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NATIONAL UNITY *and* DISUNITY

*The Nation
As a Bio-Social Organism*

By
GEORGE KINGSLEY ZIPF
University Lecturer
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PREFACE AND INTRODUCTION

SOME time ago it occurred to the author that we might learn much about our various social, economic and political problems if, instead of viewing man as "God's noblest creation," we studied human group-behavior with the same ruthless objectivity with which a biologist might study the organized activity of an ant hill, or of a bee-hive, or of a colony of termites. In other words, if we viewed man as but just another case of social organization in Nature's balance, we might hope to discern something of the fundamental drives that govern our behavior, regardless of whether that behavior happened to strike us as being particularly "noble" or "ignoble." And with this thought in mind, the author began an investigation which, thanks to the help and encouragement of friends, prospered rapidly, as the firm outlines of some very precise and yet bafflingly simple social laws emerged ever more clearly from the accumulating data. Since the purpose of the following chapters is to present the results of this investigation we shall acquaint the reader at once with a few of our findings and the nature of our investigation so that he may know without delay of the general direction into which we are headed.

To begin, if the reader will consult the census of the United States for 1930 he will note a very curious relationship between all the communities that contain at least 2,500 inhabitants. Thus he will find that New York was first in size of population; that the second largest city had $1/2$ as many inhabitants as New York; that the third largest city had $1/3$ as many inhabitants as New York; that the fourth had $1/4$ as many; the fifth $1/5$ —indeed, that the n th largest community had $1/n$ as many inhabitants as New York. This relationship between the size and rank

of our communities in 1930 was quite precise and, we might add, is one that is eminently simple to express in mathematical terms: $1, 1/2, 1/3, 1/4, 1/5, \dots, 1/n$.

If another example is needed of the type of empiric law that emerged from our data, we might add that the incomes of the United States in 1929 were distributed to individuals, corporations and other groups according to a relationship between size and rank that is both quite precise and quite simple to express in mathematical terms. For, as far as the data go, the relationship between comparative size and rank is again: $1, 1/2, 1/3, 1/4, 1/5, \dots, 1/n$.

Moreover, in the ensuing chapters there will be presented many more of the same kinds of observations for many other countries, for we have spared no pains in increasing the amount of our data to a point where all doubt will be removed about the nature of the relationship. Since the data can be presented graphically with great convenience, all our supporting data—no matter how extensive—will be included in their entirety. Furthermore, because the above-noted simple relationship will appear as a straight line on graph paper, the only question that the reader will be asked about any particular graph is whether or not the line represented is straight. Since for the answering of this question a straight-edge is the only mathematical equipment that will be necessary, it is evident that no previous knowledge of mathematics will be needed for following our demonstration from beginning to end.

Of course there will be some instances where the lines of our graphs will be anything but straight. Indeed, this lack of straightness in the distribution will probably not astonish the reader after he has noted the names of the countries for whose data straightness is lacking, and after he

has learned of the possible meaning of this straightness. For in addition to presenting an abundance of quantitative data in connection with our formulae, we shall also discuss at length and in detail the possible meaning of our formulae in terms of the forces that motivate our activity. In other words, our demonstration will be interpretative as well as factual.

Because of the inherent simplicity of the formulae that describe our data, the interpretation of the data will be greatly facilitated. Indeed the general nature of the series, $1, 1/2, 1/3, 1/4, 1/5, \dots, 1/n$, is so venerable in scientific inquiry, and its properties so well known to mathematicians, that much of our thinking has already been done for us, once we have observed the presence of this series. Indeed our chief task will be essentially to apply what we know about the series in general to what we observe about human organization in particular. And here again, because of the nature of the relationship, the non-mathematical reader will be at no disadvantage.

Perhaps the most obvious inference that can be drawn from the application of our series to the sizes of all communities of a population is that a nation may very well be a natural bio-social entity, quite comparable, in fact, to that of a colony of ants, or of bees, or of termites. Furthermore the above series, when equated with national development, may have what we shall later call a "saturation-point"—that is, a point where, under particular conditions, a nation may emerge into a quasi dead-center. And curiously enough, the population of the United States seems to have crossed this saturation point at about 1930,—that is, at about the time when, by interesting coincidence, our deep financial and social depression settled upon us, as our social-economic activity became paralyzed for reasons that have never been altogether clear.

Another inference to be drawn from our generalized series is that the series itself makes sense only as a whole. In other words, as we either insert fractions within it, or delete fractions from its midst, the series becomes either "surfeited" or "deficient." Hence when nations annex or cede territory, they may easily bring confusion into our orderly series of fractions. We shall illustrate the significance of "surfeit" and of "deficiency" in our series with sets of data for the United States before and after our Civil War when much was said about the "federated whole" versus the "sovereign parts." We shall also present many sets of data for European countries before and after Versailles, for we have recently heard much about a nation's "Living Space" (*Lebensraum*), and the "Community of Destiny" (*Schicksalgemeinschaft*). Indeed we may suspect even now that Nature may conceivably be so fond of the simple relationship, $1, 1/2, 1/3, 1/4, 1/5, \dots, 1/n$, that the social-economic forces responsible for it will be quite worthy of study in their historical manifestations.

Of course we must remember that our own primary interests are in disclosing as far as possible the basic principles and not in discussing any particular manifestation thereof. For the sake of illustration, or for other purposes of exposition, we shall discuss many actual cases in recent and past history; nevertheless, any such discussion of actual cases will be made solely in order to study the laws that operate their main-springs. It is for the reader if he so chooses—to apply whatever we may have found to the solution of any present-day problems. Though the author cannot ignore the existence of present-day problems,—indeed we may see many of these problems emerging from our data like ever-increasing storms—nevertheless, in discussing the problems, the author will studiously avoid

proferring practical solutions, if only because he suspects that many a reader may well be far more gifted in the art of constructive statesmanship than he. The role of the "architect," after all, remains above that of the "mechanical engineer," no matter how serviceable the latter may hope that his principles may be to the architect. To summarize our point of view, then, we may repeat that man is just another species in Nature's proverbial balance, and the United States, for example, just another instance of a presumable bio-social entity in a world where we assume that like things under like conditions behave alike. We shall not occupy ourselves with the problem of whether the United States should or should not survive as such, but rather with the problem of the general forces in terms of which nations do or do not survive, regardless of their wants.

Because of the nature of our interests, our demonstration will be governed by the need to present first essentials first, as we take our trek through the chapters. For us, the most important feature of human social-economic organization is that a "nation" is a bio-social entity in the process of rapid evolution. And in our first three chapters we shall carefully inspect the possible nature of the forces that may govern the organization of a national entity. In this connection we have already made a few prefatory remarks about *saturation* and *Living Space*. But there still await us the questions of the specialization of labor, of the mass production of goods, of the economical movement of raw materials through industrial processing and the like—questions which are apparently germane to an understanding of any nation, and ones which we may find intimately related with the sizes, number and locations of any nation's communities. In fact, we may remark even now that the comparative sizes of a nation's communities

may be a very sensitive barometer of much of the social-economic activity that occurs within that nation.

But now that we have shown what we consider to be the first essentials of our study, let us continue with our brief synopsis so that the reader may appraise our entire investigation in the light of his own interests. Once we have gained some idea of the possible meaning of a "national entity" in our first three chapters, then our most important step will have been taken. In Chapter Four we shall consider the fact that the earth's surface is covered with many competitive "national entities" with perhaps a certain inevitable cooperation and conflict between them. In this chapter we shall note the possibly catastrophic consequences that may attend the efforts of any foreign office to impose upon the world a specific "balance of power" that may contradict Nature's own balance. Here too we shall see not only how wars may break out, but also how peace may arise and continue for generations with a minimal friction in a conceivable federation of nations—if we may assume that the final arbiter of the equilibrium of international forces is neither man, nor man's speaking in behalf of Nature, but Nature herself. Nor does this problem of the natural equilibrium of social-economic forces appear only in international matters.

Indeed a consideration of international balance in Chapter Four will only lead us in Chapter Five to the question of intranational balance, where we shall broach the problem of the distribution of the shares of national production to the nation's inhabitants. In this chapter we shall present quantitative data for many nations on both sides of the Atlantic—some with straight lines, others with pronounced bends. These bends will suggest the possible meaning of such terms as "pre-Revolutionary conditions" and the like. Furthermore they will introduce one of the

most curious problems that we shall have to face: the question of the "greatest 'good' for the 'right' number." This question, which involves the definition of "good" and of "the 'right' number," may seem academic to us in its present statement as we ask what may "good," and what may "the 'right' number" mean in any social-economic sense. Nevertheless, and in spite of academic appearances, we shall later inspect some of the main trends of history to see if perchance man through the ages has not been struggling to answer the questions—"what is the greatest good?" and "who are the 'right' number that shall receive that greatest good?"—as he has proceeded from one battlefield and massacre to another, from earliest times right down to the present moment of writing. The question of the possible meaning of the "greatest good" and of the "'right' number," we shall leave with the reader for his own answering, if he chooses, for some day he may be called upon for an answer. And for his help, we shall point out the possibility of a faint suggestion of fallacy in the familiar phrase, "life, liberty and the pursuit of happiness."

In Chapter Six, the last chapter, we shall turn to the problem of cultural drives—that is, to the forces that may govern our fashions, vogues, attitudes and the like. Here we shall argue against the background of the findings in our preceding chapters in a field which might be called the "psychology of economics" or the "psychology of culture," if those terms had meaning for us, or of "social humanism." In this chapter, as in all the preceding ones, we shall note whether Nature may not be seeking to conserve energy in the balancing of her forces, even in respect to the minutiae of group behavior.

So much, then, for the chief milestones in the trek that lies ahead of us.

* * * * *

Of course, in presenting this material, the author has not disguised from himself a certain difficulty which merits very frank mention. It is one thing to examine natural phenomena objectively and dispassionately without any reference to our ethical or religious preconceptions. But it is quite another matter to present set after set of quantitative data in which are included not only the reader and the author, but also, in all probability, most of our friends and relatives. For, after all, we are writing objectively about ourselves in our capacity of being just another social animal in Nature's balance. Furthermore the implications of our studies, whether expressed or implied, may not be necessarily altogether happy for us as individuals or as a nation. In this connection, the author but offers his formulations of national forces for whatever they may be worth. If unsound, they should be ignored; if essentially sound, they will probably function whether we like it or not. Hence, if this volume should accidentally fall into the hands of a person who has unalterably made up his mind as to what is absolutely righteous and what absolutely vicious, or as to who is absolutely virtuous, and who the reverse, then this would be an excellent moment for him to lay the book aside.

For, in simple truth, the forces that we are studying seem to be like those of the rising and falling tides. They are apparently closely related to the presumed forces of history—that is, to the forces of war and of peace, the forces that make for revolutions, that bring an individual or a group out of obscurity or shunt him or them back into obscurity again—with little respect for names, or ancestry, or race, or religion, or for class-membership. Hence, if

any person should feel that he is exempt from these presumable forces, then such time as he may spend upon the following pages will be just so much time wasted, because, at least as far as we are concerned, we find no exemptions.

We do not mean to imply, of course, that we have by any means exhausted the field of inquiry, or that our own methods of study of social phenomena are alone legitimate. In this connection we might speak briefly of the problem of method if only to explain what our own methods of analysis will be; for the nature of one's findings are likely to be somewhat determined by the particular methods of analysis that are adopted.

The most familiar methods of analysis in the social field are perhaps those of speculative philosophy, in which the investigator excogitates major assumptions to serve as a basis for his logical deductions. If the logic of his deductions is unimpeachable, then the conclusions that he reaches will be those already contained in his major assumptions. Whatever the value of this approach may be, we shall not adopt it.

Another and quite different approach is the objective-factual, or empiric. Since this will be our approach, let us inspect its methods more minutely, for in so doing we shall also be explaining our own methods of analysis.

With the empiric approach, relevant facts are assembled, measured, and compared from some angle in the hope that significant correspondences, or correlations, may be found. Upon the emergence of significant correlations, the observations are compared from some other angle, or other sets of observations are mustered in the hope of testing, extending, or refining upon the original correlations, until there slowly develops a body of law. This objective-factual approach, which we shall use, happens to be the traditional approach of the exact sciences. The

approach is one that never lifts its eyes from the observable facts, and never makes a final statement except on the basis of facts, the validity of which other investigators may verify by their own independent observation and measurement. It is true that correlations may be used as major assumptions from which logical deductions may in turn be made; but logical deductions of this sort, commonly known as working hypotheses, can be viewed as "law" only if they can be found to conform to, and faithfully describe, observable facts. And these "laws" cease to be valid the moment they are contradicted by newer or better observations. Hence any such "laws" that we may propound in the course of the present study will be no more valid than the facts supporting them, just like any other empiric "law." For in this type of inquiry, the facts of nature constitute the ultimate court of appeal before whose decision all must bow, including author and reader.

Our entire analysis, therefore, will consist of the factual and interpretative; that is (1) the observation, classification and measurement of phenomena on the one hand, and (2) the comparison of sets of data and the construction of working hypotheses to be tested, together with a considerable amount of factual discussion. Since our study consists of these two types of material, the factual and the interpretative, it is vulnerable to attack both in respect to the facts and in respect to their interpretation. The reader is invited to join the author in making just such attacks, both now and in the future, that the better may be found to replace the less good.

Of course in the presentation of our observations, some of which are fairly new, we shall not feel necessarily obliged to segregate all factual material into one portion of the study, and all interpretative into another. The

exigencies of exposition will necessitate a gradual development of our ideas, in order to avoid confusion. Hence we shall follow the familiar alternation of induction-deduction, beginning with the most obvious and well-known, and proceeding, by easy steps, to the less obvious and less well-known, measuring as we proceed. Although the problem of social-economic organization is far too vast and complex to be completely solved in any one study, or by any one person like the author, nevertheless the present study does pretend to demonstrate some of the basic first principles that are apparently essential to, and inherent in, all social-economic organization of whatever sort.

However at this point let us remember a very obvious fact. The general field of "social-economic organization" has been known under many other names in the past, and many investigators have been and are still working in this general field. If a new investigator enters the field (however the field may be called), he may wish to carry on from the findings already at hand; nevertheless he is not obliged to. On the contrary he may elect to examine nature first-hand from a new angle, measuring and interpreting it in the raw from the very beginning. If he makes no mistakes and if others have made no mistakes, his findings will tend to confirm the findings of others, once they reach common ground. Since we shall elect in this study to examine nature first-hand from a new angle, measuring and interpreting it in the raw from the beginning, we may expect in due course to confirm some of the findings of others as we gradually emerge into common ground, though as a matter of courtesy we shall leave it to others to decide whether their findings are indeed being confirmed, except in cases of major priority. But, by the same token, we may unhappily also have to contradict an occasional finding as we proceed; hence the reader may

be called upon to weigh contradictory sets of data and contradictory interpretations. In order to facilitate this weighing, the author will put at the reader's disposal a large number of clear-cut sets of data in support of his contentions.

Furthermore there is another fact that must be made very clear before we begin. This entire investigation was possible only because of the help of friends, for whose kindness the author expresses also here his very profound gratitude. Among these were the author's wife, who helped in the enormous task of compiling data, and a friend who provided the financial means for some of the compilation (to be reported in greater detail in a subsequent publication). Furthermore Professors M. H. Stone and Joseph L. Walsh of the Division of Mathematics at Harvard University have been kind enough to inspect the quantitative data; indeed Professor Walsh read certain portions of the earlier drafts of the manuscript and tendered valued criticism and suggestions. The preparation of the manuscript and of the charts was considerably aided by a subvention from the Committee on Research in the Social Sciences at Harvard University. In addition, there was the encouragement and active help of students and other colleagues. The courtesy of many persons in the Department of Labor and in the Bureau of the Census in supplying the author with detailed information made possible an extension of the scope of our data. And to all these persons is gratefully dedicated anything of value which may be found in the following pages.

