STRATIFICATION AND DEVELOPMENT

Macroregional Variations in Brazil - 1973

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Archibald O. Haller
University of Wisconsin

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A SOCIOECONOMIC REGIONALIZATION OF BRAZIL*

ARCHIBALD O. HALLER

BRAZIL is of special concern to geographers and planners for several reasons and may soon become "the first Southern Hemisphere state in the world system," to quote Ronald M. Schneider's apt phrase.[1] The country has an area of some 8.5 million square kilometers, a range of climate, abundant, but only partially utilized natural resources, uneven settlement patterns, an expanding economy, and extremes of wealth and poverty.

Considerable research has been invested in attempts to identify the macroregions of Brazil.[2] There are at least three and perhaps as many as a half-dozen large, identifiable areas in the country. Although researchers differ on the exact delineation of the regions, there is agreement on their general location. The Northeast includes the seven states of Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Sergipe, Alagoas, and Bahia. Amazônia includes the states of Amazonas, Pará, and others. The South is often divided in the Far South, including Rio Grande do Sul through Paraná, and the Center-South, including at least São Paulo and Rio de Janeiro. Other states and territories may be fitted around these regions. They are not merely directional terms for Brazilians, but connote distinct socioeconomic and demographic characteristics. The Northeast means antiquated agriculture and widespread poverty. Amazônia means vast reaches of uninhabited tropical forest, the "Inferno Verde" or "Green Hell" that may contain untold natural wealth. The Center-South means the modern sector with huge urban centers of manufacturing; the Far South means rich farming and productive pasture lands. The South means a large and relatively prosperous population.

Since 1941 the Brazilian government, mostly through its statistical service, the Instituto Brasileiro de Geografia e Estatística (IBGE), has carried out serious efforts at regionalization. Initially these efforts emphasized the natural features:

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[1] Ronald M. Schneider, Brazil: Foreign Policy of a Future World Power (Boulder, Colo.: Westview Press, 1976), p. 3.

[2] Werner Baer, The Brazilian Growth and Development Experience, *in* Brazil in the Seventies (edited by Riordan Roett; Washington, D. C.: American Enterprise Institute, 1976), pp. 41–62; Speridião Faissol, Espaço, Geografia e Ciências Sociais, *Revista Brasileira de Geografia*, Vol. 37, No. 4, 1975, pp. 3–22; Janet D. Henshall and R. P. Momsen, A Geography of Brazilian Development (London: Bell and Sons, 1974), pp. 59–61; Thomas W. Merrick and Douglas H. Graham, Population and Economic Growth in Brazil, 1800 to the Present (Baltimore: Johns Hopkins University Press, 1979), pp. 17–24; Olinda Vianna Mesquita, Rivaldo Pinto Gusmão, and Solange Tietzmann Silva, Modernização da Agricultura Brasileira, *Revista Brasileira de Geografia*, Vol. 39, No. 4, 1977, pp. 3–65; and Stephan Robock, Brazil: A Study in Development Progress (Lexington, Mass.: D. C. Heath, 1975).

● DR. HALLER is a professor of rural sociology and sociology at the University of Wisconsin, Madison, Wisconsin 53706.

Delineation of Brazilian Macroregions

In this article I present a delineation of Brazilian macroregions based on socioeconomic and demographic variables measured in each of the 360 official continental microregions in the country.[3] The system is simple, comprehensive, rigorous, and flexible. For the most part, it is consistent with the IBGE regionalization and allows insights to the socioeconomic and demographic structure of Brazil, even when the new system is inconsistent with the IBGE scheme. The variables have been refined for a half century through intensive theoretical and empirical research by sociologists and demographers. Many small areal units are used as the most disaggregated level of analysis rather than a small number of large units. Rigorous separation of socioeconomic and demographic variables enhances this system. Microregions may be easily reclassified according to their scores on the socioeconomic criteria.

The current regionalization uses two basic variables: a unifactorial multivariate index of microregional socioeconomic development level (SED) with a score for each of the 360 continental microregions of Brazil, and a dichotomous variable identifying microregions that have four or more residents per square kilometer.

The IBGE provides geographical data on economic, social, political, agricultural, and other aspects of the country for approximately 2,000 variables, aggregated at the levels of *municípios*, microregions, states and territories, and grand regions. The município, the smallest effective unit in the Brazilian political system, consists of a central city and its immediate hinterland. New municípios develop as divisions of previously existing ones and are generated when new cities rise to prominence. Microregions (MRs) are agglomerations of contiguous municípios, so arrayed by IBGE that they are homogeneous in terms of ecology, demography, agriculture, manufacturing, and transportation. Most MRs are several thousand square kilometers in area, although some are barely larger than 1,000 square kilometers. In the vast Amazonian backlands, some MRs are as large as 300,000 square kilometers. Their populations vary from a few thousand people in those backlands to millions in the highly urbanized areas. In this study, I used only the 360 continental MRs and excluded Fernando de Noronha, the small group of islands that lies 345 kilometers offshore.

The microregion is the basic unit of analysis for this study, although the IBGE formed each MR from the smaller municípios. The statistical data on each MR were compiled from the censuses of population, agriculture, commerce, and manufacturing as well as from other public records; in other words, the most basic data on each microregion were taken from firms, farms, households, and individuals. Units smaller than a microregion thus indirectly enter the analysis. IBGE's mezzoregions and grand regions were not used in the analysis. States and territories also were not used, but for some purposes macroregions drawn along state and territorial boundaries are presented.

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[3] Divisão do Brasil em Microregiões Homogêneas (Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística, 1970).

indicator of $M/_k$ might be an adequate measure of SED.[4] If tests seemed advisable for $M/_k$ and its indicators, they would be essential for the remainder of the variables. The case for face-validity of $SES/_k$ is promising in that its component variables would be microregional isomorphs of the kinds of variables that have long been known to be valid and sensitive measures of socioeconomic status at the household level. This line of research has has been pursued for at least fifty years, the variable sometimes being called SES, sometimes social status or level of living, and occasionally standard of living.[5] The approach worked well in at least one poor and isolated rural area of Brazil.[6] However, the data available at the microregional level might differ slightly from those proved to work at the household level, and correlations among variables might differ at the microregional level. These variables would require testing at the microregional level, as would $S/_k$ and $A/_k$, neither of which has been well established as an indicator of development at the countrywide, much less at the microregional, level.

It is thus essential, though not sufficient, to test each variable of the level of development by correlating it with the others. Several logical outcomes are possible. All variables might be highly intercorrelated ($r = +.98$ or higher), in which case each one of them could be taken to be a valid indicator of the variable that it is thought to measure. They could all have low correlations ($r = +.30$ or lower), an implication that without other evidence none of them could be shown to be a valid indicator. They might be a mixture of high and low correlations (+.95 to +.10), meaning either that certain variables were poorly chosen or that the concept was not unifactorial. Or the correlations might all be moderately high (+.40 to +.90), in which case factor analysis might show them all to be rather good, but individually imperfect measures of the socioeconomic development level of the microregions. In the fourth case (and perhaps the second and third) a factor-weighted index employing all variables would be a better measure than any one of them alone.

Data on each microregion were obtained with the cooperation of IBGE and were used to construct the following variables.

Variable 1. $M/_k$: microregional involvement in manufacturing. *Measure A.* $MEmp/_w$: manufacturing employment per worker—the proportion of each MR's economically active population that was employed in manufacturing on December 31, 1970. This is the main measure of the variable. *Measure B.* $MEng/_k$: manufacturing energy potential per capita—the total potential energy output in horsepower of all manufactural machinery in the MR (1970). This checks the validity of Measure A.

Variable 2. $S/_k$: microregional involvement in commerce—total value of all commercial sales per capita in the MR (1970) in thousands of cruzeiros.

Variable 3. $A/_k$: microregional involvement in agriculture—total number of

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[4] Werner Baer, Evaluating the Impact of Brazilian Industrialization, *Luso-Brazilian Review*, Vol. 15, 1978, pp. 178–179; and Robock, footnote 2 above, pp. 40–74.

[5] William H. Sewell, The Construction and Standardization of a Scale to Measure the Socioeconomic Status of Oklahoma Farm Families (Stillwater: Oklahoma State University Agricultural Experiment Station, 1940).

[6] Archibald O. Haller and Helcio Ulhoa Saraiva, Status Measurement and the Variable Discrimination Hypothesis in an Isolated Brazilian Region, *Rural Sociology*, Vol. 37, 1972, pp. 325–351.

