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POPULATION DISTRIBUTION AND THE "GREEN REVOLUTION".

Parker G. Marden

International Population Program  
Cornell University

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# POPULATION DISTRIBUTION AND THE "GREEN REVOLUTION"

Parker G. Marden  
Cornell University

## Introduction

The growing recognition of the problems created by rapid population change has led many persons from diverse backgrounds to express their concern. This situation understandably characterizes the analysis of an important social issue, but such public attention often obscures the intricacies of the problem. Therefore, while population problems are now receiving the public scrutiny which they deserve, the relationships between demographic and social variables are increasingly simplified, often in a regrettable way. This is particularly true when the leading advocates for certain population policies are trained in the natural sciences rather than in demography or the other social sciences--those disciplines that are more usually charged within the scientific division of labor with concern for such matters. (Cf. Ehrlich, 1968.)

Perhaps nothing serves to illustrate the misdirected simplicity with which many approach the topic of population change than their singular focus on population size. The population of any country or region is often discussed as a single, homogeneous aggregate.<sup>1</sup>

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1. The influential report of the President's Scientific Advisory Committee is one illustration. In the more than 850 pages providing recommendations and supplying documentation, only four could be characterized as being devoted to a focus on differentials within the general population and their implications for food problems. (PSAC, 1967, Volumes I and II.)

In reality, however, a full understanding of demographic developments demands the recognition that the population can better be described as a complex, multidimensional matrix, divided and redivided in terms of the composition and distribution of the population. Age, sex, race, ethnicity, socioeconomic status, occupation, and residence are among variables of population structure that deserve attention. Failure to assign them appropriate importance leads to serious misunderstanding and possible misdirection of population policies. Two examples serve to illustrate this point.

Because the growing public concern over the magnitude of both domestic and world population growth, a number of proposals have been made concerning the desirable rates of demographic increase and policies designed to implement them. One striking proposal concerns the attainment of a zero rate of population growth (ZPG) at an early date, long before the limits of the earth make it inevitable. (Cf. Day and Day, 1964; Davis, 1967.) Spurred on by the awakening concern on college campuses for ecological and environmental issues, this proposal has taken on dramatic, almost cultish proportions and controversy swirls around the kinds of governmental policies that would be needed to reach its goal. Lost in such discussions, however, are some basic demographic facts that deserve fuller public attention.

Consider, for example, the effect that a rate of zero growth would have on the age structure of a population to which it might apply. A stationary population with an expectation of life of 70 years would have as many persons over 60 as under 15 years of age. The cohorts in the working ages would be approximately

identical in size and the median age would be about 37 years. This would contrast with the present demographic situation in the United States where the present median age is less than 28 years and persons under 15 outnumber those over 60 by more than 2 to 1. With these facts in mind, Ansley J. Coale, in his Presidential Address to the Population Association of America in 1968, offered the following observations:

A society with such an age structure is not likely to be receptive to change, and indeed would have a strong tendency towards nostalgia and conservatism.... In a stationary population, as Myrdal pointed out years ago, there is no longer the consonance between the pyramid of responsibility and the age pyramid that there is in a growing population. When the population is stationary, there is no longer a reasonable expectation of advancement in authority with age, since the number of 50-year olds is little different from the number of 20-year olds.... The question is one of balance between the disadvantages of further growth and greater population size, on the one hand, and the disadvantages of a stationary population, on the other. (Coale, 1968; 471.)

One can disagree with Coale's discussion concerning the direct relationship between age structure and societal conservatism (although some students of recent French economic history would not), but it seems difficult to argue with his concluding assertion. In a dispassionate assessment of the desirable, short-run rate of population growth, attention must be directed to considerations of demographic structure other than size. Age structure, as well as other compositional and distributional factors, deserves careful examination.

A second example which illustrates the need to look beyond population size as the only important demographic variable can be found in recent conceptualizations of the "population problem."

It is developed in terms either of a food/population (or resource) problem or an employment/population problem. The preferred conceptualization appears to vary by professional orientation, the degree of euphoria felt over the gains of the "Green Revolution," and similar considerations.<sup>2</sup> While such preferences would be a worthy challenge for an intellectual historian, I mention it not to assess the accuracy of either perspective, since both are needed, but to emphasize the necessity to understand the importance of population composition.

Of the two ratios (and the situations that they symbolize), the dialogue on the food/population problem has been the much more widely-discussed, perhaps because of its greater ease for public understanding and the emotional impact of Malthusian predictions. Discussions concerning the demographic side of this ratio have led directly to the prescription for the rapid adoption of birth control measures to reduce the size of the population. But while this demographic development, coupled with the impressive gains being made by agricultural science on the supply side of the ratio, could lead to a solution of nutritional and related problems, it obscures larger issues symbolized by the employment/population ratio. For even if birth control was totally effective, i.e., if there were no births for the next fifteen years, the world would be left with a serious population problem because persons entering the labor force during this period would have already been born.

2. As examples, consider the stances taken by the Paddocks, Brown, Clark, Paarlberg, and others in recent years. (Cf. Population Reference Bureau, 1968: 81-99.)

Table I suggests why this is an important consideration. The coefficient of replacement is the key indicator in the table. It indicates the number of males who will enter the labor force in any given year for every one hundred persons who will leave it through death and retirement. Clearly, a serious challenge confronts those nations characterized here as "agricultural" or "semi-industrialized."<sup>3</sup> In both categories, more than two persons will enter the labor force yearly for every vacancy that will become open within it through attrition. In some nations, the coefficient of replacement is as high as 300 and for most nations in the first two categories, it promises to rise as mortality declines increase the number of infants and children who survive to reach working age. (Sadie, 1967: 126)

While these figures do not reflect many problems of the labor force in developing nations, they do dramatically demonstrate the need to examine population dynamics in a broad context. To focus only upon the resource/population ratio even with the challenge it signifies is a serious error. It understates the complexities of contemporary population problems by ignoring or understating elements of demographic structure other than size.

3. The distinction between categories is made in terms of the proportion of the male labor force engaged in agriculture. The "agricultural" nations have more than 60 per cent in agriculture, those classified as "semi-industrialized" have 35-59 per cent in this category, and the "industrialized" nations have less than 35 percent in agriculture.