Nevertheless the reader has been invited to find shortcomings in the following pages, and to modify the author's statements and deductions in the light of his own experience with these problems. In order to prepare for the

eventuality of adverse criticism, the author hastens to add that no person or persons mentioned in this preface have seen the author's manuscript in its final redaction. Hence the author alone bears all responsibility for any error of whatever sort that may be found therein.

G. K. Z.

Duxbury, September, 1940

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CHAPTER ONE

The Sizes of Communities as a Measure of Social Organization

1. PRELIMINARY CONSIDERATIONS

THE PURPOSE of the present study is to investigate (1) the organized behavior of the individual in reference to the social group of which he is a member, and (2) the organized behavior of the social group in reference to the individuals who constitute it. In dividing our study into the above two parts, however, we must not imagine that an individual is neatly divisible into an "individual component" on the one hand and a "social component" on the other, in such a fashion that the one may be completely isolated from the other. On the contrary we shall find reasons for believing that the behavior of the individual member of a social group is governed to a considerable extent by the laws of the social group of which he is a member, and that the terms "individual" and "social" represent but two different points of view of one integrated field of organized activity. For the want of a better term, we shall name the principles of this organized group-activity, as disclosed from our two points of view, the principles of "social-economics."

In selecting the term, "social-economics," to describe the general problems of our present study, we do not imply that we are in any sense establishing a new field of inquiry. We employ the word, "social," but to indicate that our chief interests are in the activity of the group and not of the individual. And we employ the word "economics" but to describe in advance what will appear to be one of the fundamental drives of human group-activity: the urge to save energy in the solution of social problems.

Our task, however, is not the invention of descriptive labels for underlying principles, but the disclosure of those underlying principles. Therefore let us proceed step by step with the actual disclosure.

2. AN ORIENTING DISCUSSION OF INHABITED TERRAIN

With the above preliminaries behind us, we shall make our first very simple observation, and ask an obvious question. It is a matter of common knowledge that in the United States of America there are a few very large cities and many small ones. Why should that be true? Let us orient ourselves in the problem of community-size and community-number, by noting how one enormous urban community in a vast rural territory will break into many communities of smaller size in order to save time and energy in the transportation of matter through the processes of production and distribution.

If we concentrate our attention upon the physical terrain of the continental territory of the United States, for example, and remember the high degree of industrialization necessary to produce the quantity and quality of goods to which we are accustomed, we might be inclined to conclude that it would be necessary to have some communities larger than others, because of the exigencies of mechanized mass-production. And yet these same exigencies of mechanized mass-production would scarcely seem to lead of themselves to a few large communities and many small ones. Indeed we might conceivably have One Big City in the United States where all the manufacture of all goods was performed, both for its own needs and for the needs of the rest of the territory which would be populated by small rural communities of say five or ten persons each. The rural communities would supply the raw materials for the One Big City, and in return would receive

from it their finished goods. In short the One Big City with, say, 60 million persons might conceivably manufacture goods from the raw materials provided by the 6 million odd rural communities. Could such a fictitious condition function for long?

The condition of One Big City and millions of small rural communities could only function if a means of transportation were developed whereby the raw materials could be transported from the 6 million rural communities into the One Big City, and whereby the consumable goods could be brought from the One Big City to all the 6 million rural communities. Yet it would seem that the instant we made provision for transportation, we should also simultaneously set forces into operation that might well lead to a whole series of communities of various sizes in place of the One Big City. For, no matter what means of transportation were adopted, the moment that the question arose of transporting raw materials and finished goods with the minimum amount of energy (or with the maximum amount of efficiency), that very moment the economy of moving human beings towards the raw materials would suggest itself, in order to "save transportation charges." Yet the migration of persons towards the raw materials would tend to break the One Big City into many smaller ones of various sizes. Let us see why this would be true.

If the One Big City is to preserve its size and perform its exclusive function of manufacture, then vehicles of transportation will have to pass between it and each rural community in order to collect raw materials and to deliver finished goods. Yet the moment there emerges the desire to save transportation charges in the movement of goods, there will emerge also the economy of establishing trading centers and centers for semi-finishing. For example, in order to save transportation charges (i.e., expenditure of

energy) on raw materials, some of the raw materials, like ores, timber, and so on, might be semi-finished near the source of supply in order to remove waste-materials as soon as possible, and these centers for semi-finishing, furthermore, might also become collecting centers for adjacent outlying districts. Similarly, in order to save transportation charges, one would hesitate to ship all human beings, dead or alive, to the One Big City and return for, say, educational, spiritual, or somatic treatment; it would save transportation costs to ship doctors, dentists, ministers, school-teachers, lawyers, undertakers, and the like to settle permanently among the small communities. For by sending one of these persons out to the rural districts, we might save the expense of sending hundreds of persons into the One Big City. If cheapness in transportation is to be a decisive factor, these professional persons will settle in greater numbers in the larger rural communities (our slowly growing trading-posts of semi-manufacturing), thereby increasing their sizes proportionately, for they would then not have so far to transport themselves in order to answer the needs of the people. And with the doctors and lawyers, and so on, would come nurses and stenographers, and so on, together with their beauty parlors and moving picture theaters with attendants; the need would arise for telephones, electric lights, and all the other paraphernalia of modern life, with a staff of additional human beings "to keep things moving." Hence a number of these originally 6 million small rural communities would increase in size, and at the expense, we might imagine, of the size of our One Big City. In short a few large cities might arise simply in order to save transportation charges.

But we might arrive at exactly the same conclusion of a few large cities and many small ones from an entirely different angle: the exigencies of a more effective organiza-

tion. Let us assume that the territory of the United States was populated exclusively by small rural families, each living on its own land and each one producing in the course of a year enough to satisfy all of its own needs. That is, each family would make its own shoes, clothes, food, harness, tools, buildings, fuel, entertainment, and the like. Is there anything inherent in this situation which might lead naturally to the growth of a few large communities at the expense of the many smaller ones?

If the territory of the United States were completely homogeneous from one end to the other, so that there were no differences in climate, contour, or mineral content of the soil, we should perhaps have an optimal condition for the continuation of the hypothetically equal-sized rural communities. But in fact the territory of the United States is not homogeneous in any such sense for there are very great differences in climate, contour, and contents of the soil; that is, there are such differences in the terrain, that in some localities a family might flourish more easily than in others. Those living in the Corn Belt would be so greatly favored in the production of cereals and live stock that a given unit of land would support many more persons than a similar unit in the forests of northern Maine, or in the semi-arid territory between the Corn Belt and the Rocky Mountains. But the inhabitants of Maine, although at a disadvantage in the production of food when compared with the inhabitants of the Corn Belt, would be at a great advantage in the production of lumber, or of water-power. Similarly the inhabitants of the semi-arid districts might be at a great advantage in the production of ores, or of petroleum.

As soon as the inhabitants of these various districts began to pursue the advantages of their particular locations in the hope of trading their surpluses in exchange for

their shortages, the entire territory of the United States could scarcely remain long divided into many small rural communities of equal size. The successful pursuit of each of these different advantages would hardly require precisely the same amount of labor per unit of land, be the unit an acre or a square mile. One family might spend its entire labor in keeping 80 acres under tillage, while another family might graze its stock over 640. To remove ore or coal from 80 acres might well occupy many families; and similarly with the numerous other pursuits in the quest of raw materials. Hence differences in the kind and in the degree of benevolence of soil-climate-contour are capable of inducing differences in the density of the population throughout the entire territory, *but only if all persons pursue the advantages inherent in their locations*. With a mobility of population, less productive districts will be abandoned for more productive districts as long as these more productive districts offer comparatively more of the materials of life for a comparatively less expenditure of effort. We must remember that this *specialization of occupation* in conformity with the material advantages of the terrain is neither morally better nor worse; it is simply more economical, in the sense that the organization is more efficient, or more effective. Bands of Indians might inhabit the same territory, each band gaining its own sustenance from its own locality. We may not say that these Indians will be less happy in their less specialized and less efficiently organized mode of life; we may only suggest that they will receive fewer goods in reward for their labors.

This specialization of enterprise, conditioned by the various advantages offered by a non-homogeneous terrain, naturally presupposes some sort of an exchange of goods, if only because human beings cannot profitably eat, say,

lumber and mineral ores. Specialization of enterprise leads to an exchange of goods, and an exchange of goods leads to the transportation of goods, and the transportation of goods leads to the establishment and growth of trading posts, as discussed above, to the end that larger communities will arise—the complete process resulting in communities of various sizes and numbers. Of course we are belaboring this subject of the number and sizes of communities only because number and size is something that we can measure.

Our real interests are not primarily in the number and sizes of communities but in the laws governing the conservation of energy in the processing of raw materials and in the distribution of finished goods within a social-economic system of organized human beings. We are now but setting forth preliminary reasons for believing that the number and sizes of a nation's urban-rural communities may reflect the economy with which that nation processes and distributes its consumable goods. In other words, we are seeking in the number and sizes of a nation's communities a barometer of the effectiveness of the nation's total economic organization to the end that a change in the condition of the latter will effect measurable changes in the former. Furthermore, by untying with great care this knot of national social-economic organization, we may hope to learn how similar though unrelated knots may be untied.

Thus far we have seen general reasons for suspecting the possible existence of some sort of economic law governing the number and sizes of a nation's communities. Of course, if there exists any such economic law of community-size, we should expect to find its operation revealed in any accurate set of census data for the communities of any given nation. Let us, as our next step, see if we do

actually find any orderly law in the distribution of communities according to size. If we find it, we shall minutely inspect the implications of the law, in the hope that it will throw open the door to our entire study of all human organization of physical energy and materials. For though the number and sizes of the individual communities of a given nation may in themselves appear of negligible importance, nevertheless, to repeat, the light they may shed upon the dynamics of national process may be of fundamental general importance, not only in indicating how the economic problems of a nation may be most readily solved, but also in suggesting how all related human problems can best be studied. It will be the author's responsibility to make these correlations clear, step by step, as we proceed.

3. THE ORDERLINESS OF THE SIZE OF AMERICAN COMMUNITIES IN 1930

If we examine the census report of the United States for 1930,¹ we find that all cities in the United States are listed with population, beginning with cities having not less than 2,500 inhabitants, and continuing upwards through the largest city, New York, with its 6,930,446 inhabitants. As we inspect the sizes and numbers of these various communities, we note a very striking orderliness. To illustrate this orderliness, let us present in Table One below the reported populations of the fifty largest communities in the United States in 1930, ranked in the order of decreasing size. Thus in Column I of Table One is the Rank (*R*) of each of the fifty communities from the largest, with Rank 1, through the fiftieth largest, with Rank 50. In

1. Unless the contrary is expressly stated, all census data throughout our entire study will be taken from the official census reports of the country and year in question without further bibliographical documentation on our part.

TABLE ONE

The fifty largest communities in the United States in 1930, Ranked (R) in the decreasing order of Size (S), together with the Product (P) of Rank (R) Multiplied by Size (S).

I Rank (R)	II Size (S)	III Product (P = R × S)	I Rank (R)	II Size (S)	III Product (P = R × S)
1	6 930 446	6 930 446	26	292 352	7 601 152
2	3 376 438	6 752 876	27	290 718	7 849 386
3	1 950 961	5 852 883	28	290 564	8 135 792
4	1 568 662	6 274 648	29	287 861	8 347 969
5	1 238 048	6 190 240	30	284 063	8 521 890
6	900 429	5 402 574	31	271 606	8 419 786
7	821 960	5 753 720	32	270 366	8 651 712
8	804 874	6 438 992	33	260 475	8 595 675
9	781 188	7 030 692	34	259 678	8 829 052
10	669 817	6 698 170	35	255 040	8 926 400
11	634 394	6 978 334	36	253 143	9 113 148
12	578 249	6 938 988	37	252 981	9 360 297
13	573 076	7 449 988	38	231 542	8 798 596
14	486 869	6 806 166	39	214 006	8 346 234
15	464 356	6 965 340	40	209 326	8 373 040
16	458 762	7 440 192	41	200 982	8 240 262
17	451 160	7 669 720	42	195 311	8 203 062
18	442 337	7 962 066	43	185 389	7 971 727
19	399 746	7 595 174	44	182 929	8 048 876
20	365 583	7 311 660	45	170 002	7 650 090
21	364 161	7 647 381	46	168 592	7 755 232
22	328 132	7 218 904	47	164 072	7 711 384
23	316 715	7 285 445	48	163 447	7 845 456
24	307 745	7 385 880	49	162 655	7 969 095
25	301 815	7 545 375	50	156 492	7 824 600

Column II is presented the size (S) of the population of each of these fifty largest communities. In Column III is given the product obtained by multiplying the size (S) of each community by its rank (R); that is, the product resulting from multiplying items in Column I by corresponding items in Column II.

Now it will be noticed in Column III of Table One that the product of each community's size (S), when multiplied by its rank (R), remains fairly constant. True, the items in Column III are not precisely the same, but vary roughly between $5\frac{1}{2}$ and $9\frac{1}{2}$ millions; later we shall inspect the possible reasons for this. Nevertheless the items in Column II vary all the way from about 7 millions to about 150 thousand.² In view of these considerations, we may say that the size of a city seems to stand in some inverse relationship to its rank in the total population. In short we have found a correlation, or correspondence, between a city's rank and its size, to the end that its size is roughly deducible from its rank, and its rank from its size. The number and sizes of the communities in this total population seem thus far to be orderly, and our working hypothesis, stated at the end of the preceding section, seems to be confirmed by an objective test. Let us now ignore our previous working hypothesis for a time, and restrict our attention to an analysis of the total community data of the United States for 1930.

The question arises whether we should find the same relationship for all the other 3,000 odd communities of the United States which had a population of 2,500 or more in 1930. It would be quite cumbersome to tabulate the sizes, ranks, and products of size-by-rank of all these communities, hence a simpler device for presentation of the entire data would be welcome, and happily a simpler device is available.

For if it is true for the year 1930 that the rank (R) of each community in the United States, when multiplied by

2. The variations in Column III we shall for the present assume to be on the whole random and hence ignore, even though, strictly speaking, there does seem to be evidence of a trend to which we shall refer again at the end of Chapter IV.

its size (S) remains constant (C), then we may represent that fact by the simple formula:

$$R \times S = C$$

which is an equation, technically known as that of an equilateral hyperbola. The non-mathematical reader may ignore this fact, and this formula; he need only look at Figure I and decided for himself, with his own eyes, whether (1) the curve drawn is not approximating a straight line, and whether (2) this curve is not intercepting at the bottom the same angle with which it is intercepting the left side of the figure at the top. If he finds that this curve is approximately straight, and that it is including equal angles at the top and bottom, then he has found that all the communities in the United States with not fewer than 2,500 inhabitants in the year 1930, when ranked in the order of decreasing size, follow to a reasonably close approximation the formula: $R \times S = C$. The data are plotted on what is technically called double-logarithmic paper, with size (S) measured vertically, and rank (R) measured horizontally. All figures throughout this entire study will be presented on this type of graph-paper; and for every figure, without exception, the reader, regardless of his knowledge of mathematics, will be asked only one question: is the curve on the figure approximating a straight line? In Chapter Three we shall inspect possible reasons for the straightness of this and similar lines; until that time we shall rely upon the graphical appearance of the data.