TABLE I—VARIABLES INDICATING MICROREGIONAL SOCIOECONOMIC DEVELOPMENT 1970

VARIABLES	CORRELATIONS 2	3	4	5	6	7	8	MEANS	STANDARD DEVIATIONS (N = 360)
Manufacturing MEmp/$_k$	.458	−.447	.511	.660	.687	.607	.445	.044	.051
Sales S/$_k$ (÷Cr$1000)		−.571	.663	.824	.779	.756	.635	.700	.864
Agriculture A/$_k$			−.570	−.702	−.691	−.616	−.546	.270	.132
Radios/$_k$				.814	.749	.894	.907	.482	.202
Refrigerators/$_k$					.946	.894	.771	.128	.123
Television sets/$_k$						.867	.696	.096	.126
Automobiles/$_k$							.837	.053	.046
Literacy/$_k$								.721	.119

Source: Calculated by author from 1970 IBGE public-use data-tape.

not highly developed, commerce is not lively, and large numbers of people engage in farming, often at subsistence levels. Approximately 50 percent of the 1970 Brazilian population had access to radios, but only 12.8 percent had access to refrigerators, 9.6 percent to television sets, and 5.3 percent to automobiles. The average literacy rate was not high, 72.1 percent. Several variables have low means and high standard deviations, a reflection of the degree to which the microregional distribution of most of the variables is skewed: most microregions are inhabited by the poor, but some microregions have relatively prosperous populations. After reversing the signs of the correlations with A/$_k$, so that high A/$_k$ means underdevelopment, as is proper, the signs imply that each variable varies directly with every other variable.

This evidence is not sufficient to permit inferences to be drawn about socioeconomic development, the hypothetical conceptual variable underlying this study. The factor-analytic structure is examined to determine whether these eight variables can be interpreted as empirical manifestations of SED. If three conditions are met, it may be concluded that the data are consistent with the hypothesis that a single dimension more fundamental than any of the eight variables explains their intercorrelations. The three conditions are: a single principal component that accounts for a large part of the common variance of the eight items; no other principal component that also accounts for a substantial proportion; and all items have a reasonably high loading on the first principal component.

All principal components necessary to account for 100 percent of the common variance were extracted. Eight were required. The first accounts for 74.5 percent of the common variance, and its eigenvalue is 5.956. The other seven eigenvalues are less than 1.00, the largest being 0.700. In accordance with standard practice only those with eigenvalues equal to or greater than 1.00 are used. In terms of the proportion of the common variance accounted for, the second-largest factor yields 8.7 percent, the third 6.6 percent, and so on.

One factor alone is sufficient to explain most of the common variance in the matrix, and that variable may be termed microregional socioeconomic development. The factor loadings express the relationship of each individual indicator to the parent dimension (Table II). The factor loadings of all variables are at least moderately high, and there is no pattern that singles out some variables from the others. Involvement in manufacturing at .691 has the lowest loading,

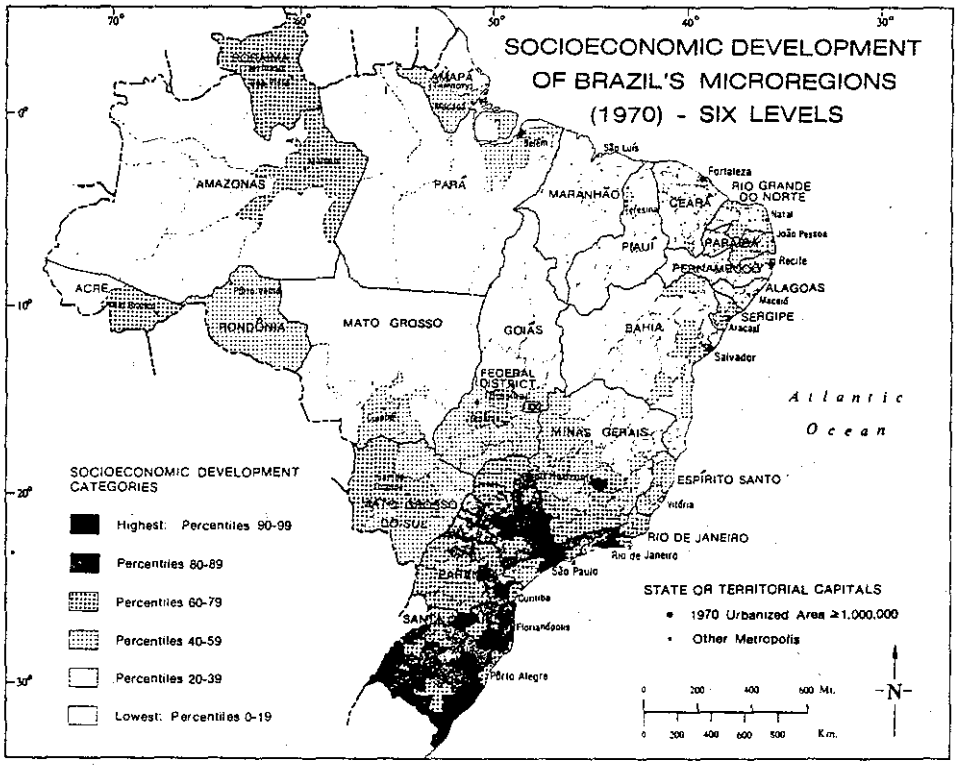

FIG. 1

map showing the geographical distribution of socioeconomic development was constructed by grouping the 360 continental microregions in quintiles, 72 to a quintile, and by dividing the highest or fifth quintile in its two deciles (the tenth or highest and the ninth or second highest), each containing thirty-six microregions (Fig. 1). On Figure 1, each microregion is assigned to its quintile or decile class according to its SED score. Macroregions were identified by isolating large sets of contiguous microregions that were classed almost without exception in the same quintile or an adjacent one, and then by marking the remaining sets of contiguous microregions (whether or not the set was composed of microregions of the same SED class). This procedure will become clearer as I discuss the resultant distribution of the microregions according to their SED scores.

Five macroregions were identified and assigned names indicating both their location and their SED characteristics (Fig. 2). Region I is the Developed South. The median SED score of its microregions is 78. Region II is the South's Developing Periphery with a median SED score of 54. This region swings across the top of the Developed South and then northwestward along the border. Region III is the Unevenly Developed Old Northeast with a median SED score of 31. Region IV is the Developing Amazonian Frontier with a median SED score of 32.5. Region V is the Underdeveloped New Northeast with a median

highest SED quintiles. The Developed South includes the states of Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, all but the northern tip of Rio de Janeiro, and the most populous one-third of Minas Gerais.

The Developing Amazonian Frontier, covering approximately one-half of the total area of Brazil, is a large set of microregions, most of which are in the second lowest SED quintile. This macroregion includes the cities of Belém, Manaus, and Macapá where SED scores are slightly higher than elsewhere in the area. The microregions located in the far west of Acre and Amazonas fall in the lowest quintile. This enormous forest-covered region contains some of the most remote settlements in the world. Brazilians expect that one day it will yield vast riches in minerals and agriculture, and vigorous developmental activities such as the opening of new mines and agricultural land are now in progress.

The Unevenly Developed Old Northeast stretches along the coast from Ceará to Bahia. The area is stereotyped as the poverty-stricken Northeast, but the chief characteristic of the region is uneven development rather than uniform poverty. The MRs forming its southern boundary—some in Bahia, others in Minas Gerais—are indeed in the lowest SED quintile. North of this boundary the macroregion contains very few microregions that fall either in the lowest or in the highest SED quintile. Several state capitals such as Salvador, Recife, and Fortaleza rise to the fourth quintile.

The South's Developing Periphery extends around the northern limit of the Developed South in an almost unbroken band of microregions, three-quarters of which are in the middle quintile. One end of the macroregion encompasses all of Espírito Santo, a small part of the state of Rio de Janeiro, and eastern Minas Gerais. A second and larger section of this macroregion swings northwestward from south-central Minas Gerais, across southern Goiás and the Federal District to include the state of Mato Grosso do Sul and the southern section of Mato Grosso. The extreme eastern part of this section wedges between the Developed South and the Unevenly Developed Old Northeast; the central part separates the South from the Underdeveloped New Northeast; and the western part separates the South from the Developing Amazonian Frontier. Two large border microregions, the new state of Rondônia and the eastern half of Acre, form a discontiguous portion of this macroregion. On Figure 2, this macroregion is divided in two parts, called the rim and the ray. The rim is the band that extends around the northern boundary of the South, and the ray contains the border projections. The region as a whole is distinct from the Developed South because the SED scores of almost all the component microregions are lower than those of the Developed South. Higher SED scores for microregions distinguish the South's Developing Periphery from the Developing Amazonian Frontier where the two abut. This pattern exists along the border with the Underdeveloped New Northeast. The microregions of the adjoining inland fringes of the Unevenly Developed Old Northeast have lower SED scores, usually in the second to lowest quintile.