Table 1

Movements Into, and Out of, the Male Labor Force per Five-Year  
Period, Three Groups of Countries, circa 1960-1965

<u>Type of Countries</u>	<u>Rate of Entry %</u>	<u>Rate of Separation Due to</u>			<u>Replacement</u>	
		<u>Mortality %</u>	<u>Retirement %</u>	<u>All Causes %</u>	<u>Rate %</u>	<u>Coefficient*</u>
Agricultural	19.1	6.8	1.5	8.3	10.8	232
Semi-Industrialized	15.3	4.3	2.9	7.2	8.1	213
Industrialized	14.7	4.2	4.5	8.7	6.0	168

\* Coefficient indicates that for every 100 men separated from the labor force, there is, on the average, \_\_\_\_\_ men entering it.

Source: Sadie: 1967: 126.

With specific reference to policy, it is imperative to understand that any developing (or developed) nation confronts not a single population aggregate in its decision-making, but the complex, multidimensional matrix described above. Each cell in this matrix may require attention that differs from that required by others and the policy-making process must be recognized as the attempt to balance such attention. Social investment such as educational facilities for a nation's youth must be weighed against capital investment in the hardware of industry and the creation of jobs. Investment in the agricultural (and rural) sector must be balanced against decisions that favor the industrial (and urban) sector. Since these decisions must be made against the background of limited resources, policy development is indeed a delicate matter. A national population policy that focuses exclusively upon population size (or the related growth rate) may actually provide a disservice. A similar indictment could be made of foreign aid programs which seriously address only the problems of high fertility.

Therefore, perspectives must be broadened if the societal impact of the Green Revolution is to be carefully examined. It is necessary to look beyond the simple relationship between population size and agricultural change to the differential impact within demographic aggregates. The balance of this paper will explore this theme. It will focus upon the distribution of population.<sup>4</sup> Following a general discussion of differential urban

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4. For reasons of clarity in presentation, the discussion will focus upon population distribution rather than looking at factors of population composition as well. As the two examples suggest, however, this emphasis should not minimize the problems of differential requirements by various demographic categories that may be concealed by a focus upon the total population aggregate.

and rural growth in the developing nations, a conceptual presentation that distinguishes between urbanization, urban structure, and urbanism will be made. This will be developed not to provide meaningless semantic exercise, but to provide some needed conceptual clarity for analysis. This effort will seek to broaden the discussion from the simple statistical characterization of population distribution toward the interdisciplinary understanding that is required. With this discussion providing both a background and an analytic tool, the relationships between the Green Revolution and population distribution will be examined.

This assignment must contend with three obstacles. First, the beginning of a new decade, like the 1970's, is the worst possible time to discuss demographic trends. Because national censuses are generally taken in the first few years of each decade and then require several years for careful analysis, it is necessary to use either data which were collected more than ten years earlier or projections that are based on these data. With the rapidity of contemporary demographic change, spurred on in some areas by deliberate attempts to influence fertility that have become effective only in the past decade, this can pose serious problems. Discussions of demographic trends in this analysis must be understood in this context.

Second, the recency of the "Green Revolution" with the many interrelated changes in agricultural technology and practice that it contains leads to the obvious difficulty that it is a phenomenon for which the problems and potentialities are not

as yet fully understood. This is a particularly acute situation because those changes contained within the Green Revolution may contribute directly and dramatically to the demographic inaccuracies mentioned above. But to analyze events as they occur is the curse of the social sciences.

Third, understanding of the impact of agricultural change upon population distribution requires a multidisciplinary approach that can at best be incomplete. One catalogue of factors related to the Green Revolution is indeed impressive: improved seeds, chemical fertilizers, better water usage, crop protection, improved agricultural equipment, and higher standards of farming. (Food and Agricultural Organization, 1969.) To this list, one could add consideration of land reform, marketing strategies, and many other factors. It is a challenge to be acquainted with these various factors, let alone being conversant with them. What demographer, for example, understands the implications of using tractors in the improvement of crop production in India? Yet as Frankel indicates, farm mechanization is necessary to realize the full potential of Mexican wheats because traditional Indian plows penetrate the soil too deeply to permit such varieties to germinate properly. (1960: 696.) This fact alone can change the calculation of the proportion of the Indian peasantry that can remain productively involved in agriculture. This, in turn, may affect the probability for rural-urban migration.<sup>5</sup> Combined with the other two difficulties, this problem sets the boundaries for success in the present discussion.

5. This situation is compounded by the problem of generalizing from one region of the world to another. For example, much of Africa, unlike Latin America, does not have the problems of land tenure that require major programs of agrarian reform in order to absorb a rising labor force. (Tobin, 1971:26.)

## Urban Growth

A conspicuous feature of contemporary population growth in the developing world is the even greater rapidity of urbanization that is being experienced. Most nations that can be characterized as "developing" are undergoing a major transformation from predominately rural to urban societies in a very brief span of time. Urban growth has been an important consideration in the past and one could assert that it has been the central characteristic in the development of modern, industrial societies. But the tempo and magnitude of urbanization in developing nations is unique in human history. Since urbanization reflects important societal changes and poses major problems in national planning, it is a topic worthy of consideration both within and beyond larger discussions of the demographic transformation that is occurring throughout the world.<sup>6</sup>

Table 2 provides a convenient overview of the contemporary patterns of urbanization. The figures for the "more developed regions" include those for Europe and those for other "more developed" areas (combining North America, the USSR, Japan, temperate South America, Australia and New Zealand). In the case of Europe, it is estimated that its urban population will double in the five-decade period that is summarized, rising from 207 million in 1950 and 246 million in 1960 to 438 million by the end of the century. The proportion of the population that is urban, however, will rise even more significantly because Europe's rural population

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6. While the focus in this discussion will be on the "developing" nations, the same general point is true for the "developed" countries--a point that requires constant repetition. The problems of population in the United States, for example, are as much those involving population distribution as they are those of general population growth.

