial hunter population of prehistoric Eskimo Alsaka. Chapters 14 and 15 combine the hunter-gatherer interest with analyses of the dynamics of family size and group size in relation to technology among the !Kung Bushmen of Botswana.

The two final chapters take us out of cultural anthropology and archaeology to provide the physical and demographic contexts of our discussions.

The participants reacted in a range of different ways to the basic model—in terms of both their particular types of data and their personal theoretical inclinations. Both the essays and the discussions constituted an exploration of the various processes of intensification of technology, culture, and society that may result from an increase in the pressure of
population on resources. Not all the reactions were positive. Apart from Smith and Young, who, in Chapter 1, introduce the model in a specifically anthropological context and advocate its application to the data from their own special field, and Bronson (Chapter 8), who reacts negatively arguing a priori against unilinear models, the contributions tend to be not direct investigations of the model but rather allied theses inspired by its heuristic features. For instance, O'Connor in the necrophilic context of Egyptology is performing the demographic exercises without which an appreciation of the relationship between the Nile as a subsistence resource and the historical society and culture it generated is unapproachable. Sanders is largely in favor of the model but wishes to modify it with particular respect for the geographical variable. Wailes explores Medieval European agricultural technology and demographic data (where available) for patterned relationships but fails to find any. Harris introduces some modifications paying particular attention to what he sees as the internal dynamics of a technological system that comprehends a range of microenvironments. Spooner similarly introduces a range of adaptational and occupational variation within a unitary environmental context. Ekvall describes the situation of long-term population decline in Tibet. Dumond deduces from Alaskan Eskimo data that population growth and subsistence should be treated as equivalent variables. Netting is concerned with the evolution of extrasocietal roles that buffer and referee conflicts resulting from increased contact between groups in situations of population growth. Lee investigates the same problems as Smith and Young but in a modern ethnographic context that allows him to ask the logistical questions about mobility, fertility, and productivity that the archaeologists cannot get at. In his second essay he also investigates the centrifugal and centripetal forces that affect the size of social groups and distinguish large groups from small. Katz explores the interaction of physiological with ecological, demographic, and sociocultural factors in the context of population growth. Carneiro and Dumond propose slightly conflicting extensions of the model into the political sphere.

Many of the disagreements in our discussions derived from the difficulty of making differential evaluations of distinct types of data and then feeding them into one unitary theoretical framework. Among the questions that were posed but not treated in any detail were how to deal
with the special case of tree crops—for example, the date, breadfruit, olive, and perhaps the ramon—within this framework; the relationship between knowledge and engineering as different forms of investment in an environment; the significance of the diffusion of certain major cultural values—such as bread-eating and rice-eating—that require a certain crop and therefore have adaptational implications (see Bronson, Chapter 8); and finally, the concept of “overload” and the nonecological and noncultural factors that play a role in determining the size of local groups—forces that make for clustering versus dispersal and vice versa.

Questions Raised

A number of theoretical problems that were explored in the discussions but have not found a place in the revised versions of the papers, nevertheless bear closely on the main theme and require some rehearsal here. Perhaps the most vital of these scarcely became explicit until the final hour of the discussions though it was present from the beginning.

1. This question is how to define the logical unit or universe of study for any given theoretical problem. On the basis of what criteria should such a universe be defined? Little explicit attention has been paid in anthropology to this extremely important question. Implicit difference in its solution lies at the very base of the differences between the contributions of the Near Eastern archaeologists (though difference in their “micoregions” of specialization within Greater Mesopotamia is, of course, a factor). The relationship between the Tibetan nomads (described by Ekvall in Chapter 11) and the agricultural areas from which they draw demographic reinforcement raises the same question, as does the similar demographic relationship between ecological areas in the Iranian desert described by Spooner in Chapter 10. Harris’s approach in Chapter 7 emphasizes the importance of the problem, and Bronson’s argument (Chapter 8) about the role of investment begs the same question in its temporal dimension. In Chapter 3 Carneiro implicitly assumes that the problem is solved with his concept of the “circumscribed area.” On the other hand, in Chapter 5 Sanders uses charts to demonstrate a very basic and practical way in which, in the investigation of our particular problem, the appraisal of any “sub-” region is meaningful only when seen in the context of its universe, however that may be defined.
The symbiotic interaction of communities with slightly different histories, each responding to a distinctive localized combination of ecological relationships, has for some time been recognized in the literature; it is mentioned by Smith and Young (Chapter 1), lies at the base of Chapter 5, and was brought out further in the discussions:

Within a region, one community or zone is often catastrophically affected at the same time that another is prospering. Thus the crude average may be a one one-hundredth percent increase for a whole region, with a thousand or five thousand villages or whatever. But the significant units of process are hidden by overall averages. Instead they may consist, for example, of interacting pairs or small groups of communities, where fortunes of one are rising while the other’s decline [Adams, discussions].