Figure 3 presents the geographical distribution of microregions with dense population, that is, four or more inhabitants per square kilometer, and those with sparse population, that is, less than four inhabitants per square kilome-

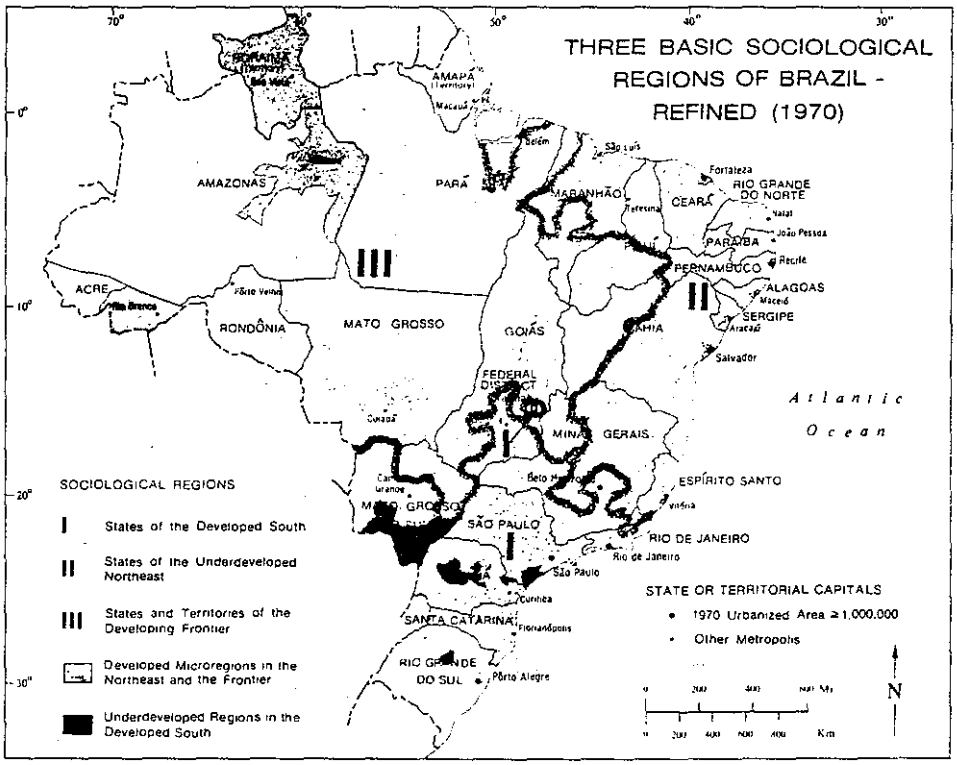

FIG. 4

based on microregional boundaries provide appropriate data by which to determine multistate macroregions. Indeed, many Brazilian states and territories are already wholly encompassed in one of the five macroregions. Allocating the divided states or territories to an appropriate macroregion may be accomplished by assigning the whole state or territory to the macroregion containing most of its population. The resulting multistate macroregions are as follows: the Developed South contains Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, Minas Gerais, and Rio de Janeiro; the South's Developing Periphery contains Espírito Santo, the Federal District, Goiás, Mato Grosso do Sul, Rondônia, and Acre; the Unevenly Developed Old Northeast contains Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, and Bahia; the Developing Amazonian Frontier contains Mato Grosso, Amazonas, Roraima, Amapá, and Pará; and the Underdeveloped New Northeast includes Maranhão and Piauí.

The realignment of macroregional boundaries in this way will be particularly useful to policy makers who must treat states and territories as unified entities. There are two major disadvantages to this system. Firstly, approximately half of Bahia and Goiás and parts of other states are taken from the Underdeveloped New Northeast, so that it retains only Maranhão and Piauí, less than one-half its original territory. Secondly, Minas Gerais is regionally complex, dissected by four of the refined SED macroregions. This complex

gions. Thus there exists a threefold division of the country among regions that are developed and densely populated, underdeveloped and densely populated, and underdeveloped and sparsely populated. The basic sociological regions of Brazil are termed the Developed South, the Underdeveloped Northeast, and the Undeveloped Frontier (Fig. 4). The boundaries of these regions on Figure 4 are refined because they follow microregional rather than state and territorial lines.

The Developed South contains populous, relatively developed microregions and a few enclaves of less-developed microregions. The Underdeveloped Northeast is composed of populous, less-developed microregions and a few, more-developed microregions, including those of the state capitals Vitória, Salvador, Aracaju, Maceió, Recife, and Fortaleza. The Undeveloped Frontier has sparsely populated and less-developed microregions and only a few sparsely populated, developed microregions. When the dissected states or territories are allocated to a region on the basis of the location of the bulk of the population as was done earlier for the macroregions, the only surprise is the inclusion of Espírito Santo in the Underdeveloped Northeast (Fig. 5).

Conclusion

Brazil is a large country with extremes of socioeconomic variation and population density. Geographical patterns of well-being and population density should form the basis of an effective regionalization of the country. Previous attempts at regionalization have met with limited success. The identification of a unidimensional socioeconomic development factor that provides a SED score for each microregion offers a method to determine the geographical distribution of levels of development. Contiguous sets of microregions with similar SED characteristics form patterns of identifiable macroregions. Maps of the patterns of population density provide a better understanding of the geographical distribution of socioeconomic differences among the people of Brazil. Perhaps the methods illustrated here will also prove useful in mapping the geography of socioeconomic development in other large, unevenly developed countries.

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STRATIFICATION AND DEVELOPMENT: THE BRAZILIAN CASE

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For many years scholars and statesmen have been concerned with the supposed relationship between stratification and development. The topic is obviously of great theoretical and practical importance. Unfortunately, until recently the available specifications of both concepts have been too imprecise to permit a clear delineation of the empirical relationships between them. Moreover the data by which to measure the variables implied by each are only just now becoming available, and even at present are rarely available except in the most highly developed countries. Topics such as this, which are important to many people but about which very little systematic empirical information exists, tend to generate large numbers of hypotheses and even myths. Some may be held quite tenaciously, often becoming bases of massive political programs. Other than war itself, few issues of the 20th Century engage the passions of practical people or the thoughts of theorists more than the development of nations and stratification--or social, political and economic inequality among people. It would be futile to try to list or to rationalize even a fraction of the often contradictory hypotheses that abound in this field. But some are of special importance. For example, some (Lenski, 1966; Treiman, 1970) hold that in the modern world, development reduces inequality and enhances social mobility. Others hold that development increases inequality (Lewis, 1976). One of the more useful and complete lists of such hypotheses is presented in Treiman (1970). Nevertheless the confusion in the literature on stratification and development is so great that one perspicacious analyst (Gartrell, 1981) presented the conflicting hypotheses in sic et non fashion, arraying them loosely according to "dependency" and "modernization" hypotheses.

as in the research on prestige and development (Treiman, 1977; Haller and Bills, 1979) or the studies of social mobility and development (Hazerigg and Garnier, 1976; Tyree, Semyonov and Hodge, 1979).

Clearly, as the requisite concepts and data become available it is important that the empirical relationships between each aspect of both phenomena be determined. At this juncture it would be useful to mark the relationships between the development levels of all societies and the key variables describing their stratification systems. Given the data limitations in most less developed countries (LDCs), this is not now feasible. But there is a useful alternative. This paper presents such data for a nation (Brazil) whose regions vary so markedly in development levels that they encompass most of the development variation found among the nations of the world. This analysis is not merely a substitute for the appropriate international comparisons that may become possible in years to come; to be credible international comparisons must overcome serious research problems that do not exist in the present instance. Leaving aside the question of diachronic measurement the sampling and data-processing requirements of such systematic international comparisons would be demanding and costly in the extreme. Parameters must be measured or estimated for at least three levels of units--household, national, and international. Probability samples of households would be needed to yield unbiased estimates of national parameters. A statistical description of the stratification system of a nation requires at least one such parameter estimate be determined for each stratification variable. Since very few nations, practically all of them highly developed, collect such data on stratification, new household probability samples would have to be drawn in many countries. The countries themselves would have to be either fully enumerated or selected on a probability basis. The

hypotheses are false in at least one significant case, thus either negating or limiting their applicability. Also, by providing a clear example of research yielding simultaneous measurement of the relationships between development levels and the levels of each of a comprehensive set of stratification variables, it would show how similar research might be carried out in other developmentally diverse nations such as Italy, the Soviet Union, Saudi Arabia, China, etc., as appropriate data become available. Lastly the resulting estimates of parameters can serve as benchmarks by which to determine the relationship between changes in development and changes in stratification. Most of all, it can clean out false hypotheses and begin the construction of better ones.

Brazil is one of the few nation-states meeting the above conditions. It may be the only one today. In theory and in fact, it is a nation of one culture and one language, Portuguese. Its culture, indeed, is mostly European, with certain African and Indian elements. The nation was founded by Portuguese empire builders, together with their African and Indian slaves, and consorts and the descendants of these in every imaginable combination--seamen, plantation owners and workers, prospectors and miners, small farmers cattlemen, and adventurers. The borders of the vast national territory have not changed much in 200 years and not at all in this century. Brazil has wide variations in levels of development. In a loose way this has been known for many years. It now appears possible to measure its regional development differences with relative precision: an abstract single-factor indicator of socioeconomic development of demonstrated validity has been worked out for the nation's 360 continental microregions (Haller, 1982; 1983). From it the nation's macroregions have been determined (see this volume). Finally, the national statistical agency, (IBGE: The Brazilian Institute of Geography and Statistics) regularly collects excellent household sample-survey data on most aspects of life essential to the study of stratification.