Table 2.  
 Urban/Rural Population<sup>1</sup> and the Percentage of Urban Population, in  
 More Developed and Less Developed Regions, 1950-2000

Year	More developed regions			Less developed regions		
	Population (millions)		Percentage Urban	Population (millions)		Percentage Urban
	Urban	Rural		Urban	Rural	
1950	439	418	51	265	1,363	16
1960	582	394	60	403	1,603	20
1970	717	374	66	635	1,910	25
1980	864	347	71	990	2,267	30
1990	1,021	316	76	1,496	2,623	36
2000	1,174	280	81	2,155	2,906	43

1. The definitions for "urban" and "rural" are those in use in each country.  
 Cf. United Nations, 1969: Chapter 1.

Source: United Nations, 1971:24.

is expected to decline over the same period. (This point, resulting from the need to consider both rural and urban population changes in the calculation of figures on urbanization, will be discussed below.) In the case of the other "more developed" regions urbanization is proceeding even more rapidly and reaching higher levels. Between 1950 and 2000, the urban population of these areas will increase threefold and the rural population will decline by nearly one half. So while 50 percent of the population of these regions could be categorized as urban in 1950 and 64 percent in 1970, the percentage could approach 85 by the end of the century. (United Nations, 1971: 24-25.)

But while the figures for "more developed" regions are impressive, those for the remaining areas are particularly dramatic. In only fifty years, it is estimated that the proportion of the population of the "less-developed" nations will increase from 16 to 43 percent. Perhaps as importantly, only one out of three urban dwellers will live in the more developed regions by the year 2000 an almost complete reversal of the pattern of only five decades (and an average person's lifetime) earlier!

These data conceal even more impressive changes in the amount and degree of urbanization, especially in the developing regions. There are significant differences by individual nations with respect to the volume and pace of urbanization. (Cf. United Nations, 1969). In addition, such figures conceal the enormous growth of individual cities and the tremendous challenge to the urban infrastructure (social and physical) that this represents. By 1980, for example, it is estimated that eighteen cities in Latin America will have

passed the million mark. Bogota will have five million residents as compared to 675,000 in 1950, Caracas will increase in size from 700,000 to 4,000,000 in the same period, while comparable figures for Sao Paulo are 2,450,000 and 7,000,000. It is also a reasonable question to ask how India will cope with such cities as Bombay and Calcutta where the populations already exceed the size of Chicago (circa 6,000,000) and threaten to grow to 20 and 30 million by the end of the century. (United Nations, 1970:19.) Similar examples abound, and behind such dry statistics rests an impressive challenge to human ingenuity in coping with this growth.

One problem in discussing the nature of urbanization concerns the clarity of the concepts which are utilized. In Table 2, "urban" is defined following the practices used by each of the various nations included within the categories "more developed" and "less developed." In general, this means an arbitrary figure of 2500 persons dividing an urban community from a rural one.<sup>7</sup> This figure is often too low for meaningful analysis. Table 3 presents some additional data for various size categories and again reveals differentials between the more developed and less developed regions in the pace and degree of urbanization. Considering cities of 20,000+, for example, the estimated growth through 1980 for the less developed nations is particularly noteworthy. By that date, one in every three persons in those regions will live in an urban center of that size.

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7. For a full discussion of the various ways in which to conceptualize "urban" in a statistical sense, see United Nations, 169, especially pp. 7-10, 81-84.

Table 3.

Total, urban, agglomerated, big-city and multimillion city population  
of the world and three major divisions, 1920, 1940, 1960 and 1980.  
(Rough estimates, in millions)

World Portion	1920	1940	1960	1980
<b>Total population</b>				
World total	1,860	2,295	2,991	4,318
Europe	325	369	425	479
Other more developed regions	348	442	551	715
Less developed regions	1,187	1,474	2,015	3,124
<b>Urban population (as nationally defined)</b>				
World total	360	570	990	1,780
Europe	150	200	245	310
Other more developed regions	110	185	335	540
Less developed regions	100	185	410	930
<b>Agglomerated population (20,000 inhabitants and over)</b>				
World total	267	432	761	1,354
Europe	113	150	188	237
Other more developed regions	85	154	262	424
Less developed regions	69	128	311	693
<b>Big-city population (500,000 inhabitants and over)</b>				
World total	107	80	352	665
Europe	52	58	81	106
Other more developed regions	41	77	140	237
Less developed regions	14	35	131	322
<b>Multimillion city population (2,500,000 inhabitants and over)</b>				
World total	36	75	142	351
Europe	20	23	24	40
Other more developed regions	16	45	74	146
Less developed regions	--	7	44	165

Source: United Nations, 1969

The rates of growth on which these figures are predicated are equally revealing. In Table 4, the pace of urban growth as defined by the increasing proportion of population in cities of 20,000+ is clearly defined. While the proportion of population in these cities is increasing in both the more developed and less developed regions, the rate of increase in the latter regions has been more than double that of the former groups of nations. Similar observations can be made on the larger-sized urban concentration. Again, when one concerns the enormous social, economic, and physical problems that are hidden behind such sterile statistics, the challenge of urbanization for the developing world becomes awe-inspiring.

Tables 3 and 4 suggest several other aspects of contemporary urban growth that deserve special mention. It is no longer sufficient to talk only in terms of some statistical categorization of urbanization, i.e., proportion of population in "cities" of 2500+, or even in cities of 20,000+. Rather, it is necessary to examine the entire "settlement system" in which the population distribution of the entire nation (or society) is carefully considered. Until recently, this has not been done in any systematic way as students of urban phenomena and those concerned with rural societies have generally gone in different research directions, being comfortable with some arbitrary statistical dividing line to separate them.<sup>8</sup> This is particularly ironic given the way in which the city and the surrounding rural and agricultural hinterland have been inextricably and reciprocally intertwined. But the failure to examine the

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8. Limited research in this area has generally been undertaken by a few urban historians and an occasional urban geographer. For one discussion, see Lampart (1960:519-554.)

Table 4.

Estimated Annual Rates of Growth in Total, Agglomerated<sup>1</sup> and Rural and Small-Town Population, 1920-1940, 1940-1960, 1960-1980.