In many cases the pattern of communications gives rise to settlement clusters whose agricultural or other direct food-producing, subsistence adaptations are not explainable without reference to their role in the communication system, as in the case of Nayband in the Iranian desert (Chapter 10).

With regard to an area such as ancient southern Mesopotamia, these observations lead to the question:

To what extent is a town like Uruk, or even all of the lower alluvial plain, really a significant unit of study in connection with problems like population pressure? There have been many recent straws in the wind suggesting surprisingly far-flung trading or other contacts: tablets with certain striking relationships with early Mesopotamian writing turning up in Romania, representations of Mesopotamian boats found on the Upper Nile, beveled-rim Uruk bowls in Kerman, massive (if highly selective) early third millennium trade networks in materials like steatite that extended across the whole Iranian plateau and all the way down the Persian Gulf. This does not necessarily imply that population movements lay at the root of any of these specific relationships, but we can dimly recognize patterns of interaction that were not confined to local communities and were not even limited to the narrowly defined ecological areas with which we normally deal. How can we continue to assume that the significant causative processes were those that were localized rather than those that ranged for 1,000 or 1,500 miles? If we cannot, then the question of the relationship of population pressure to technology has to be dealt with within a specified geographical frame, and the assumptions that we are making in order to specify that frame ought to be opened up for discussion [Adams, discussion].

2. This brief discussion of the trade factor in the geographical definition of the unit of study leads to the question of the definition of technology and its relation to the other dimensions of our universe of study.
Harris’s essay (Chapter 7) deals with this problem with particular reference to an agricultural people in east Africa. In the discussions Adams took up the problem with particular reference to ancient Mesopotamia. Both explicitly based their arguments on Merril (1968):

Let us take as technology the acquisition, processing, storage, distribution and employment of the raw materials needed by a society, especially resources directly or indirectly associated with subsistence. So used, the term obviously includes, but is not limited to, the entire artifactual inventory associated with these activities. In addition, technology must include the planning and regulating techniques required for each activity and for maintaining an ordered pattern of interrelations between them. This makes the social system, at least insofar as it is directed toward production, storage, exchange, and distribution, a part of the technological system as well.

Turning to Mesopotamia to illustrate a few specific aspects of this much broader approach to technology—first of all, systems of redistribution were characteristic of the major, early Mesopotamian institutions (whether they be temples or private estates). Usually we have tended to define these institutions in religious or sociocultural terms, but they can be taken equally well as a necessarily fundamental part of an adaptation to urban life at a new level of complexity, and therefore as an aspect of the technological system as well. What was required in order to maintain a complementary relationship between the various eco-niches of which the alluvial plain was constituted was an institutional framework through which subsistence specialities—the fisherman, the herdsman, the cultivator—could be articulated with one another. In this sense, the accounting capability that permitted the disbursement and recording of rations for participants from a number of eco-niches becomes a part of the technological system. The same obviously applies to weights and measures, for they permit the orderly exchange of the oil being processed by one set of specialists for the fish being dried by another, for the grain being cultivated by a third, and for the wool being produced by a fourth. Similarly, there are textual attestations of massive grain storage, for which—unfortunately but typically—there are as yet few convincing archaeological examples. References to the seizure of granaries said to contain ten thousand and more tons imply a centrally directed, large-scale, fairly sophisticated system of storage, which places the issue of technology right in the center of the political and social system.

Second, there is the military dimension of technology. During what might be called “the urban implosion” in lower Mesopotamia, that is, the growth of major urban centers in an apparently short period after 3000 B.C., the problem of articulating the various components of a complex subsistence system must have reached an unprecedented severity. Military considerations certainly played a part, and probably the crucial one, in the formation of walled cities. Further, if urbanization was a response to increased intergroup hostilities engendered by “population pressure,” then the economic and administrative innovations that
permitted the subsistence requirements of enormously larger population units to be met have to be understood at least in part as further derivatives of population pressure. The same applies to a more obvious technological category—advances in military equipment.