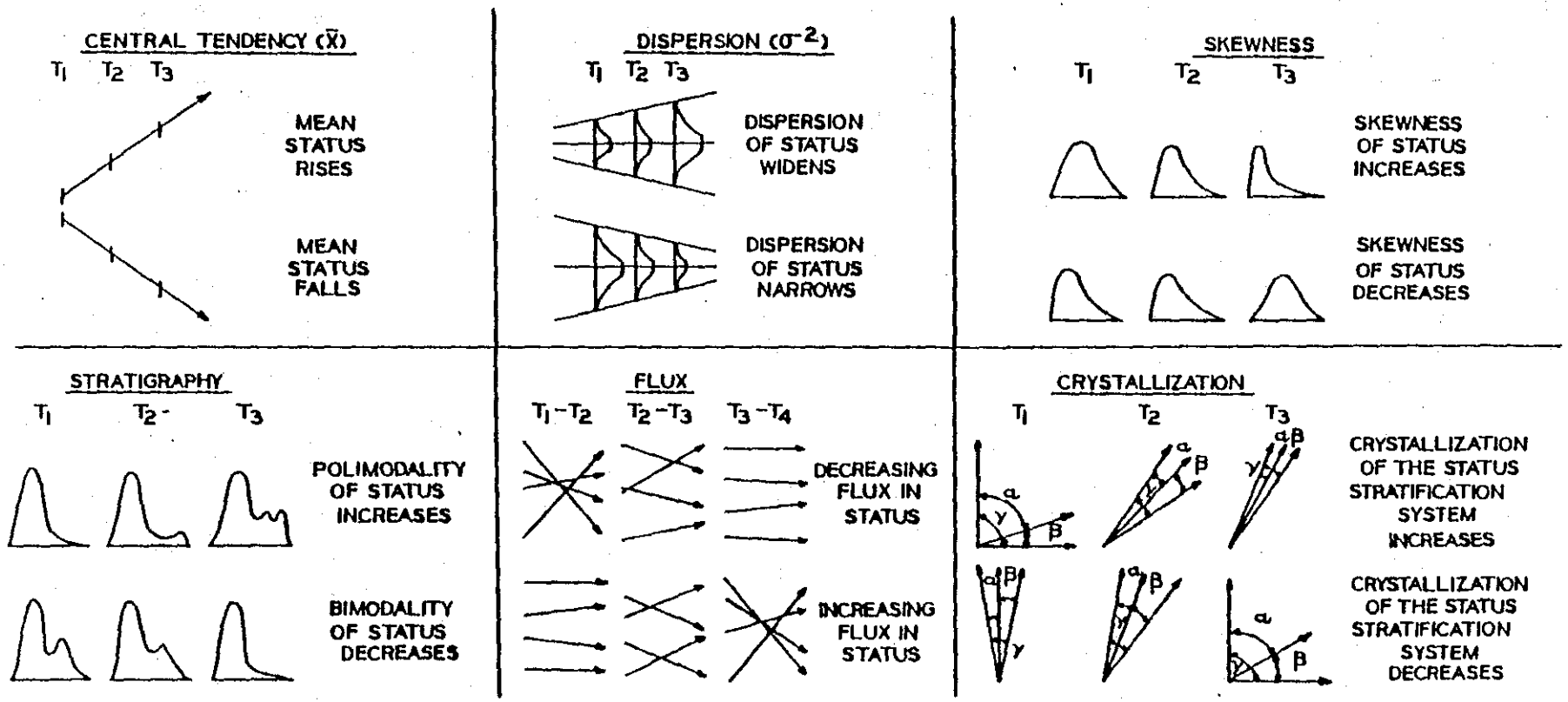
The "substances" of stratification phenomena: content dimensions of status (CDS). Several names are given by various authorities to the substantive dimensions--"content dimensions" (Haller, 1970)-by which small social units such as individuals or households are arrayed in terms of stratification. Comprehensive lists of them usually include at least four: wealth, or access to goods and services; power, or political influence; social status, usually occupational rank, and informational status, usually educational attainment. Measuring the level of each small unit of a larger system on any one content dimension requires a prior act of measurement of each unit's level on one or more specific status content variables by which each more general CDS is manifested.

The questions of how many CDSs there are and exactly what they are composed of must be answered from factor analyses of well-selected indicators of each. Exactly how many factors of what composition will remain to be seen. The factor composition may vary from across time and place (Jackson and Curtis, 1977). Indeed, several sets of such dimensions have been proposed over the years. They traverse quite a range in complexity. Marx seems to have thought in terms of a simple one-dimensional distinction, between the owners, whom he supposed monopolized both capital and power, and the workers, who had neither.

Weber (1946, 1947) seems to have assumed the existence of a single basis continuum of power, which controls "life chances" and which could be manifested in any one of three ways--the political influence of parties, the economic standing of classes, and the "status honor" of traditional strata. Sorokin (1927) proposed three content dimensions: "economic stratification," "political stratification," and "occupational stratification." Svalastoga (1964) proposed the four we mentioned above, though with slightly

accord to one another. But different observers emphasize different aspects of these phenomena. Without precise statistical data on each of the variables implied by the various dimensional concepts and the specific variables by which they are manifested, as well as the mathematical statistical concepts and the computers necessary to make the resulting millions of observations intelligible, there was until recently no way to determine precisely how the apparent dimensions of stratification relate to each other empirically. The research effort that would be required to do this would be enormous, and might turn up great differences among societies. In fine, all writers on social inequality or stratification are concerned with one or another aspect of the same set of phenomena. But they emphasize different specifics. At this juncture, the prudent researcher would employ a range of concepts general enough to encompass the central substantive dimensions of all major writers on the subject and specific enough to exclude all other phenomena. This is what, in recent decades, Svalastoga (1964), Duncan (1968), and Haller (1970, 1979) have tried to do. Any of these sets of terms would serve our present needs because they are equally comprehensive and because the ranges of their referents coincide exactly. These sets also encompass income, occupational prestige, and education, the three specific status variables that are used most often in today's empirical stratification research. In the present work we shall use the generic terms as they were most recently presented (Haller, 1982a; also 1970, 1979). This will keep the terminology and specific concepts consistent with earlier writings (Svalastoga, 1964; Haller and Portes, 1973; Haller and Spenner, 1977; Pastore, Haller, and Gomez-Buendia, 1975, 1977). Thus the content dimensions are taken to be wealth or economic status, power or political status, prestige or social status, and informational status. Income is the nearest measure of the first, occupational status of the third, and education of the last. Power measures are not availible.

FIGURE I ILLUSTRATIONS OF CHANGES IN THE STRUCTURE OF STATUS STRATIFICATION SYSTEMS



called "flux," although in recent research it is perhaps best known as circulation mobility. Just as variations in status central tendency may be expressed as vertical structural mobility, so also may circulation mobility be either calculated from a "mobility table" (Featherman and Hauser, 1978) or as the opposite of status inheritance after the change in the means (or "structural mobility") has been eliminated by subtraction or standardization (Kelley and Klein, 1981). Correlation coefficients (r) and coefficients of determination (r^2) automatically perform just such a standardization. So a coefficient of flux circulation mobility, F, may be defined as $F=1-r^2_{T_1T_2}$, where T_1 and T_2 refer to two standard time points. Usually status measurements are taken on men at the time of the interview when the interviewee also provides a status measurement on this father at some standard reference time, such as "when you took your first regular job."

Variations on the sixth and last SDS, crystallization, show changes in the degree to which the different SCDs vary together. As Landecker (1981:48-49), using the terms"rank system"where we use CDS, puts it, "A low correlation indicates the extent to which different rank systems are distinct and separate hierarchies"..."The direct significance of a high correlation is that it represents the degree to which the different rank systems converge with one another and jointly form a monolithic and comprehensive system of inequality." Ways to measure variations in status crystallization have not yet become standard. If sufficient numbers of appropriately selected indicators of each main SCD are can be obtained an examination of variations in item-factor weights might serve. While it would be useful to summarize the degree of crystallization in a single number, this does not now seem feasible.

Content variables and structural dimensions in the present analysis. In analyses to follow, we shall examine Brazilian regional developmental

What is known about stratification and development: the evidence. Scholarly knowledge of stratification phenomena go back as far as scholarship itself, records of lay awareness of them further yet. But historical records are spotty, both topically and regionally. At least until recently, even the best historical scholarship was incapable of providing a comprehensive and precise description of even one key strucltural dimension of the stratification system of a given societal unit. As insisted earlier, valid reliable measurements of appropriate indicators of each status content dimension must be so taken and processed that the SDS parameters may be estimated with precision. This must be done comparably for each of a set of societal units which have been arrayed in terms of valid and reliable indicators of development such that precise estimates of SDS parameters may be drawn for the larger universe to which the societal units belong. Such data are an emergent of the past twenty-five years or so, and are still quite incomplete.