	1920-1940	1940-1960	1960-1980
<b>Total Population</b>			
World	1.1	1.3	1.9
More-Developed Regions	1.0	0.9	1.0
Less-Developed Regions	1.1	1.6	2.2
<b>Agglomerated Population</b>			
World	2.4	2.9	2.9
More-Developed Regions	2.2	2.0	1.9
Less-Developed Regions	3.1	4.5	4.1
<b>Rural and Small-Town Population</b>			
World	0.8	0.9	1.4
More-Developed Regions	0.4	1.0	0.1
Less-Developed Regions	0.0	1.2	1.8

1. Populations of 20,000+

Source: United Nations, 1969:64. Data are abstracted from Table 34.

general "settlement system" of a nation or society, i.e., the way in which its population is ordered from the smallest population concentration to the largest, has become painfully obvious over the last several years. Several reasons for this change deserve mention

First, urban growth has not been proportionally distributed across all of the size categories into which a population might be divided. In almost every region of the world, the most dramatic increases in population have occurred in the largest cities. This is especially true in those developing nations where there has been a strong colonial presence with a "primate city" established (e.g., Mexico City, Manila, Lagos, Caracas). This point can be illustrated by examining the pattern of urbanization in Mexico during the first sixty years of this century. Table 5 divides the population of Mexico living in cities of 10,000 or more into four size categories. In 1900, a time when only 12.7 percent of the Mexican population lived in cities of this size, there was a comparatively even distribution among the four size categories. Since this time, however, an ever-increasing proportion of the urban population has become concentrated in the largest size category. To underline this point, Browning makes the following observation:

The size-of-place hierarchy of Mexico reflects the "duality" still characteristic of a country in transition to a developed status. In 1960, 44 percent of the population was to be found in small or medium-sized villages (100-2499) in contrast to the 20 percent in large urban centers of 500,000 or more. An indication of how far Mexico has come in the last 20 years is the fact that these figures in 1940 were, respectively, 55 and 8 percent. Almost certainly by 1980, they will be nearly balanced (1968:13.)

Table 5.

Changes in the Distribution of Mexican Population in Urban  
Size Classes over 10,000, 1900 - 1960  
(in percent)

Year	Urban Size Class				Total Population	
	10,000- 19,999	20,000- 49,999	50,000- 99,999	100,000 and Over	Per Cent	Absolute Figures
1900	24.4	32.1	16.8	26.7	100.0	1,670,504
1910	23.7	32.7	16.6	27.0	100.0	2,186,423
1921	21.7	21.1	22.1	35.1	100.0	2,440,359
1930	24.0	17.8	15.4	42.7	99.9	3,405,962
1940	17.6	17.8	13.7	50.9	100.0	4,308,240
1950	14.2	14.8	10.0	61.0	100.0	7,753,186
1960	11.7	12.0	12.1	64.2	100.0	13,330,445

Source: Browning, 1968:46.

So one reason for a need to examine the entire "settlement system" is the fact that some important aspects of urban growth cannot be otherwise understood.

A second and closely-related point concerns the policy implications of the disproportional growth of the largest urban centers. Since a major contributor to the growth of these cities has been large-scale migration from rural areas, one proposed way of controlling this growth is the deflection of migration to other cities in the urban hierarchy. The potential value of such policies and the general need for awareness of a total "settlement system" has been described in the following way:

For many reasons, the special study of small-town populations would be well-justified. Many links between the urban-industrial and the rural-agrarian sectors of the economy depend on a network of widely distributed small towns. Stagnation or decay of small towns increases the remoteness of these sectors of the economy and society from the mainstream and renders the economic, educational and cultural transition necessitated in the process of urbanization more difficult. A strengthening of smaller urban settlement may offer some relief to rural population pressures and at the same time reduce heavy social overhead costs in congested big cities. (United Nations, 1969:47.)

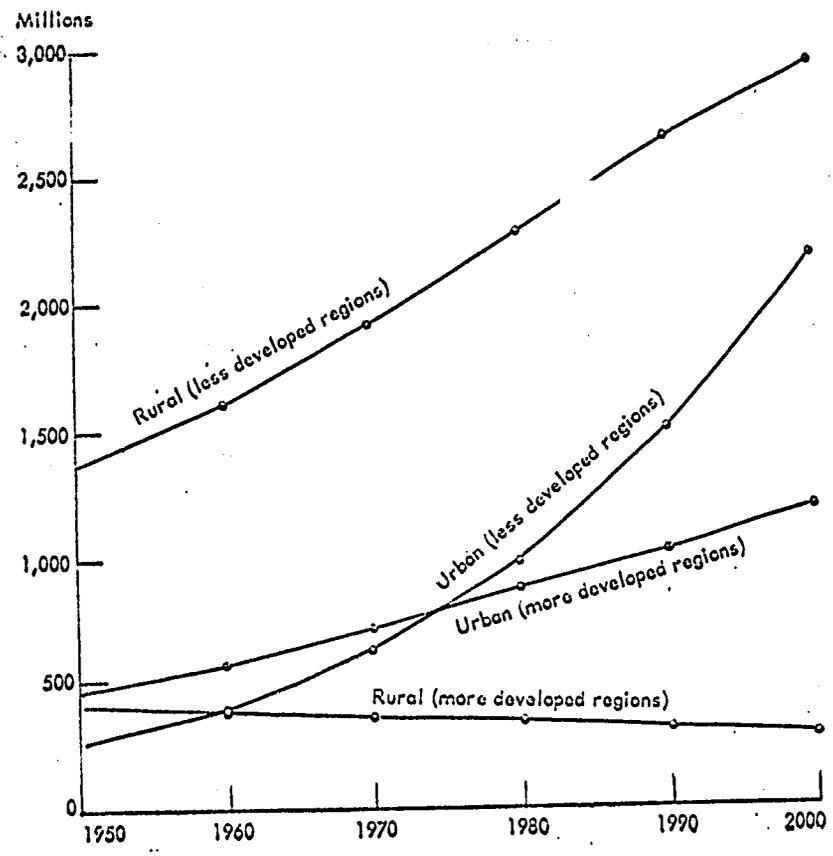
The fact that this observation is buried in a footnote speaks to the current status of research in this area, as compelling as it may be for additional attention.

The third reason for considering the entire settlement system and not just the largest cities, or even areas defined as "urban" requires a return to an observation made at the beginning of this discussion. While the patterns of urbanization that were discussed are dramatic, they can only be understood against the background of general population increase. While the previous assertion about the conspicuousness of the pace and magnitude of urban growth is correct,

it is paralleled by a much less noticeable, almost insidious increase of population in rural areas. Figure 1 reflects this situation by graphically summarizing the data presented in Table 2. So, in the period between 1960 and 1970, for example, the urban population of the less-developed regions increased by 232 million--an amount that exacerbated the collective and highly-visible social and physical problems faced by city dwellers throughout the developing world. At the same time, however, the rural population in these areas increased by 307 million! It has been a relatively unnoticed development both in terms of policy and research, but it poses serious threats to both the rural areas and, through the close interrelationships between city and countryside, to the urban centers.