There are also some less obvious although perhaps equally important links between urbanization/militarization (and hence population pressure) on the one hand and technological or administrative innovations on the other. For example, there is some evidence that one of the purposes of the walls around major urban centers was to provide a place of protection into which the herds of animals could be brought under conditions of long-continuing military insecurity. Such conditions were unprecedented at the village level, as were also the facilities to feed and house large herds of animals that had to be designed to meet them. This interjected the state apparatus into herding operations that earlier may have been the responsibility of small local groups. Again, given the conditions of dense nucleation, populations in the new centers were forced to reside at considerable distances from their fields. Hence an unprecedented need arose for centrally planning the deployment of plow animals. Does this explain the introduction by mid-third millennium times of plows regularly drawn by six draft animals? Do later references to very long and narrow fields suggest that the central control of animal tractive power encouraged cadastral changes that would permit heavy plows to draw long, straight furrows? One of the functions of a symposium of this kind is to raise such questions, but I do not mean to imply that they can yet be answered.

[However,] if we are to deal constructively with the suggestion that population increases or the pressure of population on resources is articulated with technological development, we have to view technology in this far more complex and ramifying sense [Adams, dicussions].

3. Any study of man, insofar as it concerns men in groups, begs demographic questions, and it is unfortunate that there has been so little contact in the past between anthropology and demography. In the colloquium we were fortunate to have the active participation of John D. Durand, whose contributions to the discussions have been edited to appear as a statement of the demographic context of our theme in the final chapter. The penultimate chapter is Katz’s essay on the physiological factors that interact with our basically cultural theme. In the discussion the question of the relevance of nutrition to fertility was raised. The following case of the dietary roles of corn and milk provides an interesting example of this:

First, there is evidence that a pure cereal diet—and corn is especially notorious for this—is very deficient in lysine, an essential amino acid. This means that on a corn diet there is a growth retardation effect which, if not supplemented by another source of lysine, can be very serious.
However, it so happens that milk and milk products contain considerable lysine, and therefore the two foods together produce a balanced diet. In the long run this sort of nutritional balance has a great deal to do with the survival of a population and must indirectly influence its fertility.

Furthermore, in order to digest the sugar (lactose) in milk, it is necessary to have the enzyme lactase in the intestinal tract. There is considerable evidence that lactase only occurs in infants and certain adults. It seems that the adults of some populations can digest lactose, while the adults of others cannot. This probably indicates the action of a gene for the synthesis of the enzyme in the adult. The evidence indicates that most milk-drinking populations and especially the European population has the adult lactase present and active. If an adult does not have the enzyme, the lactose is not broken down in the intestine (to galactose and glucose) and is excreted into the large intestine or colon. Here it is broken down by the lactobacillus bacteria into lactic acid. Unfortunately, lactic acid is osmotically active and produces a great deal of secretion into the colon which results in diarrhea. Over a longer time this continuous irritation of the colon leads to ulcerative colitis, a more severe disease.

This suggests that since milk and cereals generally are nutritionally complementary, (1) there is some evolution going on with respect to the ability or inability to digest lactose, and (2) the treatment of certain dairy foods by various bacteria outside the gastrointestinal tract into foods such as cheese and yoghurt is an important adaptation for the lack of the enzyme in the adult individual. In this way the technology of food preparation allows the food to be digestible in persons who might not otherwise be able to consume it [Katz, discussions].

Thus, a physiological barrier—to demographic movements—is thrown up between populations with different subsistence technologies.

A further nutritional point, with perhaps more direct relevance to demography, was introduced by Lee, who wished to combat the more traditional thesis that the agricultural diet is a better diet than the hunting and gathering diet, for his own data suggest that the opposite is the case—specifically that the hunting and gathering diet is superior in terms of protein and the range of minerals and nutrients. He has nutritional assays on forty-five species of Bushman foods that show that some of these wild foods concentrate certain minerals and vitamins such as vitamin C and carotene in remarkable amounts, and high-quality vegetable protein comprises 25 percent of the staple nutrients.

The Bushmen may possibly face nutritional problems in terms of gross overall calories, but they certainly have a very good array of vitamins, minerals, and proteins, both vegetable and animal. Because of this we
should reexamine the argument that, in the early Neolithic, populations increased because of improvements in the quality of the diet [Lee, discussions].