The author, in scrutinizing the curve of Figure I, believes to see that the curve is indeed fundamentally that of a straight line and that the line is including angles at the top and bottom of approximately 45° ; he therefore assumes, *as a working hypothesis*, that all the communi-

ties in the United States which were reported by the Census of 1930 as being populated by not fewer than 2,500 inhabitants do in fact approximate the equation: $R \times S = C$. Nevertheless the line of Figure I is not absolutely straight, for it suffers slight distortions in one

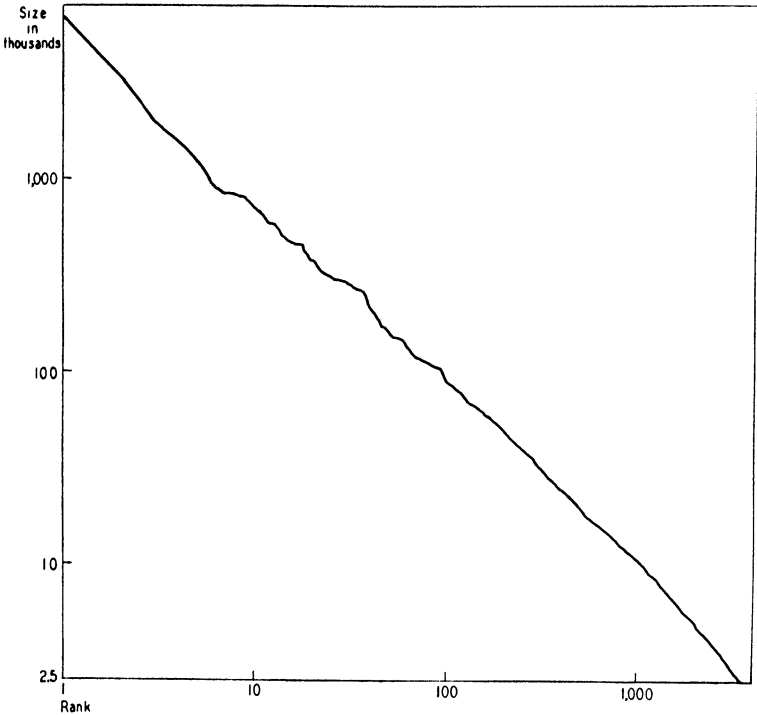


FIGURE I. U. S. A. 1930. Communities of 2,500 or more persons, ranked in the decreasing order of size of population.

direction or another throughout much of its length. Yet if our line is really fundamentally straight, we should inquire briefly into the nature of some of the possible factors capable of disturbing the fundamental straightness of the line. This brief inquiry, though perhaps slightly tedious for the

non-mathematical reader, is an essential step in our analysis, and, if conducted adequately in respect to one typical set of data, need not be repeated again.

4. FACTORS TENDING TO DISTURB THE COMPLETE LINEARITY OF THE RANK-SIZE RELATION- SHIP OF COMMUNAL ORGANIZATION

A line may be fundamentally straight and yet never appear as absolutely straight in any given set of actual measurements; hence to become certain of the fundamental straightness of a given line is frequently very difficult. The chief reason for the difficulty lies in the possible presence of innumerable forces that tend to disturb the fundamental distribution one way or another—that is, for example, to induce bends in an otherwise linear curve. Naturally extraneous forces may also disturb orderly but non-linear curves; if we speak of linear distributions and of straight lines throughout our present study that it because our curves are apparently linear.

In order to illustrate what we mean by extraneous forces and their ability to disturb an otherwise orderly curve, let us take as an example a very familiar curve which, incidentally, happens not to be linear. For example, if we shoot a bullet under “ideal conditions,” its trajectory will be an orderly curve that is known technically as a parabola. Nevertheless when one battleship shoots a projectile at another, the gunner does not automatically assume that the conditions will be “ideal” and that hence the trajectory of the intended shot will be a pure parabola. On the contrary his chief concern may well be in the calculation of the extraneous forces that will modify the parabolic course of the projectile. Although the fundamental trajectory may be viewed as the curve of a parabola, he

will allow for air-resistance, for the speed and direction of the wind, for barometric pressure, for temperature of the powder, for the course and speed of his own ship and for that of the target, and such like. And when he shoots the projectile, its course will very likely not be that of a pure parabola.

The point for us, however, of the above illustration, of the projectile is not how the gunner should set his sights, but rather that a fundamentally orderly curve can appear in practice as distorted. If we had only the actual trajectories of bullets to judge by, we might well wonder how we could tell that any trajectory under "ideal conditions" would be a parabola. Of course, by taking ever more examples of bullets proceeding under many different conditions, one might become ever more certain that deviations from the parabola resulted from the impingements of extraneous forces; indeed the multiplication of the sets of observations is an ingenious device for testing a fundamentally orderly relationship. But not until the bullet proceeds actually under "ideal conditions," that is, until all other factors have been removed to the positive demonstrable knowledge of the experimenter will the line become a parabola. It is after all the chief, if not only, virtue of an experimental laboratory that one can there either remove or control extraneous factors. Of course we, for our part, cannot move the population of the United States into an experimental laboratory in order to eliminate or control extraneous factors; indeed we do not yet know what the extraneous factors are, or what "ideal conditions" would be in our community-organization. Our problem is more like that of the astro-physicist who once and for all cannot get his astronomical bodies into an experimental laboratory. Indeed the astro-physicist, faced by the problem of the remoteness and unwieldiness of his data, learns

of the laws of his data by studying the conditions under which his data change. He argues that whatever the laws of stars may be, the behavior of the stars is a manifestation of their laws in operation. We shall copy the astro-physicist in his attitude towards his problem. And by seeking the possible causes of distortion in our straight line, we shall hope to learn considerably of the forces causing the straightness of our line. Let us see, now, what can cause some bends in our line, and what these bends may signify. We shall proceed from the theoretical to the practical.

a) The Problem of Classifying a Community.

In inquiring into the nature of possible factors disturbing the assumed fundamental straightness of the line in Figure I, we shall first question the correctness of the data used for plotting the line; that is, the correctness of the data as reported by the Bureau of the Census. For our purposes, the community's territorial limits must be drawn at the final outskirts of the community, so that on the one hand the entire community is included within the community's limits, and so that on the other hand no portion of any other community is included. Though we ourselves do not know by what objective means one can infallibly decide where one community stops and another commences, nevertheless we can plainly see that a mistake in the delimitation of a community's district may very easily introduce a bend in an otherwise straight line. For a mistake in delimitation will mean that the community's size will be either too large or too small, and hence its point on our graph either above or below where it should be. In view of this difficulty of delimitation, may we safely assume without further thought that the official city limits for every American city in 1930, or in any other year, were precisely the correct limits in this sense?

In order to inspect this general problem of delimitation, let us shift our attention to the census of 1890, where, as it happens, we have two separate classifications, one made in 1890 and the other in 1910, the latter correcting the former. Here we can see the effect upon our straight line of a "correction" of census data. But first let us inspect the problem of "correction," as we commence with the communities called New York and Brooklyn which were considered and listed as separate communities in the 1890 census report. In 1898 the two communities were officially combined into the one official community, New York, and were so reported in the 1900 census. In short, at one moment in the course of 1898 they were still two communities, and at the next moment they were already one. But can we believe that the social-economic organization of the once two communities and now suddenly one community underwent a sudden change at all commensurate with the gross statistical rearrangement that would appear in a census for 1897 and 1899 respectively? In 1890 New York was the largest city, having rank 1, with a population of 1,515,301, whereas Brooklyn was the fourth largest city, with rank 4, and a population of 806,343. Were these cities to have been joined in 1890, then the first largest city would have become 2,321,644; the second and third largest would have remained the same; the fourth largest city, Brooklyn, would have disappeared and every community from the fifth largest down would have moved upwards by one rank. Such a rearrangement could not take place without entailing the appearance of a bend or bends, either in the distribution-curve representing all communities before New York and Brooklyn were united, or else in the curve for communities after the union. Both curves, the one an instant before and the other an instant after the union, could not be straight. And as we have

argued of New York and Brooklyn, so too we might argue about every other community or group of communities. Though certain communities may be broken into politically separate cities and even be divided by state lines, rivers, harbors and so on, like Brooklyn and New York, nevertheless that does not necessarily mean that some of these politically separate cities may not belong together in an economic sense.

Furthermore, in continuing with the Census of 1890, there is a question as to what territory should be included in the social-economic domain of the United States in 1890. The Census of 1890 was intended to apply only to those states already admitted to the Union by April 1, 1890. Two states, Idaho and Wyoming, entered the Union in July, 1890, and four more subsequently; the communities in these latest six states were naturally ignored by Act of Congress in the Census Report for 1890. But are we justified in assuming that the communities in the Territories in 1890 were simply non-existent for the social-economic organization of the United States up to the instant of their admission to the Union as states; and that they instantly became full-fledged and completely integrated communities in the organization of the United States the moment they had been admitted as states? Obviously it would be absurd for us to make any such assumption of a total territorial unrelatedness up to one instant, and then a complete territorial integration the very moment that the Territories became states. Rather do we see in this situation a real problem of statistical classification which, incidentally, though abstruse, is not therefore necessarily imponderable, as every census bureau knows.

The above problems of statistical classification and many others like them confront the census bureaus of

every nation, and their ingenious solutions can be found discussed cogently and in full in almost any of the recent census reports, so that the investigator rarely need be in any doubt as to the precise nature of the procedure adopted. Furthermore, as far as the author is capable of judging, the beautiful work of our own Bureau of the Census needs no apology when compared with that of other nations; and it would seem that the citizens of many other countries are justified in similarly appraising the excellence of their own census enumerations. Nevertheless, with the general advance of all knowledge, the whole problem of census enumeration has also been solved with increasingly greater precision and accuracy, to the end that the more recent census reports are generally more reliable than the earlier ones.¹

In the report for 1890 all those communities in territories not yet states by April, 1890, were omitted (quite correctly) from any consideration of the communities in the United States proper. Furthermore, in respect to those communities lying within state boundaries, the officially defined limits of the communities were generally considered the limits of the communities. This description of the procedure of the 1890 census report is somewhat superfi-

1. For population-studies of the United States it is profitable to avoid as far as possible the necessity of consulting census reports earlier than the one for 1910. The avoidance of the earlier census reports has been made the easier by the Bureau of the Census which, with the Census Report for 1910, began reclassifying the earlier census data with great acumen, in order to bring the earlier census data in line with the better statistical procedure of later decades. Thus we have for the year 1890 not only the Official Census Report of 1890, but also the reclassification of the 1890 data in the Official Census Report for 1910. And these two different classifications of the same material will be of great value to us now for comparative purposes in our present treatment of the complete linearity of the rank-size relationship of communal organization.

cial and is not intended to summarize completely all the descriptive material in that report which devotes a considerable number of pages to an explanation of its treatment of New England towns alone. Nevertheless our present brief description of the procedure in 1890 is accurate for the essentials that concern us now, and suffice it to say that the 1890 data were later corrected. In the Official Report for 1910 are presented not merely the populations of all communities in the United States in 1910 with populations not less than 2,500. For each of these communities is given also (1) its population in 1890 and (2) its population in 1900. The author incidentally has taken as the best available material for 1890 (and 1900) the corrected data for these years as presented in the 1910 Census Report.¹

Now the effects of the reclassification of the 1890 census data appear graphically in the two curves presented in Figure II. The one curve (A) represents the census data for 1890; the other curve (B) represents the census data for 1890 as reclassified in the Census Report for 1910.

1. Nevertheless, strictly considered, the figures for 1890 and 1900 as presented in the 1910 Census, though perfectly legitimate from the viewpoint of the Bureau of the Census, are not entirely above reproach from the viewpoint of our needs. It would have been better technique to have presented the comparative data for all communities in 1890, 1900 and 1910, which, in any one of these three moments of census, had a population of 2,500 or more. For it is quite possible that there were communities of 2,500 or more in, say, 1890, which, because of a subsequent loss of population, failed to muster the prerequisite 2,500 minimum in 1910 necessary for inclusion in the reclassified list. We mention this shortcoming but to show that we have not entirely overlooked it. On the other hand, by way of qualification, we must also remember that in view of the general population increase in the United States between 1890 and 1900, the number of actual instances of population-decrease in individual communities was probably statistically completely negligible. For all intents and purposes, then, the reclassifications in the 1910 Census Report, and later reports, are substantially correct.

As we scrutinize the two curves of Figure II, we note that the curve (B) for the reclassified data approximates a straight line much more closely than the curve (A). We may be inclined to conclude, therefore, that possible devia-

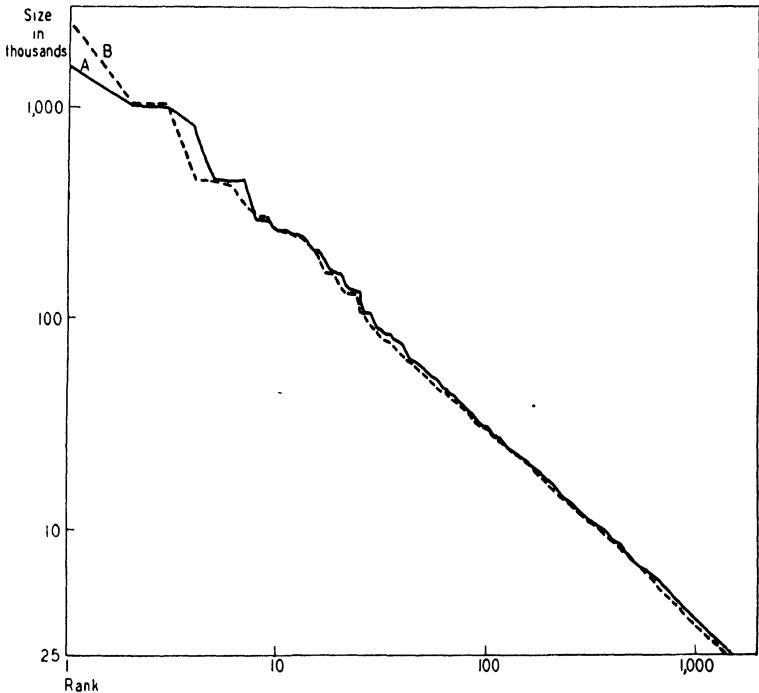


FIGURE II. U. S. A. 1890. Communities of 2,500 or more persons, ranked in the decreasing order of size of population.

A: as originally presented.

B: as "corrected" in 1910.

tions from a hypothetical straight-line in any set of census-data may be conceivably ascribable in part to the method of classification used and to the delimitation of territorial boundaries and of community-limits. In the present case, for example, we find a single set of data reclassified later

according to what is intended to be a more accurate statistical technique in the opinion of the Bureau of the Census, and we find also that the reclassified data approximate a straight line much more closely. There is no indication that the intention of the Bureau of the Census, in presenting the data again for 1890 in the 1910 Census Report, was primarily to make them follow more closely a linear-distribution. We may only suspect that linearity in the size-number of communities may somehow be implicit in the very existence of "correctly" enumerated communities in a "total population,"—a suspicion that we shall later find confirmed.

But before we continue with our analysis of community-populations of the United States, it would be well for us to test our hypothesis of linearity in similar but non-American data, lest we believe that the United States has any monopoly on this linearity.

*b) The Linearity of the Rank-Size Relationship
of Community Organization in Canada.*

We have noted in our above census-data that great masses of human beings have not behaved according to random chance in respect to congregating with one another in communities, at least as tested at moments of counting in 1890 and 1930 in the United States and as described according to the latest and best available classifications. On the contrary in each case the communities have been found distributed with a fairly high degree of approximation according to the general formula $R \times S = C$, a formula which appears in both sets of data, in spite of the forty years of growth and development intervening between 1890 and 1930.