Considerations regarding the concept and measurement of development are as important to this topic as those of stratification. It will be evident that the term "development" means different things to different scholars. This is because its not all of its ambiguities have yet been clarified in the literature, despite the fact that there is clearly a central core of meaning. A comprehensive review of meanings of national development is presented by Portes (1976); it would appear to apply about equally to other levels of societal units. Forshortening his definitions, he sees it as meaning economic transformation ("increases in the national product"), social transformation ("egalitarian distribution of income and widespread access...to social goods"); and cultural transformation

items or institutions promoting individual development--survival, health, information, and contact with others; in other words, individual access to goods and services. The empirical relationships between these two aspects of development cannot be taken for granted.

In the following paragraphs, we draw upon the small but growing body of quantitative research literature in which at least one SDC parameter has been estimated comparably and with precision for each set of comparable societal units (communities, definable regions, nations, states) so selected as to permit reasonably accurate estimates of the corresponding SDC-by-development parameters in the universe of societal units from which they were drawn. These findings will be presented for each structural dimension of status (SDC), and, within each of them, for each the most commonly used specific indicators of status content dimensions--income, educational attainment, and occupational status.

When such comparisons are made among nations, serious problems of comparability of measurement may arise. For income, it is obvious that monetary units vary among societies. Economists have faced this problem for years, and today most such data are presented in roughly comparable terms, usually standardized.

For education the problem appears to be more difficult and has never, to present knowledge, been solved in a definitive way. The usual ad hoc solution is to treat educational attainment as if whomever successfully completes up through a certain number of years of school has obtained the same amount of learning, regardless of country. If pressed closely it is obvious that the assumption is untrue. But it is useful nonetheless. Consider some hypothetical cases. Suppose a 20 year old Brazilian has successfully completed three years of primary school. Would his learning

holders of each is an immense undertaking even for individual countries, and multiple-country comparisons compound it.

The two main types of occupational status indexes are called 1) occupational socioeconomic indexes (SEI: Duncan, 1961; Featherman and Hauser, 1978) and 2) occupational prestige scales (OPS: Treiman, 1977). SEI techniques use standard weighting procedures to assign scores to specific occupational titles according to the average income and education of persons employed in them. They assume that the order of occupations is a consequence of differential individual rewards and inputs. An occupation's rewards are indicated by the average earnings of incumbents, its inputs by their average number of years of education. Obviously, these differ from country to country. Published SEI scales are available only for the United States (Duncan, 1961; Featherman and Hauser, 1978). OPS techniques have been in use for many years (Haller and Bills, 1979). Recently Treiman (1977) has proposed a Standard International Occupational Prestige Scale (SIOPS), which he believes to be a satisfactory instrument for comparing the occupational structures of societal units. As yet published of descriptions of the relationship between development and occupational status as measured by the SIOPS are not available. Definitive research on international comparisons of occupational status is just now getting underway (Jonathan Kelley, personal communication). Preliminary findings based upon what appears to be a modification of the SIOPS are presented in Kelley and Klein (1981).

1. Development and Status Central Tendency (SCT). Obviously, these are some extremely important senses in which these two concepts overlap. In some senses, perhaps including its deepest, the term "development"

that among societal units regarding average occupational status or average educational attainment follow the same pattern as variations in development.

Income. It follows that at the level of nations, there is abundant evidence that development and the central tendency of income vary together; indeed they are often assumed with good reason to be exactly the same (Portes, 1976; Kuznets, 1971). The same holds for regions within Brazil (Langoni, 1973, p. 159), and a similar pattern has been found for rural Thailand (Chiswick, 1981; Roongruangsee, 1982) and for the Philippines (Valera, 1980), except that the wealthiest nonindustrial area is Manila rather than in its industrialized urban surroundings. The conclusion is that development and average income are identical for most purposes.

Occupational status. In occupational hierarchies the jobs that score highest are usually those that pay better, are most prestigious, and require the most formal education. The most highly developed societies (or other levels of societal units) are those where small inputs of human energy yield large outputs of goods and services; and conversely the least developed are those in which large expenditures of human energy result in low outputs of goods and services. It follows that highly developed societies require and are most capable of supporting a larger proportion of workers in occupations of higher status than are those in less developed societies. So there should be a strong positive relationship between development and the central tendency of occupational status. Data on the relationship are just now becoming available, as noted. In a preliminary statement, Kelley and Klein (1981:75) have graphed the per capita gross national product of 14 societies by their mean occupational statuses (1975), using a collapsed version of Treiman's (1977) SIOPS as the measure of OPS. The sampling of societies is too spotty to permit calculating the correlation

and referents of development are a bit ambiguous. Nonetheless no one seriously doubts that $GNP/_k$ (or $GDP/_k$) and $KWH/_k$ both measure at least one aspect of economic development rather well. Development in the sense of $GNP/_k$ is the same thing as CT of income. $KWH/_k$ is not, but because of its (presumably) nearly perfect correlation with $GNP/_k$ it might as well be. The scanty data available within countries conform to the international trend. Similarly, the evidence regarding the CT of occupational status and educational attainment is consistent with that regarding income.

But the data presented here leave much to be desired. Neither the indicators of development nor those of the status central tendency are precise enough to provide a reasonably accurate estimate of the relationships between them.

2. Development and Status Dispersion. This topic is at least as problematical as the previous. Regarding the concept of development, as Portes (1976) has noted, some authors define it as a reduction of inequality. So conceptual redundancy is possible here, too. If on the other hand, development variations in the average level of access to goods and services, then development and inequality are indeed two different concepts (barring problems with the measurement of inequality), and relations between indicators of the two concepts should be straightforward.

But they are not. The measurement of status dispersion is far from unambiguous. Most of the measurement techniques that have been proposed are appropriate for interval scale data, especially income in money, the variable for which they were worked out. They are less appropriate for education and occupational status, which at best only approximate interval scales. But even for income it is not at all obvious how inequality should

in A is rather well off at \$20,000/year; whilst the "average D_{10} person" there is wealthy (\$500,000/year). By contrast the "average D_1 person" in B is in abject poverty at \$200/year; whilst even the "average D_{10} person" in B is poor, at \$5,000/year. Note, too, that the differences in shares of income is the same in both countries at 24 percent (25% - 1%)--they appear to be equally unequal, so to speak. But the absolute differences between the respective means are enormous, for A: \$500,000 - \$5,000 = \$495,000; for B: \$5,000 - \$200 = \$4,800. In this absolute sense the degree of inequality in A is huge compared to that in B. It is $\frac{\$495,000}{\$4,800}$ or 103.125 times as great. This is no doubt why Thurow and Lucas (1973), for one example, compared the (disinflated) dollar value of $\bar{\$}_{D_{10}} - \bar{\$}_{D_1}$ for two time periods when studying the changes in real income in post-war America. The sustained economic boom was so considerable during this period that though the share of the lowest decile remained about the same, their absolute earnings went up dramatically. But the real increase among those in the top decile was even greater--everybody gained but the well-to-do gained by far the most. This has two implications. First, societal units with larger disposable income per capita can have higher degrees of absolute inequality than those of lower, even when share distribution parameters based upon exactly the same observations indicate equality or that it is the poorer that is more unequal. It is absolute, not relative, disposable income that buys goods and services. So valid measures of absolute inequality might tell more about inequality in goods and services, which is the issue of most central to stratification, than do share-distribution measures. Unfortunately, the international data are compiled for share differences, not absolutes. Second, unequivocal conclusions may be drawn only when share-distribution and absolute data both indicate that the same one of the

and the Gini coefficient is +.43. This provides strong support for the inverted U curve hypothesis. In general, share-distribution income data describing relative inequality show two trends: 1) an overall trend in which the higher the level of development, the lower the degree of relative inequality, overlain by 2) an inverted U curve in which relative inequality appears to increase with development among the least developed nations, to reach an asymtote at $\$230/_k$/year (in constant 1964 United States dollars), and to turn down again among more developed nations. (Tyree, Semyonov, and Hodge, 1979, reported a much higher correlation between GNP/capita and "income inequality" [r = -.539]. This partly done to their use of the percent of income held by the top five percent. It may also be affected by their choice of countries: Bornshier and Ballmer-Cao, 1979, report a correlation of -.39 for the same two concepts taken over a larger list of countries.)