These differentials in the patterns of growth between urban and rural areas have a larger meaning in the present discussion because they provide a clue to understanding the differences that exist between the developed and the developing nations concerning agricultural change. When the nations now characterized as "more developed" underwent a revolution in agricultural techniques and organization permitting fewer workers to produce increasing amounts of food, there was a ready market for the services of the reservoir of labor that became available. The urban centers were beginning to industrialize and both because of the demands of the industrial structure and the heavy toil taken by high mortality in cities, the release of manpower from agriculture did not overburden the urban areas in their process of modernization. These

Figure 1.  
Urban and rural population, in more developed  
and less developed regions, 1950-2000.



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Source: United Nations, 1971:24.

cities became the centers of a transformation from a social order that was near-feudal, static, and predominantly agricultural to a society centered on "modern" values. In large part, the transition was comparatively smooth (despite its heavy social and personal costs), but as some have indicated, it was also the result of a remarkable series of fortunate coincidences.

No one planned the series of bumper harvests which before 1750 gave British agriculture a sudden and remarkable impetus. Napoleon's conquests had more to do with the abolition of continental feudalism than any estimate of the need for agricultural productivity. David Ricardo, gloomily forecasting the squeezing out of profits by the growing cost of food, could not know that the Ukraine, the Middle West of the United States, the Argentinian pampas and the Australian Wimmera would be drawn in a new world of cereal abundance to redress the shrinking resources of the old world of British farming. No omniscient planner invented the drain-pipe (symbolic of litter sanitation and lower mortality) after the railway spurred urban growth. Yet these were among the decisive historic changes that prevented the largely unplanned and remarkably effective processes of nineteenth century modernization from running into the assorted deadlocks, bottlenecks, and vicious circles which another and completely different set of chances of urban development appears to be imposing on the development process today. (United Nations, 1970:7)

Urbanization in the developing world is occurring without benefit of a similar set of fortunate circumstances. While the growth of cities in the now-developed nations was made possible by voluminous migration from the rural areas, urbanization reciprocated by aiding in agricultural development through allowing for greater capital investment and the consolidation of land holdings. Urban growth in the developing world is not performing the same role in solving rural problems. Davis points to the situation in Venezuela as a good illustration of the situation in less developed nations.

Its capital, Caracas, jumped from a population of 359,000 in 1941 to 1,507,000 in 1963; other Venezuelan towns and cities equaled or exceeded this (rate of) growth. Is this rapid rise denuding the countryside of people? No, the Venezuelan farm population increased in the decade 1951-1961 by 11 percent. The only thing that declined was the amount of cultivated land. As a result the agricultural density became worse. In 1950 there were 64 males engaged in agriculture per square mile of cultivated land; in 1961 there were 78. (Compare this with 4.8 males occupied in agriculture per square mile of cultivated land in Canada; 6.8 in the U.S., and 15.6 in Argentina.) With each male occupied in agriculture there are of course dependents. Approximately 225 persons in Venezuela are trying to live from each square mile of cultivated land. (Davis, 1965: 20-21.)

Again, these facts serve as a reminder about the importance of viewing urban problems in a larger societal context. The situation in Venezuela is one which is repeated throughout the developing world and failure to consider the increasing population size of rural areas in discussing urban problems is a serious omission. A new reservoir of ready labor has been developing in rural areas, but on this occasion, there is no demand for its services. In the urban centers of Latin America, Africa, and Asia, the industrial labor force (and a meaningful tertiary or service sector) cannot expand rapidly enough to accommodate those who become urban residents by the process of natural increase, let alone through migration. The reservoir of labor in the rural areas is indeed substantial. For example, Currie has prepared estimates of the number of persons in the rural labor force of Colombia who could be released from it without altering agricultural productivity. For 1961, he concluded that of the 2,550,000 persons in the economically-active rural population of Colombia, 1,890,000 could be displaced with a conversion of a feasible, technical operation

of agriculture. (Currie, 1966: 168-187.) While Currie's assumptions deserve careful review, they do suggest that there is a tremendous potential for change in Colombia and, by extension, in other developing nations. It is a condition that approaches that of the now-developed nations some 200 years earlier, but the absorptive capacity of urban centers in the less developed world, both because of more limited industrial structure and lower mortality levels, is significantly less.

One final point deserves mention. In the period when the developed nations underwent their greatest amount of urbanization, it was due principally to rural-urban migration. Mortality in the cities was substantially higher than in the rural areas, while fertility was lower. With low rates of natural increase, cities would have had problems sustaining their population levels, let alone achieving rapid growth, if it had not been for the large population transfers from the countryside. Again, the situation is different in the developing regions. Natural increase is a major contributor to the increasing size of cities, while migration is relatively less important, despite its volume and the usual perceptions of its role. Davis indicates, for example, that 50 percent of the urban population increase in Mexico between 1940 and 1960 was attributable to that nation's general population increase and only 22 percent to urbanization alone. (1965:18.) While the relative importance of rural-urban migration in developing areas is a question still being debated by demographers, it is important to recognize that (1) if there was an immediate cessation of migration to urban centers, these areas would have enough

momentum to continue their growth through natural increase (and an age structure favorable to high fertility and relatively low mortality), and (2) the impact of strategies designed to address the problems of either rural or urban areas (or both) are destined to failure if this fact is not recognized due to an undue pre-occupation with migration.