In Chapter 14 Lee presents the view that the dietary cause of population growth is not a better diet but a softer (that is, more easily digestible) one. Katz was able to append a comment to this to the effect that in general a baby can survive very well on mother’s milk till two and a half years of age. However, if the culture has available to it certain kinds of soft foods that babies can chew and digest, then that supplements the mother’s milk. Therefore, the quantity of milk the mother produces is decreased, ovulation can return sooner, and the birth rate is increased [Katz, discussions].

4. The most significant points in the history of population, in the context of this volume, would appear to be four: (1) at the dawn of the Neolithic, sedentarization brought about the first major increase in the rate of population growth; (2) population growth has caused intensification on all planes of culture and society, particularly in the technology of agriculture and subsistence in general, and in political and social organization; (3) natural catastrophes, such as the Black Death in Europe and floods in China, did not reverse or stop the rate of growth, but caused only minor temporary setbacks; (4) the rate of growth was reaching geometrical proportions well before the great improvements in sanitation and medical treatment began to accord it an extra fillip in the nineteenth century (see Marshall and Brown 1971).

Population decrease has not been entirely neglected, but documented cases do not figure very prominently because they are relatively difficult to find. This may be justifiable since, taken in general perspective, the world’s population has shown an unbroken upward curve. However, cases of decrease are important for the support of our hypothesis. With this in mind it is well to cite here a contribution to the discussions suggesting that investment and intensification may in some cases lead to disease and a decrease in fertility (though the newly available lands in which the former inhabitants had made an investment might attract enough in-migration to maintain the rate of population increase).

In the country irrigated from the Aswan Dam in Egypt, due to the methods of irrigation in use, the level of parasitic infection—in this case schistosomiasis—runs at about 99 percent of the population, which is severely debilitating and has adverse effects on both productivity and
fertility. This disease used to strike in Egypt on a seasonal basis with the flooding of the Nile. With the intensification of the irrigation system (by means of major investment), it has become active throughout the year. Thus, major irrigation systems, whether or not they are as technologically advanced as the Aswan Dam, may introduce secondary variables such as disease that limit not only population growth but also productivity. We have to take into account the biological factors that interact with population change. To take the argument one step further: the rate of schistosomiasis and similar diseases is intimately associated with population. The greater the density, the higher the transmission rate [Katz, discussions].

5. Finally, in this as in all discussions in the social sciences, a basic problem between the participants, which was implicit throughout, was the problem of explanation in anthropology. It was verbalized usefully at one point in the discussions by Carneiro, and I paraphrase and adapt his comments in what follows:

The very identification of a set of variables—which are in the first place selected more or less arbitrarily—as dependent or independent must be recognized as an explanatory device. Linear causation is sought by some for similar reasons. There is obviously reciprocal influence between factors. Dependent on the goal of the explanation, some will be causally more significant than others. Among some of the participants an obvious preference was detectable for stressing all the various factors, an attitude of a democracy of causes where no one should be rated higher than any other. It is an implicit epistemological assumption in works such as that of Boserup and many of the contributors to this volume that there is an advantage to trying to find those causes or that cause which is strongest and to see how far it may be used to explain an entire process. We should not be afraid of such monism, cultural or otherwise, if in fact a pursuit of this type of interpretation really gives us better results than we get otherwise. To the extent that we can explain one principle, or a very economical number of principles, and a very large amount of cultural behavior—to that extent we have progressed. This is a legitimate scientific objective. When we have made our explanation in terms of one (or more) selected principles, the next stage is to introduce auxiliary hypotheses and make modifications in order to explain the residue that is not covered in the first explanation. Gradually the first explanation will be superseded. Such is the dialectical process of scientific explanation. It is not a reason to try from the start to be fair to every cause by
giving it equal weight. Instead of one supermodel to answer all questions, we must content ourselves with various types of fairly simple models to answer different questions.

Altogether we have of course made only a small beginning in the investigation of a major series of related problems, but at the very least we may claim to have drawn attention to the importance of a major noncultural factor in cultural change and evolution. The central theme of these essays and the discussions that generated them (as suggested by Smith at one point in the discussion) is that changes in population pressure are not the sole prime mover in history and society, but an ever-present force—sometimes gentle, sometimes compelling.