In our own review of Paukert's (1973) and Jain's (1975) data, we are struck by certain special exceptions to the overall trend. Eastern European socialist nations are generally low. (In part, this may be artifactual [Lenski, 1978], in that 1) those with multiple jobs are counted as if each job was held by a different person and each job of a multiple job-holder is likely to pay more than the single job of others, and 2) the State tends to provide its special perquisites to those who are already the best paid.) Among nations whose economies are organized to respond strongly to market signals ("capitalist" countries), the nations of the British Commonwealth tend to show relatively low low levels of share inequality. The northern-most countries of East Asia whether socialist or not tend to have rather low levels of share-distribution inequality.

occupational status in three developing societies (LDCs) is almost identical to that of ten developed nations (DCs).The average level of the LDCs is a bit lower, but the dispersion does not seem much different. If agriculture is added, then inequality increases among the LDCs, because most farming is at the bottom of the occupational status hierarchy, and because there are many more people in such positions in the LDCs. The tentative conclusion is that higher levels of development reduce occupational status dispersion, but mostly because small farmers are eliminated. But we cannot place much confidence in this conclusion; better data are needed.

Educational attainment dispersion. Systematic data on development and educational dispersion have not been compiled. But some strongly suggestive trend data have been presented by Meyer, Ramirez, Rubinson, and Boli-Bennett (1979:40). From 1950 to 1970 educational attendance for each age group of school-aged children and youth rose in both rich and poor countries. But 1960, almost all children in richer countries were attending school, so this rate had hit its ceiling. For poorer countries the corresponding rate increased sharply, hitting about 70 percent by 1970. The attendance rates for the secondary and teritary levels for richer countries diverged from those of poorer countries. So it would appear that development must have increased educational attainment dispersion. This is purely inferential and if true it applies to absolute dispersion, not necessarily to "share-distributions" of education.

3. Development and flux or circulation mobility. Over the years perhaps more research effort has gone into the relationship between social mobility and development than perhaps any other aspect of stratification and development other than share-distributions of income. Most research and theory pertaining to social mobility is concerned with its upward and

two standard times, of course, while synchronic comparisons can be made on measurements of central tendency. Synchronic measures of central tendency differenes among societal units merely show that the "structural levels" of units vary. Structural mobility differences among such units would imply that the rate of change in central tendency varied among them.

Circulation mobility or flux refers to the difference between total mobility and structural mobility. Conceptually it means that apart from the mobility caused--some say "forced"--by changes in the occupational structure. In other words, it is the degree of flux (in a technical sense of the word) remaining after the effects of a change in central tendency or structural mobility have been eliminated by standardization. The usual way to do this as indicated above, is by subtraction within "mobility" tables. But it can also be accomplished through correlation (r) because correlation coefficients automatically standardize the metrics of the variables they employ to a mean of zero and a standard deviation of one, and because coefficients of determination (r^2) and of alienation ($1 - r^2$) are simple derivatives of correlation. So the degree of flux or circulation mobility can be measured by a simple formula, $F = 1 - r^2_{po}$, where p is parent's status and o is off-spring's status (Haller, 1970); r^2_{po} (or r_{po}) thus would index status inheritance (Kelley and Klein, 1981). In future research this way of handling flux or circulation mobility might be preferable because it lends itself so well to correlation and regression analysis. The concept of flux or circulation mobility applies to any status content dimension or variable, although in the literature to date it seems only to have been applied to occupational status.

Income and education. As just noted, flux does not appear to have been studied with respect to these status content variables.

structural dimension (Haller, 1970) of the stratification system of societal units. It describes the degree to which the various content dimensions or more specific status variables are related to each other. When crystallization is high, all the status content variables are highly correlated. The presumption is that this would make the system "closed" in a sense different from the "closures" described by high degrees of inequality and of status inheritance. Theoretically the most "monolithic" or "closed" stratification system would be one that is very unequal (absolutely and relatively), has a very high degree of status inheritance (or low degree of flux) and is highly crystallized. As research on structural properties of stratification systems unfolds over the years, it will no doubt be the combinations of various levels of each of these three (and the other) structural dimensions that will prove informative in explaining the antecedents and consequences of stratification.

To date only one analysis of crystallization and development has been performed, that of Covello and Bollen (1979). Over the nine societies they compared, they showed a degree of status crystallization ranging from $r = +.694$ to $r = +.225$, depending upon how crystallization was measured. Apparently the more developed societies exhibit a higher degree of status crystallization.

5. Summary. We have seen that the evidence of the relationships between development and the structure of stratification is quite uneven. Most of the data are at the level of comparison among nations. Lower levels of societal units such as macroregion or communities within nations have not been given much attention. Then, too, the research literature tends to be concentrated in certain of the cells generated by cross-classifying status content variables with structural dimensions of stratification; and

Status attainment and development. In the strict sense of these terms there appears to be almost no defensible published research on this topic to date. It is extraordinarily difficult to combine evidence from various data-sets so as to conduct such analyses on secondary data (although it appears that various data-sets are now being "recalibrated" to permit such analyses; Jonathan Kelley, personal communication). Lin and Yauger (1975) have attempted to compare the United States and Great Britain with Haiti and Costa Rica. Unfortunately, serious sampling biases in the latter two countries made it impossible to draw any pertinent conclusions from it. Holsinger (1975) has attempted to determine the relationship between status attainment and development among four Brazilian cities, using data collected in 1959 and 1960. He uses standardized regression coefficients, although at the time researchers did not fully understand that metric (unstandardized) regression coefficients provide more clearly interpretable evidence. He concludes that the higher the level of development, the lower the degree of status inheritance on occupational attainment and the greater the effect of education on the same variable. So far, the data are in agreement with the Treiman (1970) hypotheses. He also found, contrary to hypotheses, mixed results regarding the development level of the city, and the combined effects of fathers' education and occupational status on the respondents educational attainment status.

Conclusions: Development and the structure of stratification and status attainment. A dozen years ago Treiman (1970) wrote out a set of propositions regarding industrialization and stratification. Quite appropriately he called them "assertions." Clearly, he understood industrialization to mean development. His assertions may well remain the best available set of statements regarding beliefs sociologists hold

Structural Variations and Development

Data of the PNAD-73 can be organized so as to permit an assessment of the relationship between Brazil's Developmental Macroregions and four of the variables called "structural dimensions" of stratification central tendency, dispersion, flux, and crystallization. The findings regarding each of these are presented in Tables 1 through 4. For convenience the

Tables 1-4 about here

first three tables are ordered by status content variable; the last is devoted to status crystallization. Each table presents the information separately for men and for women. The samples are weighted to permit direct estimations of the respective parameters for each macroregion and for the nation (see D.S. Godfrey and D.B. Bills, "Weighting the 1973 PNAD sample to estimate multi-state and national parameters," this volume). Neither formal tests against null hypotheses nor confidence limits are presented. The sample sizes are so huge that almost any difference, no matter how minute or trivial would be labeled "statistically significant," and statistical estimates are very close to their respective parameters. The data concern all persons who reported working regularly 17 or more hours per week. Three basic statistics are presented, the mean ($\bar{X}$), the standard deviation (S), and the coefficient of variation ($S/\bar{X}$). The mean is of course the measure of central tendency and the standard deviation provides the main evidence regarding dispersion. The coefficient of variation is used to permit comparisons with other status content dimensions (Allison, 1978) and for those who are interested in relative measures of dispersion. Because income distributions are usually skewed log normally the same data are presented in logrithmic form.

Table 2. Structural Variations in Occupational Status[1/] Among Brazil's Socioeconomic Development (SED)[2/] Macroregions, Data on Employed[3/] Men and Women (1973).

Structural Dimensions of Stratification[4/]	Occupational Status by Macroregion for Males and Females											
	South (78)[5/]		South's Periphery (54)[5/]		Frontier (32.5)[5/]		Old Northeast (31)[5/]		New Northeast (13)[5/]		Brazil	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Central Tendency												
Mean ($\bar{X}$)	19.43	20.29	16.79	21.24	21.88	26.16	12.15	13.41	6.86	8.58	16.69	17.80
Dispersion												
Standard Deviation (S)	18.86	19.69	17.98	20.44	18.66	21.01	15.60	17.25	10.76	14.64	18.06	19.32
Coefficient of Variation ($S/\bar{X}$)	.97	.97	1.07	.96	.85	.80	1.28	1.29	1.57	1.73	1.08	1.09
Flux (Circulation Mobility)												
Flux Coefficient ($1-r^2_{fo}$)[6/]	.72	.69	.79	.75	.77	.79	.72	.76	.85	.63	.71	.70
Number of cases	41,578	15,711	7,686	2,581	2,342	969	14,919	6,885	5,841	2,777	72,365	29,923

Source: Original calculations from an individual-level data-tape of the 1973 National Household Sample Survey of Brazil (PNAD 1973).

1/ Values given on a scale from 0-100, based on a canonical weighting of specific occupations by the mean income and education of each.

2/ Socioeconomic Development scores. See "A socioeconomic regionalization of Brazil," this Volume.

3/ All persons who reported working regularly 17 or more hours per week.

4/ All structural dimensions for which data are available, except status crystallization which is given in Table 4. Each statistic based on all data present.

5/ SED medians (Md). See note 2/.