Yet if this correlation between the ranks and sizes of communities be fundamentally true and inherent in human organization, we should expect to find it elsewhere, once the conditions are the same as those prevailing in the United States in 1890 or 1930. Though we cannot hope to find a precise duplication of our conditions elsewhere

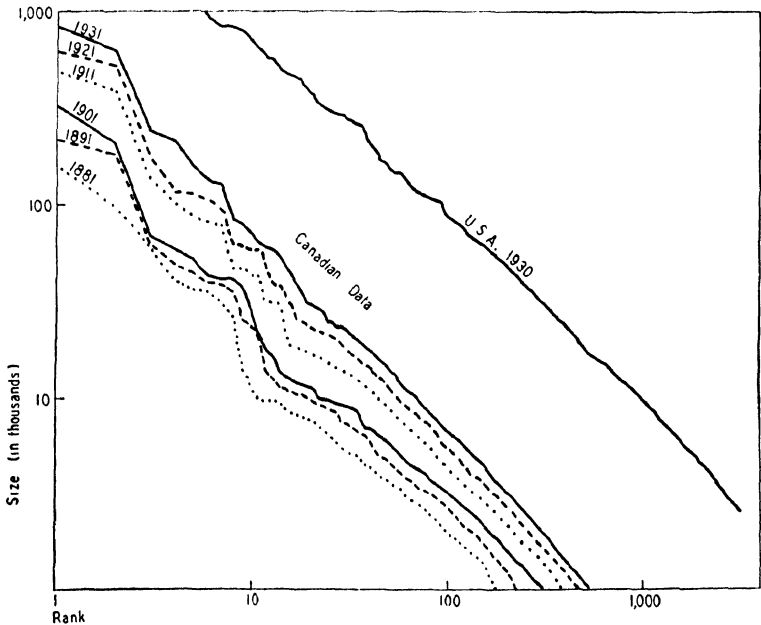


FIGURE III. Canada 1881-1931. Communities of 1,000 or more persons, ranked in the decreasing order of size of population.

and therefore may not expect to find a precise duplication of our curve of distribution elsewhere, nevertheless we may learn of the general implications of our hypothetical linear equation by studying other non-related sets of data.

In Figure III are presented the data for communities of 1,000 or more inhabitants in Canada as reported by the

official Canadian Censuses for 1881, 1891, 1901, 1911, 1921 and 1931 together with the main part of the United States' data for 1930, already presented in Figure I and included for the sake of comparison.

We notice in Figure III that the Canadian communities likewise follow in general a straight line, descending from left to right at about 45° in a manner similar to that of the United States' data. Though all the curves vary, they seem to have this in common: (1) they all approximate a straight line, and (2) they all have the same slope. Hence our hypothesis of the equilateral hyperbola is being empirically ever more confirmed.

But we also note that the Canadian data have more bends than the American data, particularly in the earlier Canadian censuses. As Canada developed with passing years, the bends tended ever more to recede while the basic straight line appeared ever more clearly. Hence we may perhaps infer that the forces that tend to cause the size-number-community relationship to approximate a straight line were already present and operating in Canada in 1881, and continued to operate with ever greater efficacy through 1931. We do not yet know precisely what these forces are. But in the light of our previous, orienting discussion, we may believe that from 1881 through 1931 in Canada, raw materials have been transported ever more economically through sets of conditions. This increased economy may have been effected by shortening distances (by the institution of bridges, tunnels, better roads, navigation services on lakes and harbors) or by otherwise increasing the economy of transportation (e.g., better railroading, etc.) or by the specialization of occupation and by an increased mass-production,—or all these factors together. In short, much of the social-economic history of Canada in terms of dynamics and in relation to

American economics may well stand decipherable in our Figure III. Yet future detailed deciphering will not be less easy or accurate if we first explore the general implications of our hypothetical linear equation. For later these bends in our straight line, like the bends in the parabola plotting graphically the trajectory of an actual bullet, may be very instructive, if properly interpreted, in disclosing the presence, nature, and strength of other forces resisting, or impinging upon a most economical social organization.

Let us, in fact, continue our study of the significance of bends in our hypothetically straight line by at once asking what the implications would be if an absolutely and invariably straight line always appeared for the sizes of communities of every census of every nation at any time. Though the question sounds foolish, the answer will be instructive.

c) The Meaning of Absolute and Invariable Linearity at All Times in All Places in Respect to Community-Size.

The lines representing the distribution of communities in the United States and Canada hitherto presented—eight lines in all—are not absolutely straight, but partially bent. Since we do not know what any of these bends may mean, let us inquire into the significance of an absolutely and invariably straight line for community-distribution at all times and in all places. For example, what might we conclude if we found that all six lines for Canada from 1881 through 1931 were as straight as if drawn by a straight-edge, and sloping precisely at an included angle of 45° ? Since the contours of these lines would but reflect the actual sizes and numbers of the communities of Canada, we need only to inquire into the numerous factors

that can increase or decrease the sizes and number of communities in order to note what may alter the contours of our lines. Indeed the sheer enumeration of some of the factors that can alter the size or number of communities in any population will suffice to show the grotesque absurdity of expecting to find an absolute and invariable linearity at all times in all places in respect to community-size.

Inasmuch as the death of inhabitants may alter the sizes of communities, and since the death-rate depends upon the emergence of disease or of the occurrence of accidents, the persistence of absolute and invariable linearity would evidence a remarkably accommodating death-rate. Similarly with the birth-rate. Furthermore since the number and sizes of communities depend somewhat upon the amount, location and availability of natural resources, our absolutely straight line would force us to draw a curious conclusion in respect to natural resources. Thus, for example, the devastations of forest fires, in fact the discovery of new natural resources and the exhaustion of old ones, or any alteration in manner, kind, or degree of natural resources would all tend to alter the sizes and number of communities. If, in spite of these various influences upon the sizes and number of communities, we invariably discovered at all times an absolute and invariable linearity, we should be obliged to conclude that any occurrence which might alter the sizes or number of Canadian communities would be automatically and instantaneously compensated for by a change in the opposite direction.

Let us carry the argument of absolute and invariable linearity to a complete absurdity. Since (1) all changes in birth and death rates, and in the amount, the location, and the availability of raw materials, and in the nature of the

seasons, and so on, are to a very great extent the effect of biological, geological, and physical forces operating throughout the whole planet and beyond, and (2) since the number and sizes of communities in Canada depend at least to a considerable extent upon these biological, geological and physical factors, then (3) it would follow from the appearance of an absolutely and invariably straight line of community-distribution at all times in Canada, (4) that the universe and all its laws always have been and still are so constructed and organized to make life very comfortable for the census-enumerators of the Dominion of Canada. Hence the absurdity of an absolute and invariable linearity is apparent.

In general, then, a fundamentally straight line may have bends, and these bends, to repeat, are potentially instructive about the nature, number, and strength of forces acting upon the fundamental straightness of the line and disturbing it. In the absence of an absolute and invariable linearity we may not argue that the distribution is not subject to the influence of extraneous forces from the rest of the universe. Nevertheless, in the presence of repeated cases of clear approximations to linearity in the sizes of communities, we may indeed ultimately conclude that the entire universe is so organized that the linearity of community-distribution may indeed emerge ever more, as disturbing forces are removed and decreased ever more. The sources of the bends in our curve constitute for us, then, a vital problem, to which we now turn our attention for the rest of the chapter in broaching the general topic of the nature of forces disturbing social-economic equilibrium, as reflected in the size and number of communities in a given, homogeneous population, inhabiting one integral territory.

But what do we mean by “a homogeneous population” or “an integral territory”? What determines the limits to a social-economic system?

5. THE HOMOGENEITY AND HETEROGENEITY OF POPULATIONS AND TERRITORIES

Let us now inspect the whole question of “homogeneity of population” and “integrality of territory.” Since we have been treating the bends to our curve, let us continue therewith, and ask what types of bends will inevitably appear simply from the way we are ranking our data, and what kinds of bends may never appear, regardless of the formula, $R \times S = C$, to whose consideration we shall very shortly return.

a) On possible Bends (or Slopes) in ranking Data according to decreasing Size.

In ranking our communities from left to right on our chart-paper according to decreasing size, we have already greatly restricted the possible shape of any line as well as the type of bends that may appear. Let us see what these restrictions are.

The first effect of plotting rank-size from left to right according to decreasing size is that the lines connecting adjacent points from left to right may never bend upward from the horizontal. For if a line bends upwards from left to right above the horizontal, that would merely indicate that we had incorrectly ranked our communities according to decreasing size. For example, if the point on the graph-paper for a community of rank 10 were higher than that for rank 9 in a given population, this fact would signify that we had incorrectly ranked communities 9 and 10 in respect to one another, since in ranking our

communities in the order of decreasing size, we may never place a smaller size before a larger size. Hence, in view of the manner in which we are using our data, a line bending upwards from left to right is simply out of the question. But may we therefore say that our line must necessarily always bend downwards? Let us see if it cannot be horizontal in part.

It is altogether possible that two communities, A and B, in a given population will be precisely equal in their size of population. Hence the line connecting the points representing A and B will be horizontal. Therefore, there is nothing in our method of ranking communities according to decreasing size that will preclude the appearance of a horizontal bend. If all communities in a given population were precisely equal in size, the line connecting their points would be horizontal throughout. To summarize: except for the possibility of horizontal lines, all lines must bend downwards, from left to right, below the horizontal. And yet, we might add that, no matter what happens, there can be no downward bend that is completely vertical. Let us now see why a vertical slope is impossible.

Since the slope of any line connecting the points of any two adjacently ranked communities is determined exclusively by the comparative sizes of the two adjacently ranked communities, any downward slope, from left to right, would seem to be quite possible in an endless series of ranked communities, *except an absolutely vertical line*. An absolutely vertical line would imply that two communities had the same rank. Since every community has its own rank, in passing from left to right, and since our line is but connecting the points representing the sizes of communities, a vertical slope is impossible. To repeat: Two

communities may have the same size, but not the same rank; hence a horizontal slope is possible, but not a vertical.

To summarize: Any angle of slope may appear graphically in our census data, now or later, from and including a true horizontal (of zero slope) downwards (from left to right) to but not including a true vertical. Let us express this summary in more simple terms for the non-mathematical reader. If the reader takes a rectangular piece of paper, a ruler and a pencil, and if he lays one end of the ruler at the upper left-hand corner of the paper, then any straight line that he draws from the upper left-hand corner may appear theoretically as a bend in a given rank-size-community-distribution, except the vertical (i.e., the line drawn from the upper left-hand corner to the lower left-hand corner). Technically, only zero and negative slopes are possible, with no "infinite slope." Within these limits there are an infinite number of possible slopes. The probability of the random appearance of a straight line, as in Figure I, is very remote.

But in addition to the above-mentioned restrictions, there is another restriction upon our line which appears automatically because of the way we are arranging our data.

b) The Restriction of Non-Fractional Rank, and the Nature of a Harmonic Series.

According to our manner of ranking our data, there may be a 1st largest, a 2nd largest, a 3rd largest, an n th largest community, with each community having its own size; but there may be no $1\frac{1}{4}$ th largest, nor $1\frac{1}{2}$ th largest, nor $1\frac{3}{4}$ th largest community, nor any community of fractional rank; in fact, a fractional rank would be unthinkable, in the

manner with which we are arranging our data. But if we may not have a fractional rank, we may not use as final our equation for a hyperbola: $R \times S = C$. For, according to this equation for a hyperbola, an infinite number of fractional terms may be substituted for R between the ranks of 1 and 2, or between any other ranks. In other words, our equation above is continuous from zero to infinity, positive or negative, whereas the data it is intended to describe are most certainly not continuous in any such sense. Hence if we wish to find a more accurate formula, we must find one that will preclude the possibility of fractional ranks. Let us relate the appearance of bends with the question of non-fractional ranks as an expeditious device for finding the new formula.

Since the lines on our graph paper are drawn but to connect adjacent points, ranked in the order of decreasing size, the entire curve as we proceed from left to right, may change its slope only at a change in rank. Since our ranks cannot be fractional, they are always integral; hence our curve may change its slope only at integral numbers of the x-axis. Thus the curve may change its slope at the rank of 2, or 19 or 127 or 1,000,001, or at any other non-fractional number for which there is a community, but at no fraction. To make a long story short, the size of R , and also of S , must always be positive and non-fractional. In view of these several restrictions, a more refined formula is necessary, and happily the more refined formula is also the simpler formula. We may derive it from the previous equation without the introduction of additional data, if we remember first that the rank of any American community, when multiplied by its size, remains constant, and, second, that every rank must be a whole number.

Since the rank of the largest community is 1, and since the product of its rank by its size (S) is the constant, C , then the size of the largest community is also the size of the constant; for we have but said: $1 \times S_1 = C$, in which S_1 designates the size of the community of rank 1. In the United States in 1930, New York was the community of rank 1; hence its size, 6,930,446, is the size of the constant (approximately). If we wish to find the size of any other community in the United States in 1930 whose rank we know, we need but divide the size of the largest community, New York, by the rank of the community about whose size we desire information. Thus the size of Pittsburgh, the 10th largest community in 1930, would be 1/10th the size of New York, or theoretically 693,000 (actually 669,817). In short, referring to Table One, some pages previous, we are but dividing C by R in order to find S ; that is, we are but using the transposed equation: $S = \frac{C}{R}$. And as we have argued about Pittsburgh, the 10th largest community in 1930, so too we may argue about every other American community, if we but know its rank; for its size will be the result of dividing the Constant by its rank.

Now if we represent the size of the largest community as 1, we can represent the size of the n th largest community as $\frac{1}{n}$. Furthermore we can rank the sizes of the first n communities by means of the following harmonic series:

$$1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots, \frac{1}{n}.$$

When actual values are substituted for these fractions (or proportions), and plotted graphically, the lines connecting these points will yield a single straight line, as we know, descending from left to right at an angle of 45° , as previously described. Henceforth, in the interest of clarity of exposi-

tion, we shall call this straight line with this 45° slope, the *standard slope*. And we may say at once, that any bend in the line, at any integral rank or ranks, away from the *standard slope*, will represent an increase or decrease in the size of at least one of the fractions in this series, subject to the restriction, of course, that the change in the size of any fraction may not be so great as to make it larger than that of the preceding, or smaller than that of the following fraction, since rank is always according to decreasing size.

Once we use the above harmonic series as a standard of comparison for our community-population studies, we have greatly facilitated our investigation, and for two reasons. First, we can have only positive ranks, and positive sizes, with changes in slope possible only at integral ranks; in short, the formula of a harmonic series eliminates the shortcomings of that of the equilateral hyperbola, originally presented. And second, by studying the properties of a harmonic series, we automatically and in the simplest manner study also the properties of community-populations, insofar as their distribution is that of a harmonic series. The harmonic series, eminent alike for simplicity and venerable reliability in this universe, will rapidly give us the desired information about homogeneity of populations and territories, once we set it in an equation, as we shall now do.

c) The Properties of a Harmonic Series in Respect to Bends; Saturation, Surfeit and Deficiency.

As soon as we succeed in reducing the problem of community-sizes to that of a harmonic series we have taken an enormous stride forward in our analysis, because all the established properties of a harmonic series will apply automatically to the number and sizes of communities. Let us

now briefly inspect at the outset some of the more obvious properties of a harmonic series. To fortify the patience of the non-mathematical reader to face what in fact is but very elementary arithmetic, we might add that this simplest of all series happens to be one of fundamental importance in organization.

Let us refer our harmonic series to the problem of community-size. If a population contains a given number, n , of different communities (n may be a thousand or any other number the reader will), and if these communities differ in size according to the proportions of a harmonic series, then, obviously we can represent our entire urban population as the sum of these harmonically seriated fractions, thus:

$$\text{Urban Population} = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}.$$

Let us say by way of definition that whenever the communities of a nation follow the proportions of a harmonic series, that nation is in a condition of *saturation* (cp. Chapters Two and Three).

Now the question arises of how we might add to, or subtract from, a total urban population without destroying the nature of the harmonic series involved. Let us, in fact, inspect this question of addition and subtraction, which will immediately reveal the meaning of all bends in our curve and will permit a very precise definition of the term, *homogeneity of population*, as well as that of *integrality of territory* in a social-economic sense.