### Paradigm for Urban Concepts

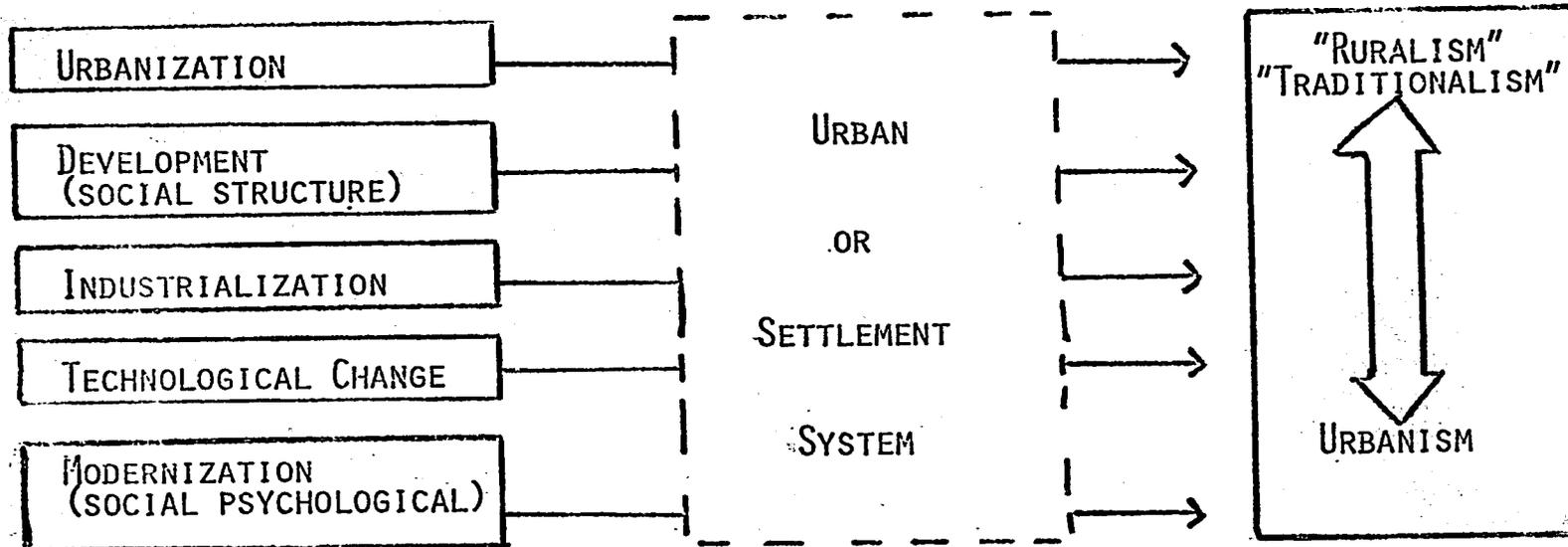
With the above review of urban growth as background, it would seem appropriate to add some conceptual specification to this discussion. There is perhaps no other area in the social sciences in which terms are used as loosely as in considerations of urban processes and phenomena. Consider, for example, what the process of urbanization might mean. Is it a simple statistical concept that reflects the growing proportion of a nation's population living in communities of a certain size? Or is it a more general concept denoting the major social transformations that are occurring in many nations? Through this conceptual specification and a supporting example, perhaps some new insights can be obtained. A modest paradigm by which to organize this discussion is suggested in Figure 2.

An appropriate beginning statement is found in Goode's detailed discussion of the family in changing societies. He notes:

A common theoretical error is to treat "urbanization" as a single variable, but to include in that variable almost all the social changes that are now going on. Since these are changes that are taking place, one cannot treat them as causal variables. Indeed, they are the phenomena to be

FIGURE 2

PARADIGM FOR ORGANIZING CONCEPTS  
USED IN THE DISCUSSION OF URBANIZATION



explained. Or alternatively, by including under this category almost every conceivable social change, one can say that "urbanization causes everything, simply because urbanization is so loosely defined to include everything." (196:374, emphasis supplied.)

One possible solution to this dilemma is to provide a strict demographic definition for the term "urbanization" (as above) and include it in a more extensive list of variables of societal change including development, technological change, industrialization, and modernization. In this manner, urbanization represents only the increasing proportion of population in urban centers of a specified size and it could be the cause or consequence of other societal change. The merits of this specification can be seen in two examples. First, it confirms those situations reflected throughout the literature on certain problems as researchers have identified situations where urbanization and one or more of the other variables are out of phase. Sovani's discussion of overurbanization which points to discontinuities between urbanization and industrialization (1964:113-122) and the observations of various social scientists about pockets of rurality in urban centers (e.g., Gans, 1962; Gutkind, 1965; and others) are representative illustrations. Secondly, when a specific research question is raised such as the impact of changes in agricultural technology and organization, it is possible to distinguish between "urbanization" and "modernization" (as a social psychological variable) with regard to the receptivity to such changes. This point will be considered below.

If the use of the term "urbanization" is considered as a demographic concept, it is necessary to have another term (that reflects the behavioral and social psychological differences (or

changes) which distinguish "urban" from "rural" areas. This point has preoccupied many sociologists and anthropologists and the literature is filled with the specification of continua that range between such polar concepts as folk-urban, sacred-secular, traditional-modern, Gemeinschaft-Gesellschaft, and many others. Perhaps the most satisfactory term to use in this connection is "urbanism" (and its opposite, "ruralism" or "traditionalism"). Borrowed originally from the work of Wirth, this term denotes the kinds of interpersonal relationships, social psychological conditions, and patterns of behavior that characterize urban areas and the organizational structure that has evolved in their support. In his classic essay, "Urbanism as a Way of Life," Wirth describes this complex of traits with terms like "superficial," "anonymous," "transitory," "impersonal," "segmental," "sophisticated," "rational" and "utilitarian," -- adjectives that descriptively separate urban from rural extremes along a continuum. For this discussion, terms indicating a predisposition to change and other aspects of modernisms should be added to reflect that "urbanism" is a societal concept and not just an urban one. (Wirth, 1938: 1-24.)

It should be noted, that the conceptual paradigm set forth in Figure 2 is carefully arranged to specify that "urbanism" is the result of a variety of societal processes, only one of which is urbanization. For example, the changing social psychological predispositions to new approaches called "modernization," for example, may be as important and it can operate independently of the demographic process of urbanization. Because of the technological revolution in communications, one need not be located physically in cities to possess all of the characteristics subsumed under

"urbanism." Since technological change is also one of the process variables described in the paradigm, its potential can be seen in calling attention to the confusion of concepts, in specifying some of the relationships between variables, and in identifying areas of research neglect.

The paradigm also indicates a point that was discussed above. The process variables operated to produce "urbanism" in a context, i.e., through the urban (or settlement) system. It is quite conceivable, for example, that systems of cities dominated by one large primate urban center differ with respect to basic urban characteristics than do those with a more pyramidal ordering of cities by size. In the first situation, one might hypothesize that the society is really a dual one in its nature with a large metropolis oriented to external interests and a large, homogeneous, and undifferentiated rural area which does not share in whatever change might be occurring. In the latter, cities as centers for change are more evenly distributed and urban networks extend throughout the countryside.