6/ Flux coefficients ($1-r^2_{fo}$): r^2 is a coefficient of determination; $(1-r^2)$ a coefficient of alientation; f is fathers' (occupational) status; and o is the "offspring's" or respondent's status.

Table 4. Status Crystallization[1] Among Brazil's Socioeconomic Development (SED)[2] Macroregions, Data on Employed[3] Men and Women (1973).

Status Variables	Status Crystallization[4]											
	South (78)[4]		South's Periphery (54)[4]		Frontier (32.5)[4]		Old Northeast (32)[4]		New Northeast (13)[4]		Brazil	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Income x Occupational Status	.23	.23	.16	.17	.26	.19	.27	.22	.13	.16	.24	.23
Income x Education	.27	.23	.18	.20	.28	.18	.29	.25	.16	.20	.28	.25
Occupational Status x Education	.52	.65	.51	.67	.49	.61	.53	.63	.35	.52	.53	.65

Source: Original calculations, National Household Sample Survey of Brazil, 1973.

[1] Bivariate shared variance (r^2).

[2] Socioeconomic Development Median scores. See "A sociological regionalization of Brazil," this Volume.

[3] Reported to be working regularly 17 or more hours per week.

[4] SED medians.

thinking of the United States of course. Touqueville mostly wrote about the incentives encouraged by the American's freedom from a landowning class; Turner, too, about the availability of land but also the resourcefulness induced by the demands of frontier life. This position would argue, not that the economies of frontiers attract unusually productive people but that frontier life induces traits of individual productivity. One would guess that most if not all of the anomolous scores of the Frontier are due to sampling and/or the urban concentration of the bulk of the population.

The Question of Dispersion and Inequality. As we have seen researchers seem to think of inequality as a special kind, or set of kinds, of dispersion. When applied to distributions that are at least approximately normal or have been normalized by some appropriate transformation of the original metric, the standard deviation (S or σ) and its square (S^2 or σ^2) have mathematically definite properties, and they measure the absolute dispersion of the empirical distribution of a variable. When divided by the mean ($\bar{X}$) to yield the coefficient of variation ($S/\bar{X}$), the resulting number permits comparisons of the relative dispersion of the empirical distribution of one variable with that of another (Allison, 1978), permiting statements of the kind, "Variable Y has a greater (or lesser) dispersion than variable X." It would appear that the many measures of "inequality" regarding stratification variables go beyond unambiguous discriptions of dispersion, additionally specifying them in terms of one conception or another of good or just distributions. Some are unabashedly at least as ethical as analytical in concept, as noted by Allison (1978) and Frank and Webb (1977). Indeed there seems to be a wide spread tacit consensus to the effect that when "share-distribution"-- relative dispersion-- measuresremain equal within a country over time, or are

Regarding the central tendency, the main trend is a general rise in income with regional development, regardless of whether one looks at the data for men or for women regarding the means of income or the log transformations of income. For the Developed South (whose SED score is 78), the South's Developing Periphery (SED = 54), the Unevenly Developed Old Northeast (SED: 31), and the Underdeveloped New Northeast (SED: 13) the dollar trends are almost linear. The unexpected finding is that the Developing Amazonian Frontier (SED: 31.5) appears to be out of line.

The same trends, including curve location of the Frontier are evident for the standard deviations of the dollar distributions--a more or less linear positive trend of S_{income} by SED, except for an upward jog for the Frontier. The rest of the data appear to be less useful. The standard deviations of the logs are misleadingly close for men and women, and equally misleadingly make it appear that there is a curvilinear relationship between SED and income variability. The macroregional SED variations of the coefficients of variation are even more deceiving and are to be disregarded.

It seems almost certain the Frontier anomolies are genuinely special cases, and should be held in abeyance for now. So the unsurprising general conclusion is that macroregional mean income and dispersion of income rise with macroregional socioeconomic development.

Occupational status. The corresponding data for occupational status, together with data on father-to-offspring flux, or circulation mobility, are given in Table 2. Here, too, sex differences are of general interest. Contrary to the data on income, the mean occupational status scores for women exceed those of men in each macroregion, ranging from a ratio of sex means ($\bar{X}$ men/$\bar{X}$ women) of .79 in the South's Developing Periphery to .95 in the Developed South. The same is true of the ratios of the dispersions,

8.58; the Old Northeast is 13.41; for the Frontier, 26.16; for the South's Developing Periphery it is 21.24; for the South it goes down to 19.43.

The dispersion trends do not conform perfectly to any predictable trend, either. True, for males and females they both rise from the New Northeast through the Old Northeast, to the Frontier. After that they are almost flat. (The macroregional SED variations in the coefficients of variation (CV) are misleading: the higher the mean, the lower the CV.)

The flux trends are not completely clear, although the overall pattern may make sense in general, and the main anomoly may make sense in Brazil. It should be recalled that flux or circulation mobility refers to temporal (T_1, T_2)variations net of structural mobility. Total mobility in Brazil has increased substantially as measured from father to son and most of the increase is structural (Pastore, 1982?). This is true for all regions. Using a different scale and a more refined regionalization, the present analysis of men too finds that the average "distance of upward mobility" (sons' scores minus fathers' scores) varies directly with development level--except for the Frontier, of course, whose residents started higher, ended higher, and moved a greater distance to get there. The women's trend is a bit different, however. The greatest average mobility "distance" was travelled by women in the Periphery, with the Frontier and the South following close behind; the shortest,by those of the New Northeast, nearly the same by those of the Old Northeast. A flux coefficient, on the other hand measures the degree to which a person's status is, within the status parameters of his or her societal unit, free of control by his or her fathers' status. In this sense, it turns out that flux or circulation mobility tends to decrease with the level of development. But Unevenly Developed Old Northeast is the main exception here. Its flux line is quite low for women and much lower than the trend line would lead on to expect for men.

and status crystallization. 1) The degree of crystallization of occupational status and education (at .35 to .67) is much higher than either of the other two types (.16 to .28). 2) The tie between education and occupational status is much higher for women (.52 - .67) than for men (.35 - .53).

The main apparent trend, cutting across all the six comparisons (each pair of status content variables by sex) is that crystallization tends to increase wtih macroregional level of socioeconomic development. Two main anomolies, seen before, also appear here. The Frontier appears to be a bit more crystallized than would be expected, no doubt as part of the more general Frontier Phenomenon. The Unevenly Developed Old Northeast also appears to be more crystallized than would be guessed from the trend line; this is probably an accurate reading. In the one other comparison that has been made of status crystallization by levels of development (industrialization) the findings appear to be about the same. Covello and Bollen (1979) also report that status crystallization appears to increase with industrialization.

Summary. The general findings are mostly in line with what one would expect, most anomolies due to either a peculiarity of the Frontier or to the especially "rigid" stratification of the Northeast. Ignoring the Frontier, the following structural variations in stratification by macroregional SED have been found: 1) The central tendencies of all status variables rise with development. 2) The dispersion of all status variables rise with development. 3) Occupational status flux or circulation mobility falls with development. 4) Crystallization tends to rise with development. Despite the above, both the flux level and the degree of status crystallization are higher in the Old Northeast than would be predicted from the rest of the data points (less the Frontier, of course). The overall cross-sectional picture of Brazil, then, is one in

Status Attainment and Development

Problem and method. As we have seen, definitive research on status attainment in relation to development has not yet emerged, although there is a small amount of suggestive work available (Holsinger, 1975; Lin and Yauger, 1975; Hansen, 1977). This is true despite the fact that more or less systematic hypotheses concerning the matter have been available for years. Within the United States there is a long tradition of status attainment research though it has little to do with development. From a social psychological perspective, this work has recently been reviewed by Haller (1982). The present essay is an attempt to provide the first systematic analysis of status attainment and development. For employed men and women, it compares successively, by socioeconomic development (SED) level of Brazilian macroregions, the metric (unstandardized) regression coefficients of a number of recently codified antecedents of education, occupational status, and income (and log income). The antecedents of education are age and two social origin variables, father's class and occupational status. Those of occupational status include education and its antecedents, plus three variables describing the labor markets in which the workers participate--the SED or general quality of the local (microregional) labor markets, urban versus rural labor markets, and internal vs. noninternal labor markets. All of the foregoing variables are used as the antecedents of income (or log income).

All individual data were taken from the 1973 Household Sample Survey of Brazil (reported elsewhere in this Volume), and are weighted to permit generalization to states, regions, and the nation (see Godfrey, this Volume). Only persons of 20-64 years of age who worked regularly 17 or more hours per week are included herein.

of the people thus labeled as "capitalists" are small operators, and the literature is confused as to the role of size of holdings on the definition of the term. Yet owning the means of production and exploiting the labor of others is clearly the core of the "relations of production." Size is another matter, and most of the status effects of size are surely included in the effects of fathers' occupational status. Class origin thus may miss the size effects of capitalist origins, but those are picked up by fathers' position in the occupatinal status hierarchy. The variable here called "class origins" captures the unique effects of father's capitalist/non-capitalist class, net of the effects of his occupational status and other variables.