If we wish to add to our harmonic series, without destroying its fundamental proportions, we can do so only by increasing the number (n) of the fractions at the smaller, right-hand, end of the series. This being obvious, let us note now what will happen if we arbitrarily add some fraction, say $\frac{3}{10}$, that is alien to the series, as we rank it within the series according to its size, thus:

$$\text{Urban Population} = 1 + \frac{1}{2} + \frac{1}{3} + \frac{3}{10} + \frac{1}{4} + \frac{1}{5} + \dots + \frac{1}{n}$$

With the addition of this alien fraction, the succession of members no longer represent a true harmonic series. For the want of a better term let us call our above series *surfeited*, to suggest that there is an alien member in it. In order to normalize our series again we should have to remove the alien fraction, $\frac{3}{10}$, and break it down into small, harmonically seriated fractions to be added at the extreme right-hand end of the series. We might use the term *digestion* to describe this manner of normalization.

Yet how would the presence of the alien member, $\frac{3}{10}$, be revealed graphically? Since a normal harmonic series descends from left to right at the standard slope of 45° , it follows that a surfeited series will show a bend upwards from this slope as it comes to the rank of the alien member. In Curve A of Figure Four below we see the bend upwards from the harmonic slope at rank four of the above equation. In general, then, we may suspect that upward bends (i.e., convexity upwards) from our standard slope of 45° , will signify the presence of a member or members alien to our harmonic series. In short, tendencies towards upward convexity indicate a surfeited series. So much, then for additions to our series.

The same caution must be used in subtracting from our series. If the series is to be kept intact, the only possible subtraction is a removal of fractions from the right-hand end of the series. If we remove some fraction from within the series, say, the fraction $\frac{1}{4}$, then our series will become

$$\text{Urban Population} = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{5} + \frac{1}{6} + \dots + \frac{1}{n}$$

In this case our series can be called *deficient*. The absence of the member will appear graphically by an abrupt bend downwards (i.e., convexity downwards) below the standard

slope at the place of the absent member, as can be seen from Curve B of Figure Four where the above equation is plotted. In short a downward convexity indicates the absence of a member or members from a harmonic series.

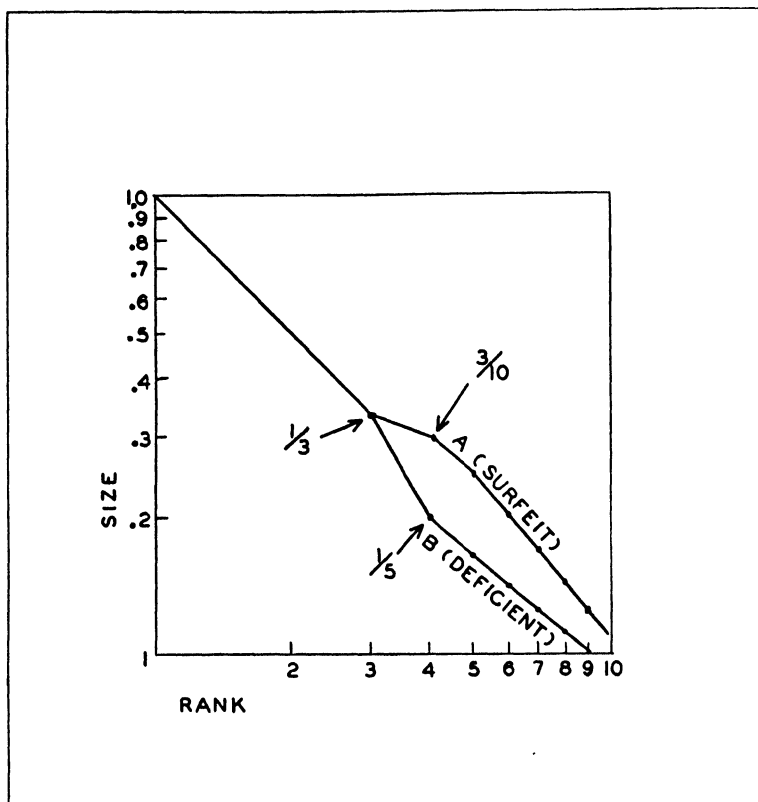


FIGURE IV. Conditions of Surfeit (A) and of Deficiency (B) in Harmonic Series.

To summarize, if we call the condition of a pure harmonic series *saturated*, then the presence of alien members makes it *surfeited*, and the absence of essential members make it *deficient*,—simply by definition.

But let us now pause for a moment and briefly note the implications of these terms in respect to communities. Obviously if the communities of the United States are in a saturated condition, then any secession of territory with communities will result in a deficiency, manifested by bends that are convex downwards. By the same token, any annexation of further territory with communities will result in a surfeit, manifested by bends that are convex upwards. From this preliminary analysis of the origin of bends, we can perhaps already appreciate their ultimate importance for social-economic studies. Even now we perhaps can sense the appropriateness of quoting to all the belligerents of the present European war, the following familiar fact:

They are as sick who surfeit with
Too much as they who starve with naught.

And in a later chapter we shall see how nature in a love of balance may at present be engaged in restoring more nearly a condition of saturation in the territory of Western-Eastern Europe as well as in that of much of the rest of the earth's surface.

But let us continue our inspection of the implications of a harmonic series. We have seen what *deficiency* and *surfeit* mean, and have observed, if only cursorily, their possible bearing upon the secession and annexation of territory. We shall now study some of the consequences of *saturation* itself.

d) *The Homogeneity of the Whole and the Heterogeneity of the Parts. The UNITED STATES versus the United States.*

It is one of the properties of a harmonic series that the component members of the series cannot be divided into

two or more subsidiary harmonic series. The reason for this is quite obviously the simple fact that each fraction occurs only once in the series and is essential to the series. But what are the implications of this non-divisibility of the series for the territory whose communities follow the series?

If the number and sizes of communities of a given piece of territory, say, for example, that of the United States, constitute a saturated harmonic series, then we may say that the given piece of territory belongs together, or is, by definition, *homogeneous* as an integral whole in respect to its human communal habitation. Regardless of how the territory is bounded, or cut to pieces by rivers, lakes, or oceans, it is *homogeneous* in respect to its human inhabitation if its communities follow a harmonic series in their sizes,—by definition.

Inasmuch as a saturated harmonic series cannot be broken down into subsidiary sets of saturated harmonic series, it follows that *if the whole territory is homogeneous, the parts cannot be homogeneous*. The same holds true in the reverse. If one or more parts of the territory are homogeneous, then an aggregate of these parts cannot be homogeneous. The importance of this statement for national-international relations can be sensed even now. For, when we later define a national entity in terms related to a harmonic series, we can expect to find (Chapter Four) that the arbitrary splitting up of national territories, as occurred at Versailles in 1919; or the arbitrary aggregation of territories, as has been effected by England in the course of her empire-building, can each lead to highly unstable conditions in which the traditionally assumed balance of nature can reassert itself suddenly with almost explosive force. Nevertheless we need by no means depart

from our present study of the United States in order to understand the meaning of the homogeneous whole and the non-homogeneous parts.

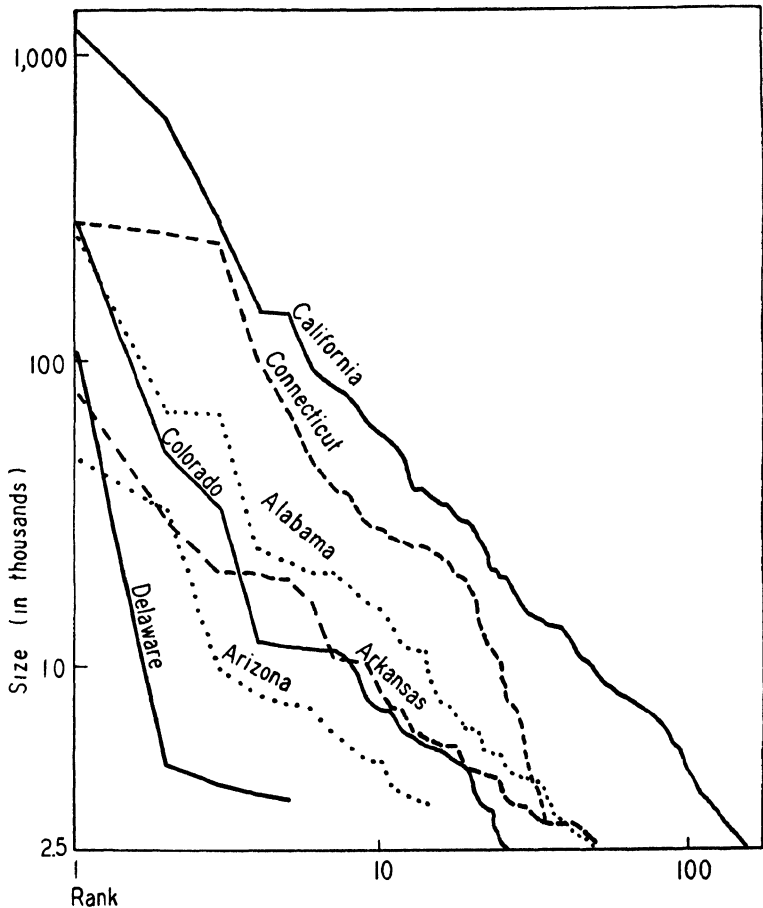


FIGURE V. Seven States (U. S. A.) 1930. Communities of 2,500 or more persons ranked in the decreasing order of size of population.

If the United States can be considered approximately homogeneous as a whole, then its forty-eight constituent

states cannot be homogeneous parts. In Figure V we present the distribution of communities larger than 2,500 and ranked in decreasing order for each of the first seven states selected alphabetically from Alabama through Delaware. The purpose of this figure is to show how extreme the degrees of surfeit and deficiency of these seven typical states can be. Obviously few if any of these seven states would seem to represent a saturated series. Nevertheless these seven states plus their remaining forty-one sister states, with all their individual non-homogeneity, add up beautifully into a homogeneous whole of high order. In other words, the social-economic meaning of the individual states in respect to our barometer of community-size is lost in the social-economic meaning of the whole country. We can readily imagine that any attempt to interpose fixed customs boundaries between all these states today might cause economic duress in all of them. In short, were our states suddenly to become sovereign and independent from one another, with the result of a complete Balkanization of our territory, we should perhaps understand soon enough the meaning of the assumed forces of human organization of which the law of community-size may be a barometer.

Of course, in the development of the United States since its Declaration of Independence we have had a serious controversy between the proponents of the Federal Whole and those of the Sovereign States. So severe was this controversy at one time that the total social-economy of the United States broke out in savage Civil War. Let us see how the pre-Civil War and post-Civil War periods appear graphically in their effect upon our barometer of community-size. This study of the development of the United States as a whole will be of great value to us in all our future chapters, for it will be but a typical case of the

unification of a country in terms of its human organization, and will explain much that has happened recently in many parts of Europe.

6. THE DISTRIBUTION OF COMMUNITIES ACCORDING TO SIZE DURING THE DEVELOPMENT OF THE UNITED STATES, 1790-1930

As we turn our attention now to a study of the distribution of communities in the United States from 1790 through 1930, we may state at the outset that if each of the thirteen original American colonies were homogeneous the moment before they founded the United States, then the United States was not homogeneous, at least during the first moment of its existence. Unfortunately the author does not have the necessary confidence in his abilities to handle the extremely early and faulty census data of colonial times; hence he passes over the question of whether the original colonies in their later days previous to the Union were or were not individually homogeneous. The community-distribution in the colonies, though of great interest, is by no means essential to our present discussion; therefore we restrict our attention to the distribution of communities in the Union.

In Figure Six are presented graphically data for the community-distribution in the United States from 1790 through 1930 at decennial periods. Before discussing the curves there plotted, let us discuss the reliability of the data there represented, for some of the sets of data are more reliable than others. In fact our data fall into three different groups in respect to completeness and reliability.

The most reliable data are those for 1890, 1900, 1910, 1920, and 1930, that is, for the five upper curves. These data were all taken from the Census Reports for 1910 and

after; in a previous section we have described our reasons for using later census material for the 1890 census, and the same reasons, *mutatis mutandis*, apply to that for 1900. The data for 1910, 1920, and 1930 come from their respective census reports. We might add that insofar as the author has checked these data from the official census reports with those published in the *World Almanac* he has found the correspondence practically perfect; he mentions this but to suggest that recent census data can be found elsewhere than in the official census reports themselves.

The next most reliable data are for the years 1840 through 1880. In recent official census reports the Bureau of the Census has presented the populations and names of the fifty largest cities, ranked according to decreasing size, for decennial periods commencing with 1840; this information is the source of our data for the fifty largest communities in the community-distributions for 1840-1880. In addition to these data there is information given as to the number of communities, say, between 2,500 and 5,000, 5,000 and 10,000, 10,000 and 25,000, 25,000 and 50,000, and above 50,000 inhabitants. The author has used this information to estimate the approximate ranks of the communities at 50,000, 25,000, 10,000, 5,000, and 2,500, where necessary, and in the following fashion. The number of communities having a population larger than 50,000 would be the rank of the community nearest to 50,000 inhabitants; thus if 100 communities had a population greater than 50,000, then the community of Rank 100 would have about 50,000 inhabitants. To this rank of 100, which would be indicated on the chart by a circle, is added the number of communities between 50,000 and 25,000, with the resultant sum being the rank of the community nearest to 25,000 inhabitants; thus, if there are 500 communities between 25,000 inhabitants and 50,000, and 100 communities with

more than 50,000 inhabitants, then the rank of the community of approximately 25,000 inhabitants would be 600. And so on cumulatively down to and including 2,500. Since it is essential that the reader understand this manner of evaluating incompletely articulated data, we present, for purposes of illustration, a hypothetical table (Table Two).

TABLE TWO

Theoretical Data Illustrating Method of Ranking Incompletely Articulated Data

THE CUMULATIVE METHOD OF RANKING

Ranks	Number of Communities	Sizes of Communities (in Population)
1-100	100	50,000 and above
101-600	500	25,000 to 50,000
601-1600	1000	10,000 to 25,000
1601-3000	1400	5,000 to 10,000
3001-5000	2000	2,500 to 5,000
	Total	
	5000	

Thus we see from our theoretical Table Two that 5,000 is the rank of the community nearest 2,500; that 3,000 is the rank of the community nearest 5,000; that 1,600 is the rank of the community nearest 10,000; that 600 is the rank of the community nearest 25,000, and that 100 is the rank nearest 50,000. We shall call this the *cumulative method of ranking* as we use it repeatedly in the following pages and chapters. We plot the above ranks and sizes, circumscribing the point with a circle to indicate its approximate nature; we connect adjacent approximate points with straight lines to help the readers' eyes in estimating how the points fall. True, this method is but approximate; but, as the size of the rank increases, the probabilities increase enormously that our approximate size is correct. Though

the author offers these circumscribed points as but approximations, he would like to suggest that in many cases the substitution of actual, observed values would not alter the point appreciably. So much then for the distributions for 1840-1880 as far as they go.

The third group is that for 1790 through 1830. Recent Census reports give the sizes of all cities at the time of over 25,000 with their populations back through 1790; and the author has ranked these communities for each of the censuses from 1790 through 1830 and presents graphically the data for communities of 2,500 inhabitants or more, for each of the decades from 1790 through 1830. If there had been a community of, say, 6,000 in 1790-1830 which failed to muster 25,000 or more inhabitants by, say, 1900, then it would not be included in our charts. We mention this matter but to show that we have not overlooked it. The complete sets of data, though very desirable, would probably not materially modify the essentials of our curves. Let us now turn to the curves on Figure VI.