So, all of these variables, "urbanization," "urban systems," and "urbanism" need to be carefully distinguished and used with exactness. Admittedly, the paradigm that is presented only serves to introduce this topic and requires additional modification. One example of a particular situation of dramatic social change, seems to indicate its potential.

A recent article by Clark discusses the relationship between land reform and participation in peasant markets in the north highlands of Bolivia centering on the city of La Paz. (1968: 153-182.) The material that Clark assembles in support of his thesis

also fits the paradigm of urban concepts and provides some needed specification. Clark describes the landholding patterns in northern Bolivia and discusses the changes that occur when a land reform program is initiated in August, 1953.

Bolivia had one of the most extreme landholding patterns in Latin America prior to the peasant-supported revolution of 1951. The 1950 Census of Agriculture showed that of 82,598 private holdings of land, 9.6 percent were farms of 500+ acres. This represented 74 percent of the total land area and 63 percent of the land cultivated. At the other extreme, 61 percent of the private holdings were farms of less than 12 acres, representing .28 percent of the total area and 8.1 percent of the cultivated land. (Clark, 1968: 154) The central figure in this land-holding system was the absentee landlord, generally living in La Paz, who visited the hacienda only during periods of planting and harvesting to oversee his investment. For the balance of the year, management was left in the hands of white or mestizo administrators.

In return for access to the land and the right to grow crops for family consumption, the peasant workers were obligated to provide personal and farm labor on the hacienda. This also included an annual period of work in La Paz in the household or the store of the landowner. The arrangements between peasant laborer and the owner of the hacienda bound the farmer to the land and held him in near-servitude with only minimal obligations on the part of the landlord. It was a system of labor exploitation with large landholdings, absentee ownership, and virtual serfdom. (Clark, 1968: 156.) The system was so structured that caste-like distinctions were enforced between the Indian worker and the white landowner.

For example, peasants could not speak Spanish to the owner and, upon arriving in La Paz to perform his obligatory service, he would have to change into coarse homespun if he was wearing ready-made clothing. (Clark, 1968: 156.) Presumably this was designed to discourage the adoption of non-peasant dress or language in the hope that farm laborers would not leave the rural areas for the city.

All of these patterns were reflected in the marketing structure. Under the traditional system, the markets for agricultural produce were predominantly in La Paz and the marketing arrangements were dominated by the landowner with the produce delivered directly to his store in the city from the hacienda by "his" peasant families. There were only a few local markets and participation in their activities was very limited. Transactions were between the rural landholdings and the major urban center, La Paz.

With the assumption of power by the National Revolutionary Movement Party (MNR) following a military revolt, a land reform program was begun. Because the MNR created a national peasant union movement to help maintain its power, one of the first items of legislation that was passed in 1953 was a law that changed the usual tenure relationships between the landowning minority and the non-landowning majority. Although the magnitude of these changes is open to discussion, the immediate impact was the destruction of the system of getting produce to market. What (former) landowner could send his trucks safely into the countryside? As a consequence,

the amount of produce reaching La Paz dropped dramatically. As Clark notes, this is not, a consequence of declines in productivity but one result of land reform was the transference of the burden of getting agricultural produce to market in sufficient quantities to the peasants and buyers from both the rural areas and the city. (Clark, 1968: 162) After a serious period of adjustment, a new marketing system was developed based upon sales by peasants instead of landlords. This new system had several consequences that are directly related to the question under consideration.

First, the new marketing system has a possible direct relationship with urbanization. In order to sell their goods, peasants began to go to La Paz more frequently than in the past and on their own terms. Reciprocally, middlemen began to go out into the countryside to buy products, thereby establishing regular networks of communication and transportation. This two-way exchange is a potential contributor to migration (urbanization). While such an assertion must still be empirically verified for Bolivia, it is certainly possible given the importance of "pull" factors in the migration process, e.g., better opportunities, real or perceived, in the cities.

Secondly, the new marketing system had important implications for the settlement system. The bottleneck in marketing and transportation which developed immediately after land reform programs had changed the relationship between the rural areas and La Paz led to efforts by various leaders and entrepreneurs to create ne

points for the exchange of agricultural and other goods. These local fairs and new markets to which farmers can go to sell their produce and tradespeople from La Paz and other cities can come to buy and sell in return, presents an opportunity for the restructuring of the traditional urban system in Bolivia centered on La Paz as its primate city. According to Clark, new fairs were created in areas that were formerly isolated from transportation routes and provincial centers. (1968: 166) This can change the entire character of the settlement system. Not the least of these changes is the creation of more non-agricultural jobs in rural areas. Careful consideration of future Bolivian census data might reveal the extent to which the beginnings of a changed settlement system may exist, both in terms of population and occupational structure.

The changes that occurred in Bolivia also have a direct relationship to the third of our urban concepts: urbanism. In the local fair, products go both ways. Produce is sold to the middlemen and they in return seek to meet (and sometimes create) new demand for items. Clark describes one fair created after land reform that is now visited by more than twenty trucks each week:

(One can) find kerosene stoves, sewing machines, new and used bicycles, tires, and all bicycle parts and accessories, as well as all kinds of new tubes and batteries for radios. Besides these items the fair is filled with many stalls of ready-made clothing, plastic shoes, metal products such as nails, hammers, carpentry tools, and factory-made materials... in addition to the many small manufactured consumption articles and food products which everyone now takes for granted. (1968: 170)

This situation is quite different from the one that would be found prior to agrarian reform and the new patterns of marketing. But the demand for manufactured goods is only a symbol of the more important social changes that have occurred such as the development of a cash economy with its characteristics of rationality. Similarly,

the availability of radios (and their batteries) provides new avenues to the urban world. With these and other changes, the rural Bolivian Indian becomes increasingly "urbanized" without changing his physical location. In discussing the adjustment to land reform, Clark touches on its very point. He notes that two things were required to change rural Bolivia: a combination of land reform carried by the government and peasant unions and time--time to increase the horizons and expectations of the peasantry. Clark observes:

"This was only to be expected of persons who had worked for centuries as serfs on land belonging to others. In particular, time was needed to increase the number of rural families experiencing the new incentives, attitudes and motivations, all of which derived primarily from development and the use of individual managerial talents." (1968: 171)

Certainly, this observation is closely related to the meaning sought for urbanism in the conceptual paradigm.