Age in years is the third antecedent variable. This is frequently used as a proxy for "experience." It surely includes an experience component, but it may include more. In this analysis we include only the linear effects of age. The well-known quadratic effects are ignored.

Three labor market variables are introduced into the explanation of occupationa status and income differences. They are metropolitan/nonmetropolitan residence, microregional socioeconomic development (MR SED), and internal/noninternal labor market. Urban-rural residence distinguishes between those who resided in a metropolitan area from those who did not (as defined for purposes of PNAD 73--the Pesquisa Nacional de Amostragen por Domicilios, or National Household Sample Survey of 1973). This is taken to be a way of conceiving of labor market segmentation. Brazil's population tends to be concentrated in large cities and in rural areas. The urban area wages respond to the requirements of manufacturing and other more or less specialized activities. In the rural areas, wages tend to be quite low (Haller, Tourinho, Bills and Pastore, 1981; also this Volume). We assume that metropolitan wages and occupational status, as well as the demand for

Taken together, then, with education and occupational status, income (or log income) is regressed on all of the above. In the analysis to follow, we compare metric regression coefficients across development macroregions for both sexes. The largest sample sizes for education are presented first, followed by those used for occupational status and income (and log income) are in parentheses for the five regions are: Developed South - 41 578 (31 586) men, 15 711 (8 791) women; the South's Developing Periphery - 7 686 (5 942) men, 2 581 (1 658) women; Developing Amazonian Frontier - 2 342 (1 641) men, 969 (602) women; Unevenly Developed Old Northeast - 14 919 (11 804) men, 6 885 (3 918) women; Underdeveloped New Northeast - 5 841 (4 501) men, 2 777 (1 320) women. These figures vary downwards for certain variables in certain samples. The exact data are given in Addendum 1, which also presents the means, standard deviations, bivariate sample sizes, and correlation coefficients for each sample as these were used in the larger samples available for education. Addendum 2 presents all regressions for the full sample ("All Regions"). Addendum 4 shows correlation matrices for the regressions of occupational status, income, and log income. It is based on the bivariate data given in Addendum 4. The nominal definitions of all computer acronyms for variables are presented in Table 5.

Table 5 About Here

Results. The results are presented in 40 regression tables generated for sexes (2) by dependent variables (4) by regions (5). They are numbered in three-digit decimals. The left-hand digit is 1 for men or 2 for women. The middle digit is 1 for education, 2 for occupational status, 3 for income, and 4 for lqg income. The right-hand digit is 1 for the Developed South (SED=78), 2 for the South's Developing Periphery (SED=54), 3 for the Developing Amazonian Frontier (SED=32.5), 4 for the Unevenly Developed Old

Northeast (SED=31), and 5 for the Underdeveloped New Northeast (SED= 13). The decimal numbers for these tables run from 1.1.1 for "Men--Education--Developed South" to 2.4.5 for "Women--Log income--Underdeveloped Old Northeast." These tables present the details. The conclusions are drawn from graphs of them which are not presented here.

Tables 1.1.1 through 2.4.5 after this page

PARTIAL CORRELATIONS AND CORRECTED REGRESSIONS FOR WORKING MEN *SOUTHS DEVELOPING PERIPHERY* 04/16/82 PAGE 12

FILE WKGMEN (CREATION DATE = 04/10/82)
SUBFILE WKGMEN.

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. ED

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FCANOCC
AGE
CLSSORGN

MULTIPLE R	.53318	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.28428	REGRESSION	3,	24356.83266	8118.94422	827.77251
ADJUSTED R SQUARE	.28394	RESIDUAL	6252,	61320.75992	9.80818	
STANDARD ERROR	3.13180					

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	BETA	STD ERROR B	F
FCANOCC	.1333962+000	.45809	.00319	1753.906
AGE	-.5914362-001	-.18587	.00342	299.361
CLSSORGN	.1111139+001	.09786	.12380	80.552
(CONSTANT)	.5076127+001			

---------- VARIABLES NOT IN THE EQUATION ----------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

ALL VARIABLES ARE IN THE EQUATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

PARTIAL CORRELATIONS AND CORRECTED REGRESSIONS FOR WORKING MEN (UNEQUALLY DEVELOPED) GLH NORTHEAST 04/18/82 PAGE 12

FILE WKGMEN (CREATION DATE = 04/10/82)
SUBFILE WKGMEN,

* MULTIPLE REGRESSION * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. ED

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FCANOCC
AGE
CLSSORGN

MULTIPLE R	.58403	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.34103	REGRESSION	3.	46289.48295	15429.82765	2170.25731
ADJUSTED R SQUARE	.34187	RESIDUAL	12525.	89048.69948	7.10968	
STANDARD ERROR	2.66640					

VARIABLES IN THE EQUATION

VARIABLE	R	BETA	STD ERROR B	F
FCANOCC	.1596528+000	.54985	.00216	5482.809
AGE	-.2814950-001	-.10342	.00198	201.658
CLSSORGN	.8909991+000	.07275	.09081	96.275
(CONSTANT)	.2366853+001			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

ALL VARIABLES ARE IN THE EQUATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

1.2.1

REGRESSIONS FOR WORKING MEN DEVELOPED SOUTH 04/09/82 PAGE 10

FILE MEN (CREATION DATE = 04/09/82)

* MULTIPLE REGRESSION * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 4

DEPENDENT VARIABLE.. CANOCC

VARIABLE(S) ENTERED ON STEP NUMBER 1.. URBRUR
SCORE
FCANOCC
AGE
INTLRMKT
CLSSORGN
ED

MULTIPLE R	.76770	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.58937	REGRESSION	7.	6440101.50726	920014.50104	6471.00299
ADJUSTED R SQUARE	.58928	RESIDUAL	31560.	4487041.29556	142.17495	
STANDARD ERROR	11.92371					

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
URBRUR	.3679798+001	.09860	.17911	422.074
SCORE	.2681381-001	.01536	.00831	10.420
FCANOCC	.1619730+000	.12994	.00559	839.288
AGE	.1305884+000	.07997	.00609	459.068
INTLRMKT	.5996990+001	.16117	.15225	1551.514
CLSSORGN	-.1147318+000	-.00174	.24807	.214
ED	.2801743+001	.58675	.02215	16000.343
(CONSTANT)	-.7730679+001			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

ALL VARIABLES ARE IN THE EQUATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

REGRESSIONS FOR WORKING MEN DEVELOPING AMAZONIAN FRONTIER 04/09/82 PAGE 10

FILE MEN (CREATION DATE = 04/09/82)

* MULTIPLE REGRESSION * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 4

DEPENDENT VARIABLE.. CANOCC

VARIABLE(S) ENTERED ON STEP NUMBER 1.. URBRUR
SCORE
FCANOCC
AGE
INTLBMKT
CLSSORGN
ED

MULTIPLE R	.72123
R SQUARE	.52017
ADJUSTED R SQUARE	.51811
STANDARD ERROR	12.91849

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	7.	296352.61615	42336.08802	252.89696
RESIDUAL	1633.	273371.54168	167.40450	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
URBRUR	.382673D+000	.00978	.94035	.166
SCORE	-.362855D-002	-.00388	.02257	.026
FCANOCC	.159115B+000	.13846	.02329	46.674
AGE	.170896J+000	.10274	.02962	33.283
INTLBMKT	.508596D+001	.13643	.70081	52.667
CLSSORGN	.850545+000	.01344	1.11339	.584
ED	.280700D+001	.60010	.10072	776.726
(CONSTANT)	-.228885D+001			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

ALL VARIABLES ARE IN THE EQUATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

1.2.5

REGRESSIONS FOR WORKING MEN UNDERDEVELOPED NEW NORTHEAST 04/09/82 PAGE 10

FILE MEN (CREATION DATE = 04/09/82)

* MULTIPLE REGRESSION * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 4

DEPENDENT VARIABLE.. CANOCC

VARIABLE(S) ENTERED ON STEP NUMBER 1.. URBRUR
SCORE
FCANOCC
AGE
INTLBMKT
CLSSORGN
ED

		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
MULTIPLE R	.66336					
R SQUARE	.44005	REGRESSION	7.	217085.20352	31012.17193	504.41753
ADJUSTED R SQUARE	.43918	RESIDUAL	4493.	276234.82792	61.48115	
STANDARD ERROR	7.84099					

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
URBRUR	.103718D+001	.02911	.04843	4.586
SCORE	.129453D-001	.01427	.01225	1.117
FCANOCC	.172193D+000	.11947	.01902	81.990
AGE	.338145D-001	.03819	.00998	11.480
INTLBMKT	.119989D+002	.29135	.51331	546.424
CLSSORGN	.963253D+000	.02679	.43512	4.901
ED	.196953D+001	.41388	.06173	1017.913
(CONSTANT)	.387614D+000			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

ALL VARIABLES ARE IN THE EQUATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.