In the opinion of the author, the lower three curves (i.e., 1790-1810) seem progressively to be straightening out, although the slopes of these curves (judged by the eye) would seem to be steeper, or nearer the vertical, than our standard slope. In these three lower curves there is some slight horizontality, such as with the curve for 1800 commencing with rank 10; yet neither this tendency towards horizontality nor any other tendency towards a marked slope of any sort appears to be systematic for all three curves. That is, the author sees no significant deviations in these three earliest distributions. The reader may choose to believe otherwise; perhaps complete and accurate sets of data would tell a different story.

Commencing with 1820 there appears a marked horizontality at rank 2, which was perhaps beginning to

emerge in 1810. This particular horizontality persists into 1830 and becomes very much more pronounced in 1840, so pronounced indeed that it becomes characteristic of the 1840 curve. With 1850 the whole curve tends to increase

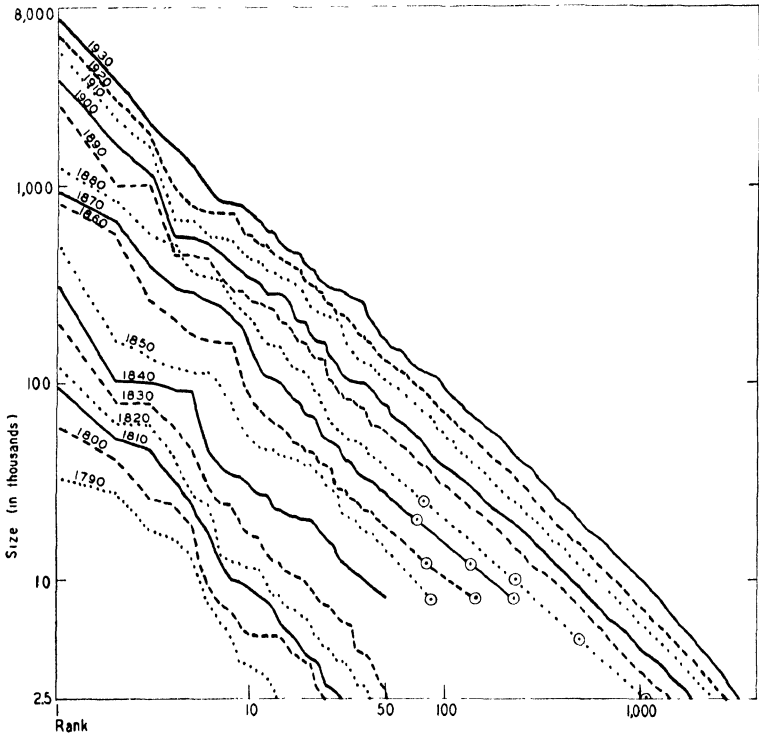


FIGURE VI. U. S. A. 1790-1930. Development of Homogeneity in Growth of Community-Populations.

in slope, and this tendency to increase in slope becomes more marked in 1860 until by 1870 the previous curiously bulging horizontality has disappeared.

With 1870 and after, the curves become ever straighter and approximate ever more closely our standard slope of 45° . Of course all these fifteen lines, in order of chronol-

ogy, are moving ever upwards on our chart-paper, thereby reflecting the general growth in the size of the United States, and in the size and number of communities. There are a great many shifts in the rank of individual communities as we find from consulting the original census data; that is, in the general increase of population some communities gained comparatively more than others, the communities in the North being on the whole, it would seem, more favored than those in the South in the increase. The author may return in the future to a more detailed study of this aspect of our open problem, a study which will be the easier after the fundamental principles have been stated.

The chief obstacle in the way of correctly interpreting the data of Figure Six is the risk of making a spurious correlation, and of arguing *post hoc ergo propter hoc*, since the facts of American history are reasonably familiar to all of us. The very marked appearance of horizontality in 1840, indicating a break in the homogeneity of the whole, and increasing up through the Civil War is almost too perfect to be trusted, for it is exactly what we should expect statistically from our knowledge of history. The fifteen sets of data on Figure Six might indeed be described as the early emergence of increasing homogeneity which in 1830 and certainly in 1840 began to break apart into an ever more marked heterogeneity, that in turn began to recede even in 1860, and certainly in 1870, as the whole curve shifted ever more to that of greater homogeneity right down through 1930.

The Civil War was indeed a struggle between the concepts of the federated whole on the one hand and of the sovereign parts on the other, with the sovereign parts losing both actually and graphically to the federated whole.

Judged solely by our data for this 150-year period, the struggle may have started in 1830, but certainly in 1840, becoming ever more marked until it had mostly disappeared by 1870. Our barometer of community-size seems to be a subtle indication of the interplay of the forces of social-dynamics, or, as we say, of social-economics.

But since it is not the purpose of the present investigation to attempt a social-economic history of any one nation, but rather to establish as far as possible some general first principles of social organization, as man seeks his place in nature's balance, we shall continue in general terms. Let us briefly summarize what we have already done, and survey what still awaits us.

7. SUMMARY AND PROSPECTUS

Thus far we have found a correlation between the number and sizes of the communities of Canada and, for certain later periods, of the United States. We have reduced the mathematical properties of this correlation to those of a harmonic series in terms of which we have defined certain conditions as ones of *surfeit*, *deficiency* and of *saturation*. Yet this harmonic series of community size and number is but a barometer and would seem to be the effect, and not the cause, of man's way of organizing energy and raw materials in the production and distribution of his consumable goods. What the connection actually is between the correlation of the number and sizes of communities on the one hand and man's organization of production and distribution on the other, we must soon investigate.

But first we shall see (in Chapter Two) what we mean by the saturation of a harmonic series. Our study of saturation will be important because it will show that national organization in particular, and human organization in gen-

eral, are both subject to limitations upon their growth. In other words our study of saturation will show that man can organize his production and distribution only up to a certain point.

But before turning to Chapter Two let us frankly mention a certain possibly latent criticism of our study thus far: In the face of the enormous complexities of human organization, we have proceeded, as it were, on tip-toes in order to circumvent the many psychological, sociological, anthropological, economic, geological, chemical and physical forces that enter into human organization. All we have done is to count aggregates of human beings as they strive with these many forces. This criticism is at present legitimate. But, as we continue in Chapter Two, we shall let the psychological factors emerge ever more. In Chapter Three we shall let many of the factors contained in the specialization of materials, of processes, of labor and of the use of energy enter into the background to be used in our discussion of national-international balance in Chapter Four. In Chapter Five we shall discuss the distribution of national monetary incomes and find again the presence of the generalized harmonic series with which, by that time, we shall have become quite familiar. In Chapter Six, the last chapter, we shall turn to a discussion of cultural drives in national society; and in that chapter we shall see the possible effects both of the personalities of the leaders, and of the preferences of organized groups upon the cultural and economic habits of the entire social-economic system of which they are but a part.

In brief, we are at present ignoring many of the complexities of human organization in order to treat of them later with a somewhat greater facility. Much of this later treatment will be frankly hypothetical; it will be included largely to suggest that the problems there discussed are

intimately related to those which we are now investigating, and that their empiric study is perhaps the indicated next step of the present type of investigation.

Nevertheless any future investigation of the "cultural component" or of the "psychological component" of social organization will not be rendered more difficult by the empiric disclosure of some of the more elementary principles on which we are at present engaged. Hence, though mindful of the complexity of the phenomenon we are investigating, let us proceed with our analysis of the harmonic series and note perhaps one of its most important implications for community organization—the implication of a saturation-point.

CHAPTER TWO

The Saturation-Point of Community Organization Within a Nation

The Social-Economic Unification of the United States

1. INTRODUCTION

In the present chapter we turn our attention to a curious property of the previously discussed harmonic series which we present in the following equation, where S_n represents the sum of the n -members of the series:

$$S_n = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}$$

The property we have in mind is one that we shall call the *saturation-point* of the equation, that is, a point, in dynamic terms, beyond which the formula cannot increase. As a rough and ready advance analogy of the implications of our saturation-point, we might take the case of a kernel of wheat which is carefully planted, cultivated and in every way fostered; the kernel germinates, sprouts and grows according to, and within, the laws of its growth until it reaches a point—we shall call it a saturation-point—beyond which it cannot increase, no matter how carefully we tend it. Similarly we shall find that a population of persons living in communities cannot grow, or increase, beyond the limit of saturation of its equation. The contents of the present chapter fall under two main headings: first, an explanation of what the saturation point is, in terms of our equation, and, second, a demonstration that the United States has been rapidly approaching a condition of saturation in recent years. In the last portion of our chapter we shall attempt to correlate this condition of saturation with the panic of October 1929, as we discuss, briefly and in general terms, some of the

related psychological, sociological and economic factors in operation since the Civil War, as America became ever a more unified nation.

2. THE SATURATION POINT OF A POPULATION ORGANIZED IN A HARMONIC SERIES

Let us begin by writing down our equation:

$$Sn = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}$$

We have already inspected the right-hand member of the equation and have found that it consisted of an orderly series of fractions which would be destroyed if any member, except $\frac{1}{n}$ were removed, or if any additional fractional were

interposed in the series between 1 and $\frac{1}{n}$. Now we shall inspect the left-hand member, Sn .

Sn represents nothing more than the sum of the n members of the series. If the series consists of only two members, namely $1 + \frac{1}{2}$, then Sn equals $1\frac{1}{2}$; if of three members, namely $1 + \frac{1}{2} + \frac{1}{3}$, then Sn equals $1\frac{5}{6}$, and so on. As we add ever more members to the series, their sum, Sn , increases correspondingly. We can make Sn exceed any number we please simply by increasing the size of n . Of course, the moment we fix n at a definite number, so that $\frac{1}{n}$ is a specific fraction, then Sn is also fixed at a definite number. For example, if we set n at about 12,300 so that the last fraction of our series, $\frac{1}{n}$ becomes $\frac{1}{12,300}$, then Sn is about 10. In short, the size of n determines the size of Sn .

But the reverse of the above is also true. If we limit the size of Sn , then we automatically limit the size of n . For

example, if we make Sn equal to about 10, then automatically we halt n at about 12,300, and our last fraction, $\frac{1}{n}$, becomes about $\frac{1}{12,300}$. If we set Sn equal to about 5, then $\frac{1}{n}$ is equal to about $\frac{1}{3,150}$, and so on.

Of course, strictly speaking, Sn is precisely the sum of the n terms of our series, and hence we may not set any arbitrary number as Sn (unless we allow for a constant multiplier A , and thus have $A \cdot Sn$, as will be the case in Chapter Three). Thus, for example, Sn can be $1\frac{1}{2}$ (i.e. $1 + \frac{1}{2}$), or it can be $1\frac{5}{6}$ (i.e. $1 + \frac{1}{2} + \frac{1}{3}$), but it cannot be, say, $1\frac{2}{3}$, because harmonically seriated fractions will not add up to $1\frac{2}{3}$. In the course of the present chapter, and in the interest of simplification, we shall use Sn without a constant multiplier. Therefore when we make Sn equal to a positive number larger than 1, and then inquire into the size of n , the reader will understand that we are dealing only in approximations. We mention this point but to show that we have not ignored it, and to indicate that we shall return to it again in Chapter Three where we shall explain and employ the constant multiplier A , and speak of the sum as $A \cdot SN$. With this qualification in mind we may arbitrarily set Sn , for example, at approximately $15\frac{1}{3}$, $17\frac{1}{2}$, 1,000,001, or at any other positive number not smaller than 1 that the reader may have in mind.

Now, if any positive number, not smaller than 1, may be set approximately as Sn , then any positive number, not smaller than 1, may be viewed as the approximate sum of a number of fractions ordered in a harmonic series. If the reader happens to have a fondness for the number 40, he may view 40 as the approximate sum of a number of fractions arranged in the order of a harmonic series (or, $40 = A \cdot Sn$, if the reader prefers). Indeed let us see what it may mean, in practical terms, to "view 40 as the sum of a number

of fractions arranged in the order of a harmonic series." Instead of dealing with the abstract number 40, let us in the interest of tactility deal, say, with forty mince pies, which we are to cut into pieces, or portions, according to a harmonic series.

Now forty pies (or forty anything else) can theoretically be cut with ruthless mathematical precision into portions, according to a harmonic series. Yet the number (n) of pieces, or portions, that we shall receive will depend entirely upon the size of the first and largest portion. Thus if our first portion of the forty pies consists of the forty pies themselves, then our first portion will be our only portion. If, on the other hand, our first portion is a single pie, then the remaining thirty-nine pies will be cut into portions according to the remainder of the series, $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{n}$, in which each of these fractions will mean a fraction of a whole pie. Thus, if the first pie is the first portion, then the second pie will yield the second, third, and a part of the fourth portions (viz. $\frac{1}{2} + \frac{1}{3} + \frac{1}{4}$); the third pie will be cut not only to complete the fourth portion, but also to provide the fifth, sixth, seventh, eighth and, say, the ninth portions (viz. $\frac{1}{5} + \frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{9}$); and so on with the remaining pies. Once the actual size of the first portion is determined, then all subsequent portions may be viewed as fractional pieces cut in proportion to the first.

Yet what if the first portion is not a whole pie? Clearly if the first portion is only one-half a pie, then we get the second, third, and a part of the fourth portion from the second half of our first pie. In short, the number of pieces, or portions, of pie that we shall get from our forty pies will depend entirely upon the ratio of the first portion to the entire number of pies to be cut. If the first portion of our forty pies is one whole pie, then this portion is $\frac{1}{40}$ of the

entire amount to be seriated, and the size of n is once and for all determined by the fraction $\frac{1}{40}$. But if the first portion is one-half a pie, then this portion is $\frac{1}{80}$ of the entire amount to be seriated, and our n is now determined in respect to $\frac{1}{80}$. Clearly if our first portion is only one-half a pie, we can cut far more portions from our forty pies than if it were a whole pie. In general, then, the smaller the first portion is, in reference to the whole, the more portions we can cut from the whole. In other words, the smaller the fraction is, when we divide the first portion, 1, by the whole amount, Sn , the greater number of portions, n , we shall receive. Thus as $\frac{1}{Sn}$ becomes an ever smaller fraction, the size of n , the number of portions, increases ever larger.

Now it is the size of this fraction, $\frac{1}{Sn}$, that is alone of importance to us at present. Let us call $\frac{1}{Sn}$ the *index fraction* of our equation.

Clearly like index fractions yield like n 's in any problem of pie-cutting; that is the number of possible portions will be the same, even though the actual sizes of the respective portions may be different. We shall get the same number of portions from forty pies in which the largest portion is one pie, as we shall get from eighty pies in which the largest portion is two pies, as we shall get from 40 million pies of which the first portion is one million pies, as we shall get from twenty pies of which the first portion is one-half a pie. For in each of these cases, the first portion is one-fortieth of the whole, or, as we shall say, the index fraction is $\frac{1}{40}$.

Hence if we desire to cut a greater number of portions, we must decrease the index fraction, or, in other words, we must cut a proportionally smaller first portion—for example,

one the size of $\frac{1}{100}$, or, say, $\frac{1}{999}$ of the whole. We can make this index fraction as small as we please; the smaller we make it, the more portions we shall receive.

Naturally we are not primarily interested in this chapter in cutting mince pies into portions according to a harmonic series; nevertheless we are very greatly interested in cutting populations into communities according to a harmonic series. And all we have said above about portions of pies we can repeat here about communities. If we have 123 million of people in the United States and if we choose to put them into communities varying in size according to a harmonic series, we can have only a definite number, n , of communities; but the size of n (the number of communities) will depend entirely upon the size of our largest community. Once we have decided upon our largest community, and have divided it by 123 millions, we have our *index fraction*. And from that index fraction we can determine with ruthless mathematical precision the number of communities that we may have. It would seem, then, that the index fraction assumes enormous importance for our studies of the rank-size of communities. For us, the important aspect of New York, our largest city, with about 7 millions in 1930, is not primarily that it had 7 millions of inhabitants, but that it was about $\frac{1}{17.5}$ of the entire population of 123 millions in the United States in 1930. With this index fraction of $\frac{1}{17.5}$ we can compute with great precision the number, n , of communities that we may have in the United States according to a harmonic series.