Hopefully, the reworking of Clark's discussion of peasant market systems within the context of the paradigm indicates the value of separating various urban concepts for the purposes of analysis. While the presentation may be torturous and incomplete, it does broaden the perspective that can be directed to a consideration of interrelationships between urban growth and the agricultural changes now characterized as the Green Revolution. Since Clark's discussion of land reform is directly concerned with one possible component of agricultural transformation, it also provides a useful transition to these other, larger concerns.

### Implications for the Green Revolution

With this discussion as background, attention will now be turned to specific relationships between population distribution and the Green Revolution. It seems appropriate to use the discussion above to enlarge the way in which this discussion is organized. Current discussions of urbanization in the context of the Green Revolution strongly argue to the value of such an effort because urbanization is seen as a "second generation" social problem created by the new agricultural transformation. There is little doubt that this is true but the extent and scope of its impact, as well as policies to counter its problems, require a broader perspective.

Therefore, the relationships between the Green Revolution and urban changes will be discussed in a series of propositions. Most require empirical verification and await better understanding. This will become possible in the years ahead as conditions produced by the Green Revolution become better known and as data become more available. These propositions are proposed tentatively with the hope that additional thought can be influenced by discussions at this conference.

First, the Green Revolution has the potential for considerable migration from rural areas to urban centers. This is true of any major agricultural change that might be applied to the contemporary situation in developing countries. Whether it is new seeds permitting greater production or changes in farming practices, fewer persons are required to staff agricultural enterprises. But it is

important to note several things about the situation: (1) This development would be true even without the Green Revolution. High population growth is a major problem in the rural areas of the developing world and new techniques and procedures in agriculture only serve to accelerate one set of demographic problems (possible population redistribution) while solving another set of problems (feeding growing population numbers). Manpower would be backing up in the rural areas even without the changes of the Green Revolution. The architects of these changes, therefore, are not indictable for producing unforeseen consequences. (2) The relationships between the Green Revolution and rural to urban migration are complex and require careful understanding. The application of the package of agricultural changes subsumed under the term "Green Revolution" have both direct and indirect effects. It might be, for example, that the new seeds require a capital investment that force many farmers to abandon agriculture because of their inability to afford such supplies. Similarly, the scale of agriculture may change so that small land-holdings must be consolidated, again "freeing" persons from the soil and causing them to move to the cities. (Flores, 1969.)

The second proposition related to the one above is that there is no way to estimate the volume of migration. There are, indeed, large numbers of persons who will be added to the rural labor force because they cannot find meaningful support in marginal agriculture, but whether or not they move to cities is another question. Migration is really a careful collection of individual calculations of

the opportunities available both in the area of origination and the area of destination. For contemporary migrants these calculations may be complicated within the context of the new agricultural revolution. For example, the severe social and physical problems of cities may mean that migrants are less drawn towards them. This point requires careful research and serious discussion if one is to fully work out the potential problems of the Green Revolution.

Third, it is important to note that regardless of the volume of migration the social and physical problems of the cities are not going to disappear in the immediate future. Indeed, it would be important to consider the problems that will be created by changing agriculture for the cities. Given that there is an intricate interrelationship between the urban center and the supporting hinterland, it is important to speculate how many persons can be supported in the city with or without the increased productivity in agriculture. For some reason the drama of the Green Revolution has suggested that the problems of feeding masses of persons, many of them in urban centers, have been solved. But the cities depend not only on new seeds and new fertilizers for increases in their food supply, they also require improved transportation and marketing systems and these must be considered in any discussion of relationships between urbanization and agricultural change.

Fourth, cities are certain to continue to grow. Even if we take an optimistic view on the number of migrants who might leave the rural areas for urban ones because of agricultural transformations, urban centers have a potential for growth which is extreme.

Any euphoria felt about the results of the Green Revolution in "buying time" for a demographic revolution should be tempered by an understanding of the potential for population growth in the developing world. In the cities, for example, the age structure is extremely favorable for additional growth even under conditions of increasing family limitation. This matter requires serious consideration.

A fifth point concerns the urban system. If policies are to be designed to cope with the potentially larger volume of migration, planners should consider deflecting population movements into urban centers through this system by creating opportunities in smaller cities and encouraging migration in these directions as has been the case in Venezuela and the Soviet Union. In addition employment opportunities in small population centers based upon the new demands of agriculture, let alone upon forms of industry, may have the effect of retaining some potential migrants in the rural areas.

Sixth, a point that has certainly been considered in discussing the relationship between agricultural changes and migration from rural to urban areas concerns the differentials in such migration. The Green Revolution is not universally applicable throughout the world. At the present time, soil conditions, climate, and other ecological factors limit its application even within regions of particular countries. It is entirely conceivable that if persons forced from agricultural employment by the new forms of agriculture decide to move to urban centers, that migration streams (i.e., the paths followed by large numbers of migrants) as they are presently

identified, may change dramatically. In urban situations where there is potential conflict between regional groups, this situation can be extremely important.

A seventh proposition concerns another kind of migration differential. What kinds of persons move from rural areas? In general, the migration measure indicates that migrants are more able and innovative than those who remain behind. This has two interesting effects in the context of this discussion. (1) The adoption of the techniques for improving agriculture may require the very kinds of persons who might migrate from the rural areas. As techniques and procedures become increasingly sophisticated, it is possible that those persons best prepared to cope with these changes, unless they have sufficient capital to support their efforts, may leave for urban destinations. This point is purely speculative but worthy of consideration. Similarly, the rural areas have been viewed as a vast population reservoir which is in serious need of programs of fertility control. The persons who may first attempt such measures may also be the first to move to urban centers because of their social psychological receptivity to change. This would have the interesting effect of disproportionately distributing persons who could become predisposed to family limitation in the urban centers as opposed to the rural ones. This would be a matter well-worth considerable discussion.

All of the propositions above derive from a broadened perspective on urbanization and represent a relatively unsophisticated understanding of the agricultural changes included within the Green Revolution. Hopefully, discussion of this paper and general discussion in the conference of which it was a part will strengthen and expand this list of propositions considerably.

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