Since index fractions seem to be so important because they dictate the number (n) of communities that a population can have, let us get some idea of the extent to which a change in the size of an index fraction will alter the number of possible communities. Below, in *Table Three* are given the number (n) of possible communities for the following

index fractions: $\frac{1}{17.5}$, $\frac{1}{15.3}$, $\frac{1}{10}$, $\frac{1}{9}$, $\frac{1}{8}$, $\frac{1}{7}$, $\frac{1}{6}$, and $\frac{1}{5}$. In the left-hand column is the index fraction, in the right-hand column, n , the number of communities:

TABLE THREE

INDEX FRACTION	NUMBER OF COMMUNITIES (APPROXIMATE)
$\frac{1}{17.5}$	22,400,000
$\frac{1}{15.3}$	2,560,000
$\frac{1}{10}$	12,300
$\frac{1}{9}$	4,550
$\frac{1}{8}$	1,670
$\frac{1}{7}$	610
$\frac{1}{6}$	227
$\frac{1}{5}$	31

From our *Table Three* it becomes evident that the increase in the size of the index fraction from $\frac{1}{17.5}$ to $\frac{1}{5}$ is attended by a wholesale slaughter of the number of possible communities. Indeed, to double the size of the fraction $\frac{1}{17.5}$ to $\frac{2}{17.5}$ will reduce the number of communities from over 22 millions to under 10 thousand. Hence, if the harmonic law applies, and if New York begins to grow in size out of proportion to all the rest of the country, that fact may be of ominous significance to many communities in the United States, notably to the smaller ones. Indeed let us see in just what proportion New York has been growing in respect to the rest of the United States from 1860 down to the estimates of 1937. We have seen in Part One that the communities larger than 2,500 were ordered according to a harmonic series since at least 1880; let us now see what the respective index fractions were in these previous decades.

In *Table Four* below are presented the index fractions for the decade years from 1860 through 1930 and for the year 1937, together with the respective populations of the United States and New York from which the index fractions were computed. (In this connection, please see Figure 6, Chapter One, in order to note that the trend of the index fraction of *Table Four* is not due to any arbitrary boundaries of New York, but would be evinced if the 20th, 30th or 40th most populous community had been arbitrarily selected for the calculation of the index fraction.)

TABLE FOUR

The Index Fractions to a *First Approximation* for Communities of the United States, 1860-1937, together with the respective populations of New York and the United States.

YEAR	INDEX FRACTION $\frac{1}{S_n}$	POPULATION OF NEW YORK (1)	POPULATION OF THE UNITED STATES (S_n)
1860	$\frac{1}{26.9}$	1,174,779	31,443,321
1870	$\frac{1}{26.1}$	1,478,103	38,558,371
1880	$\frac{1}{26.2}$	1,911,698	50,155,783
1890	$\frac{1}{25.1}$	2,507,414	62,947,714
1900	$\frac{1}{22.1}$	3,437,202	75,994,575
1910	$\frac{1}{19.2}$	4,766,883	91,972,266
1920	$\frac{1}{18.8}$	5,620,048	105,710,620
1930	$\frac{1}{17.7}$	6,930,446	122,775,046
1937 (estimated)	$\frac{1}{17.4}$	7,428,135	129,257,000 (estimated)

From *Table Four* it becomes clear that the index fraction for the United States has been growing larger from 1870 through 1937, increasing from $\frac{1}{26.1}$ in 1870 to an estimated $\frac{1}{17.4}$ in 1937. In other words, the city of New York has been growing at a progressively more rapid rate than the total country.

But not only has New York grown progressively more rapidly than the rest of the country. Since we saw in Chapter One that all communities larger than 2,500 have been keeping pace with the city of New York in terms of a harmonic series, we must conclude that all communities larger than 2,500 have been increasing on the whole at a progressively greater rate than the total country. In short, the United States has been getting urbanized at an increasingly more rapid rate in respect to its largest communities.

But what was happening to the smaller communities? If our index fraction since 1870 has been growing progressively larger, then, if our equation of the harmonic series be true, this comparatively larger increase in communities of 2,500 inhabitants or more must have been attended constantly by a systematic decrease in the number of communities smaller than 2,500 inhabitants. That is, the period from 1870 to 1937 may well have witnessed the abandonment of small towns and other rural communities, if at all times, from 1870 to 1937, our equation of the harmonic series was truly descriptive of the entire population of the United States.

How do we know, however, that our balanced equation of the harmonic series has been continuously and accurately descriptive of the entire population of the United States, including persons living in communities smaller than 2,500? We do not know it; in fact we shall presently find that it was not descriptive of the entire American population since the Civil War. Indeed evidence points to the probability that it has only been becoming ever more balanced since the Civil War, and that suddenly, on or about the year 1930, it came into a condition of balance, with all the stubborn urban-rural indecision that this condition of a balanced equation entails. Let us

see just what has been happening since the Civil War. For the sake of objectivity we shall return to our forty mince pies.

In the condition of balanced equation, our formula admits of no additions to, or subtractions from, the right hand member. We shall call this condition one of *saturation* in the sense that the sum, S_n , has all the communities that it can tolerate, *if we postulate that the smallest community, $\frac{1}{n}$, contains only one person (or two, or three or some other arbitrary, small constant number)*. Yet why do we bother to designate our equation above as being in a condition of saturation, when the term, *condition of saturation*, means nothing more than the presence of our equation in balance?

We speak of a *condition of saturation* with good reason, because we may in practice find a population which is only partly distributed in communities according to a harmonic series; for example, we might find that only the communities of 2,500 inhabitants or more followed the harmonic series, whereas the smaller communities of the population were organized in respect to size or number according to no apparent system at all. In short, the harmonic series might be true up to a certain point and no further. It would be as if we cut our forty pies according to the index fraction, $\frac{1}{40}$, only to find that there had been fifty pies and that now 10 whole pies were left over and uncut. From the point of view of our harmonic series we should have forty seriated pies plus an unseriated residue; but from the viewpoint of all fifty pies we should have, by definition, a *condition of subsaturation* to be described, say, by the formula

$$S_n + (\text{Residue}) = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} + (\text{Residue})$$

Hence, when we speak of a condition of saturation of a population, we mean not only that a harmonic series is present

but also that all inhabitants of the population are accounted for within this series, with the smallest community, $\frac{1}{n}$, containing a single person (or some other arbitrary, small constant number). In short, we speak of saturation to emphasize the fact that the population is not subsaturated. The concept of subsaturation will be very useful to us in studying the growth of the United States after the Civil War. But not only subsaturation!

There is also *supersaturation*. For example, we might be so busy seriating the first thirty of our forty pies according to the index fraction $\frac{1}{40}$, that we did not notice that someone had stolen ten of our pies. Hence, though we have been cutting our pies according to the formula of forty, we find only thirty pies at hand. In this case there would not be enough pies to be cut; or, shifting our analogy, we should not have enough cloth for our coat. From the viewpoint of our harmonic series, not a single crumb of our thirty pies would be left unseriated; but from the viewpoint of our forty pies, there would have been a shortage. To be sure the sum of the parts of the thirty pies would be equal to thirty pies; the point is that the number of portions would have fallen far short of what we had originally planned. Though we had planned to cut n portions from our forty pies according to the index fraction, $\frac{1}{40}$, we should have cut in fact only a portions, and all the portions from $(a+1)$ to n would be lacking. This condition, then, is one of supersaturation, and we might formulate it thus

$$Sn - \left(\frac{1}{a+1} + \frac{1}{a+2} + \frac{1}{a+3} + \dots + \frac{1}{n} \right) = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{a} = Sa$$

To summarize, then, *saturation* means that the whole population is organized according to a harmonic series; *sub-saturation* means that a residue of the population is left

living outside the harmonic series; and *supersaturation* means that there are not enough persons in the population to complete the harmonic series. However, to repeat, these terms have meaning only if we postulate that the smallest community, $\frac{1}{n}$, contains one person (or two, or three, or some small constant number).

The terms *subsaturation* and *supersaturation* may seem confusing to the reader who looks first at the harmonic series and second at the population of the social-economic system. From the viewpoint of the harmonic series there is with subsaturation a surplus of persons; but from the viewpoint of the population (our viewpoint) there is an insufficiency of organization for our total population. And, by the same token, from the viewpoint of the population, there is in supersaturation a superfluity of organization. But since our formulae are unambiguous, let us not worry about nomenclature.

It is not difficult to bring a formula of subsaturation or of supersaturation into one of balanced saturation as far as mathematical operations are concerned. Using our previous example of subsaturation of fifty pies and the index fraction of $\frac{1}{40}$, which left a residue of 10 pies, we need only reduce the index fraction to $\frac{1}{50}$ and continue cutting until all fifty pies are apportioned. Using our previous example of supersaturation of thirty pies and the index fraction of $\frac{1}{40}$, we need only increase the index fraction to $\frac{1}{30}$, and our equation becomes saturated. To repeat it is quite simple to bring order into the household mathematically. At no point in our treatise will mathematics cause us trouble. The trouble lies in the things to which the mathematics refer. We have used pies as an analogy only because they stay put, as it were, and remain the same.

But, instead of taking pies to be cut into portions, let us

take a hundred odd millions of guinea pigs—healthy, frolicsome, and full of their proverbial *joie de vivre*—and let us try to arrange them into droves, varying in size according to a harmonic series, first calculating our index fraction. But why guinea pigs? Why not human-beings in numbers as they were from 1860 to 1937 in the United States and with the index fractions that we find?

3. FROM SUBSATURATION TOWARDS SUPERSATURATION IN THE UNITED STATES, 1880-1930 AND AFTER

Now that we have defined our terms, *subsaturaton*, *saturation* and *supersaturation*, let us proceed to apply these terms to the actual population and communities of the United States from, say, 1880 until to-day. We know that the United States in the past fifty years has become urbanized at a stupendous rate. We shall now find that this urbanization has been peculiar, in the sense that it emerged from a condition of subsaturation (with many rural communities outside the harmonic series) and developed very rapidly towards saturation, until today there is a question of supersaturation (with too many persons in the largest communities and too few in the smaller towns and on the farms). In short, we have proceeded from a condition of rural unbalance to one of urban unbalance, with all that that entails.

The easiest and simplest way to demonstrate the fact that the United States has been developing out of the sub-saturated into the supersaturated will be to operate with our index fractions from 1880 to the estimated one for 1937. We remember from Table Four above that the index fraction of $\frac{1}{26.2}$ in 1880 increased through the decades; viz., $\frac{1}{26.2}$, $\frac{1}{25.1}$, $\frac{1}{22.1}$, $\frac{1}{19.2}$, $\frac{1}{18.8}$, $\frac{1}{17.7}$, until, in 1937, it reached an estimated $\frac{1}{17.4}$; and, furthermore, we remember that the population of the United States has been rapidly *increasing* in size from 1880 to 1937 (50,155,783 in 1880, to an estimated

129,257,000 in 1937). If our index fraction had been *decreasing* as our population had been *increasing*, we should find everything in order; it would be like decreasing our index fraction from $\frac{1}{40}$ to $\frac{1}{50}$ as we increased the number of pies from 40 to 50. The fact that in the United States both index fraction and population have been increasing implies that during the post-Civil War period, the population of the United States could not have been at all times saturated as we have defined the term above. On the contrary, since the trends both of population and of the index fraction have been consistently in the direction of an increase, then saturation must have been (or will be) but a temporary state; that is, a state of transience between the subsaturated into the supersaturated (if we postulate that $\frac{1}{n}$ represents an arbitrary, constant small number of persons). Thus, if for any given year in the United States from 1880 to 1937 we find saturation, we may argue from this single finding that subsaturation had prevailed in previous years and supersaturation in succeeding years. We need select, then, only one year. And we shall select the year 1930, or thereabouts.

In the year 1930 the index fraction for the United States was about $\frac{1}{17.5}$. We say "about" $\frac{1}{17.5}$, instead of "precisely" $\frac{1}{17.7}$, to remind the reader of the fact that we are dealing with approximations. By 1937 the index fraction had increased to $\frac{1}{17.4}$, and we may argue that between 1930 and 1937 lies the moment we are roughly measuring, namely "about" $\frac{1}{17.5}$.

Now, if the index fraction is $\frac{1}{17.5}$, it follows that Sn , in this case, must be theoretically 17.5 if we call the largest community 1. For we determine the index fraction by dividing the largest portion by the entire amount to be apportioned (7 millions by 123 millions, roughly); and we remember from our previous analogy of pie-cutting that the

ratio between the first portion and the number of pies to be cut was alone of importance (thus we obtain the same number of portions from 80 pies with a first portion of 2 pies; or from 40 pies with a first portion of 1 pie; or from 20 pies with a first portion of $\frac{1}{2}$ pie).

Since $Sn = 17\frac{1}{2}$, we write our formula with actual values calculated and substituted:

$$17\frac{1}{2} = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{22,400,000 \text{ (approximately)}}$$

And this formula means that if (1) New York City is $\frac{1}{17.5}$ of the total population of the United States, and (2) if the entire population is divided into communities according to a harmonic series, then (3) there are approximately 22,400,000 different communities.

The question arises whether there were indeed approximately 22,400,000 communities in the United States, with everyone living in a harmonically seriated community. And the answer is—No. For, if all were seriated harmonically, then the smallest community would contain

$\frac{1}{22,400,000}$ th of the number of persons in New York City,

or about $\frac{7,000,000}{22,400,000}$ which is about $\frac{1}{3}$ of a person. Since

we clearly cannot have $\frac{1}{3}$ of a person, or any other fraction of a person in a community, our number, 22,400,000, is too large to represent the different communities in the United States. Nevertheless, this mistaken number, which we shall presently correct, serves to remind us of a restriction upon our communities which was not upon our pies: individual persons cannot be fractionalized.

Any attempt to correct our figure of 22,400,000 in the direction of bringing it down to a more reasonable size, must begin with a reinspection of our index fraction. Is the fraction $\frac{1}{17.5}$ correct? Or have we perchance been guilty of

an oversight? The answer is that neither this index fraction nor any of the others in Table Four is correct beyond a rough first approximation, and that we have indeed been guilty of an oversight. Yet we have discovered this oversight only by operating with an invalid index fraction. Let us see how this is true.

We know nothing reliable about the number and sizes of communities smaller than 2,500. We only know that if we were to divide our 123 million odd Americans into harmonically seriated communities according to the fraction $\frac{1}{17.5}$, or the ratio of the official size of New York City to the total population, we should finally be obliged to cut our individuals into halves and thirds in order to obtain sufficient communities—a very clear absurdity. Although this absurdity of attempting to fractionalize individual human beings in order to meet the exigencies of the organized group may not be an unknown error of those who try to re-cut a country's pies for a new deal, let us, nevertheless, try to avoid the error ourselves, as we reinspect the condition of subsaturation.

If we had a condition of subsaturation in the seriation of one million pies, we might indicate it thus:

$$1,000,000 = Sn + (\text{residue}) = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} + (\text{residue}).$$

The index fraction would be $\frac{1}{Sn}$, whatever that might be, and it would most definitely not be $\frac{1}{1,000,000}$. The fallacy of our argument with the index fractions for the United States since 1880 has been that we have tacitly assumed that our entire American population has been harmonically seriated, whereas our evidence stopped short of communities containing not fewer than 2,500 inhabitants. We know nothing about these communities of smaller size except: (1) that they were not all harmonically seriated, and, there-

fore, (2) that they included a residue of communities, large or small, not organized in the terms of the communities of 2,500 or more inhabitants. But that is not all we know. Since the index fraction becomes progressively smaller as we retreat back to the Civil War, it follows that the unorganized residue must have been progressively larger, the nearer to the Civil War we come. The period from the Civil War, or, from 1880, if one will, down to the present time may be viewed as one in which the unorganized residue of population has become ever more organized into the whole. That is, from 1880 to the present, the United States has become ever more thoroughly absorbed into the communal organization of a harmonic series.

Can we rightly say to-day that the entire population has at last been absorbed into the community-series to the extinction of the residue? The answer to this question will depend upon whether we may take the official size of New York City proper as the actual size of social-economic community of rank 1. What is New York City?

New York City is not a social-economic concept, but a political-statutory concept. It consists exclusively of five boroughs with populations (1930) as follows: Manhattan, 1,867,312; Bronx, 1,265,258; Brooklyn, 2,560,401; Richmond, 158,346; Queens, 1,079,129. If we omitted any one of these boroughs, except Richmond, we should reduce the size of New York by at least a million persons—from 7 millions in 1930 to 6 millions. The reader may choose to remark that these five boroughs belong to New York City, and to the largest community of the United States. And that is doubtless true; surely the statutory boundaries of New York are not too large, for we have in New York City one large integrated community and not five discrete small ones. Nevertheless, a community's statutory limits are often quite arbitrary, being changed by no means auto-

matically as the community grows or shrinks in size. So too with New York. If we motored day after day over the area of land lying within a fifty mile radius of Brooklyn Bridge, crossing back and forth at will over the East River, the Hudson River and the Upper and Lower Bay, we certainly could not locate precisely the present city limits of New York simply from an inspection of the persons and buildings in the area. Indeed many of the buildings, factories, and activities of statutory New York City proper can make sense only if we add a considerable portion of the statutory suburban population outside of New York City, including portions of New Jersey. Of course, if we asked where these suburban dwellers vote, register their cars and generally sleep and shave, we should doubtless be told that all this happened outside New York City. But to the question where these same persons centered most of their money-making and pleasure-seeking activities, the answer would be New York City. If, however, we inquired into the place where they voted, registered their cars, slept, centered their money-making and other activity, we should doubtless find that it was in Social-Economic Community of Rank 1. That is, we should find that more belongs to New York than is included in the statutory limits. But once we add ever more of the right bank of the Hudson and adjacent terrain on Staten Island with a bit of Yonkers and so on, into a "Metropolitan Community of New York," we should have a population considerably larger than that for New York City. Instead of about 7 millions for New York City in 1930, we might have, say, 8 millions for the "Metropolitan Community of New York" for the same year. And, as we changed 7 millions to 8 millions, we should have to alter the "index fraction" from about $\frac{1}{17.5}$ to about $\frac{1}{15.3}$ ¹.

¹The reader may choose to protest that any such arbitrary alteration of statistical data can dig the ground out from under our own feet, since we

Furthermore, as we have argued of the social-economic entity "New York," so we may also argue of other cities of high rank—Chicago, Philadelphia, Detroit, Los Angeles, Cleveland, St. Louis, Baltimore, Boston—; in each case the limits of the functional social-economic entity may lie well beyond the statutory limits. For example, Boston, in 1930 had only 781,188 inhabitants within its statutory limits. But if we add its immediate and thoroughly integrated suburbs, we should have to include most if not all of the following populations: Cambridge, 113,643; Somerville, 103,908; Everett, 48,424; Brookline, 47,490; Chelsea, 45,816. With these added, Boston, with 781,188 would become "Boston" (i.e. Greater Boston) with over 1,100,000.

Of course, we are not interested in estimating new and more accurate census data for our largest communities. But we are interested at present in discussing the United States and the general problem of saturation. We found the country subsaturated with an index fraction of $\frac{1}{17.5}$; we have seen reasons for believing the index fraction might be too small. We do not know what the index fraction really was in 1930. But suppose it were larger, suppose it were $\frac{1}{15.3}$,— what then?

$$15.3 = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{2,560,000}.$$

In short, by a slight change in the index fraction from $\frac{1}{17.5}$ to $\frac{1}{15.3}$, resulting from increasing New York (and all larger communities proportionately) from 7 millions to 8 millions, we have slaughtered off theoretically over 20 million com-

established our harmonic series on the basis of these data. Let us postpone for a few pages any consideration of this apparently legitimate protest until we have operated with our data a little further. In point of fact, the official population of the metropolitan area of New York City in 1930 was 10,901,424 persons (see below).

munities. That is, the last community (n) drops from about 22,400,000 to about 2,560,000.

What, now, would be the size of the smallest community cut to the fraction $\frac{1}{15.3}$? We need but divide 8 millions by 2,560,000 in order to find that the smallest community would contain from three to four inhabitants—that is, say a farm with a man and wife and a child or two. This balanced arrangement of the population of our social-economy might be viewed as ideal, were it not for the acid fact that human beings are not in all respects unlike guinea pigs; what is balanced this year may not be balanced next.

To repeat, we are not interested in estimating the actual index fraction for 1930, if it were possible. Our index fraction above, $\frac{1}{15.3}$, was arbitrarily calculated. If anything, this fraction is too small. The population of the Metropolitan Area of New York City for 1930 was given officially as 10,901,424, with 7,848,065 from New York State, 2,915,056 from New Jersey, and 138,303 from Connecticut; according to these data the index fraction would be nearer $\frac{1}{12}$ than $\frac{1}{15.3}$, with the number of different communities reduced even more radically. The point of interest is that there is such a thing as a saturation point, and that we are probably now struggling with its social-economic implications which we shall discuss presently.

The reader may protest that he is not clear as to just what the proper territorial limits of a community should be. The full reply to that protest would be extremely difficult to give (cp. Chapter Four); yet even now we can offer an idea of the answer: there is no such thing as “proper territorial limits” of a community; but only approximate limits which are constantly shifting. A national population is continuous in its spread over its national territory, varying in density in what we call “communities”; these “communities” are not discrete entities, but make sense only in

reference to the rest of the country. Yet we have found a useful thing to measure in these "communities," and by first considering them as discontinuous entities, we shall perhaps later be better able to comprehend them as they appear in the continuous cobweb of interrelated human organization.

Indeed let us interrupt our arithmetical treatment and discuss the post-Civil War period "psychologically" (i.e. humanistically). This discussion will not mean that we have abandoned our attitude of empiric science, but rather will it serve to remind us of the scope of our problem, with all its human detail, some of which will engage us in later chapters. It will make our quantitative data seem more alive. As we reflect briefly upon what has happened in the last fifty years as a consequence of our rapid urbanization, we shall better understand in every-day terms the meaning of *residue* and *saturation*. Mathematical descriptions are welcome, but only after we have become at home with the data they describe. Of course, the ensuing descriptive discussion is not intended as a polemic, nor is it advanced as being particularly original. Rather is it intended to remind the reader of the many possible counterparts of "increased urbanization."

4. THE POSSIBLE SOCIOLOGICAL AND PSYCHOLOGICAL COUNTERPART OF THE URBANIZATION OF THE UNITED STATES IN POST-CIVIL WAR YEARS

When General Robert E. Lee surrendered to General Grant at Appomattox Court House on Sunday, April 9, 1865, the development of the United States passed out of that of a loose confederation of sovereign parts and into that of an integrated whole, where it was to remain until down through the 1930's when again, according to widely

held opinion, sectional fissures began to threaten. In other words, since 1865, there has occurred, at least up to the present, an ever greater national unification of social-economic activity whose effect upon the number and sizes of American communities has been previously discussed under the heading of the homogeneity of the whole and the heterogeneity of the parts. Naturally this great shift in the fundamental direction of territorial organization has been accompanied by far-reaching changes in respect not only to other aspects of social organization, but also to the trends of the individuals' mental attitudes towards the United States and American citizenship. Let us discuss very briefly these possible concomitant changes in the general sociological and psychological counterparts of the rapid urbanization of the United States. Though we shall consider the dynamics of these counterparts by and for themselves in later chapters, a brief discussion of them at the present time will serve to synthesize them with the phenomena of urbanization now under review. For in a certain practical sense we are in the process of demonstrating in the course of our first four chapters, and in reference to community size and number, that there probably exists such a thing as a social-economic entity called a nation,—as the result of nature's ordering of forces— which is above and beyond any international ordering of national entities. In later chapters we shall set forth possible reasons why the concept of a national entity,—or of nationalism, if one will—may cast its roots into the profundities of the individual's cultural and emotional life even to the ultimate eradication of intra-national organization of whatever sort. Hence the following paragraphs will serve not only to present descriptive material germane to what has gone before, but also to offer a preview of what is still to come. Our ensuing treatment will fall under the

general headings: (a) individual and class exploitation versus national exploitation, (b) the urbanization of mental attitudes, (c) the accelerated expansion of the industrial revolution of steam, petroleum, and electricity, and finally (d) the panic of October, 1929, which may well have introduced the problems of saturation and emergent sectionalism. Our discussion will be brief and descriptive, as we but suggest some of the complex "psychological," "cultural" and "social" factors which may be intimately connected with the assumed fundamental drives of national social-economics in their urban-rural manifestation.

a) Individual and Class Exploitation versus National Exploitation.

Let us go back in our memories and see what the smaller communities were like. We may infer from our data of Table Four, above, that as we go back in the history of our country, decade after decade, we should find that an ever-greater proportion of persons lived in small rural groups of less than 2,500 inhabitants. That is, as we go back, we should find an ever greater degree of subsaturation with a proportionately ever larger residue of persons not organized in communities according to a harmonic series. It was a time when farms were scattered around small towns and villages, each with its cobblers, blacksmiths and other artisans, with the local grist-mill, saw-mill, slaughter-house, and the like, and each with its church, perhaps its local newspaper, its own social-economic aristocracy and its own set of moral and political group-sentiments. Where there was fertile land, there were also, in time, agricultural settlements. It was not primarily a question then of organizing a single great political unit; it was a time for exploiting the terrain, in company with others, if possible, and alone, if necessary. The whole

policy of opening up the frontier was that of getting the soil under cultivation with maximum rapidity. It was a time of "rugged individualistic enterprise," and the colonization of territory and the exploitation of natural resources were conducted by persons largely of this type.

The communities consisted for the most part of those who traced back their origin fairly immediately to religious, social and economic "misfits" of Europe who were thrifty and hardworking, subscribing collectively and unqualifiedly to the proposition that all men are created equal, though individually, if we may trust the record, each one often operated actually on the assumption that he, in fact, was just a little better than his neighbor. The reasons for this curious feeling of self-superiority, if we may trust the analyses of sociologists, were possibly first the great relief from European oppression, and second the fact that our forefathers were living in a fool's market where, with rising land values, for example, a person had to be very stupid indeed really to suffer want. And since the United States is almost a garden-spot of the world in respect to its soil, climate, and the amount and diversity of its resources, it was quite easy for one to believe that he had been wise where in fact he had only been lucky. The "American way," as each person interpreted it to himself, was the best and only way: only in America could the humblest person become a millionaire. This somewhat self-righteous, "holier-than-thou" attitude is perhaps not completely dead today. If one were to describe it with a single clinical term, one might be inclined to call it group-paranoia,—a term that we shall attempt to define presently.

It remains a simple fact, however, that the production of agricultural and mineral raw materials is not the only possible part of a nation's productive enterprise. The fur-

ther semi-finishing and finishing of raw materials into consumable goods is a prerequisite of their consumption, and the nearer to the raw materials that much of this manufacture can be located, the greater the possible economy to all concerned. Hence it was inevitable with passing years that factories and the like would follow the trek of the pioneers who were pushing back the frontiers in their quest of raw materials. And once these manufacturing plants were established, the terrain began to lose its mobility of population and of enterprise. For as the manufacturing plants appeared in response to the need of semi-finishing and finishing the raw materials of the environment, so too the needs of the now established manufacturing plants fell as future demands upon their surrounding territory. Thus the rural and urban became ever more tied together in the co-operation of their activities.

But in general the spirit of liberty-loving individualistic pioneers and that of the managers of manufacturing plants are not always easily reconciled. The former are frequently "lone wolves"; and many of the American pioneers lived also in the profound conviction that they possessed the "true religion," the "right way of life," and the "proper and decent manner of living"; indeed that was the reason why many of them migrated here. If we were to speak clinically, we might suspect that a goodly part of the early pioneering of the United States was effected by essentially paranoid-personalities who were retreating from an organized society in the quest of the solitude of an environment which would submit to the domineering free play of their individual selves. In addition to these persons of paranoid-tendencies, there were, of course, the highly extrovert adventurers and the proverbial get-rich-quick. Nevertheless it was probably the paranoid-type that set the moral tone, developed queer religious sects, ostracized any sug-

gestion of immoral conduct, later perhaps even established prohibition, and in general stifled in others the individual development of personality they sought for themselves.

But a manufacturing plant cannot be run successfully by persons of whom each is convinced that he is right and that his personal interests come first. There must obviously be a give and take because of the co-operative nature of the problem. The ideal solution of co-operation is apparently an abandonment of some of the liberties of the individual in exchange for the greater security and productivity of the organized group (cp. Chapter Five). But unhappily this ideal solution was evidently not at all times the actual solution, for the plant owners were themselves not always without a touch of the same tendency towards excessive egocentric individualism that seems to be once and for all inherent in pioneer life. The actual solution in most cases, according to widely held opinion in which the author is inclined to concur, was the importation of immigrants by boat loads in increasing number after the Civil War, and these were exploited as a pariah-class in the American factories. Of course, because of the enormous expansion of industrialization since the Civil War, industrial leaders were repeatedly recruited from the newcomers who, once they passed from the hypothetical class of pariahs into that of the leaders, behaved as the leaders, regardless of their origins. Nevertheless we have no reason to suppose that this recruiting destroyed the fundamental nature of a certain class-stratification on the basis of national origin (cp. Chapter Six). Indeed, instead of reaching a solution of the social versus the individual in industrial matters, classes tended to arise which not only were economic, but tended also to be associated with national origins.

The top class was and is that containing descendants of

the original English or Dutch settlers. The next class was and is the general "Nordic Class" including the Germans and Scandinavians. The third and lowest class was and is the Irish, Slavic, Magyar and Mediterranean class including the eastern Jews. Though the reasons for these classes were economic, there is nevertheless an unmistakable correlation with the order of the immigrants' arrival. The top class, "the English speakers," were here first and were in fact persons of great agricultural, industrial, and commercial acumen. They had an advantage over the new-comers after the Civil War, because they knew the language and the problems of the country; they performed a useful task in opening up our national resources, even if at times under the form of an almost baronial piracy of the resources themselves.

The second, or "Nordic class," arose from the superior training of artisans in Germany and the Scandinavian countries. After all, carpenters, or gardeners, or mechanics from these countries enjoy a high reputation. In the growth of American industrialization their possession of these much needed skills made them welcome new-comers. Furthermore, since they were on the whole Protestant and mostly blond, they did not differ physically nor, it might be added, in their hatred of "popery," from the "English-speakers" with whom they intermarried.

The third class consisted of persons who for the most part were at the starvation level of countries of great cultural traditions (e.g. Ireland and Italy) or from this level in very backward and oppressed countries of few or no recent cultural traditions (e.g. the Balkans and Eastern Europe). This class was on the whole Roman Catholic or Greek Orthodox and, except for the Irish, essentially brunette. To them was allotted the more menial tasks of digging sewers, carrying hod, and laying railroad ties. Of

course there was a certain interfusion of these classes. We are speaking only in general terms and but marshalling familiar descriptive data with which few would care to quarrel.

To summarize, then, we might say that while the United States had become a highly unified social-economic system in terms of materialistic production in the post Civil War period, it had not therefore necessarily become correspondingly highly unified in terms of what in Chapter Six, we shall call "culture." Not only did nationalistic groups tend to resist amalgamation but, what is more important, they seem to have become associated with social-economic classes. In a very practical sense, of course, this particular type of stratification is apparently inevitable in a new country; it would have been highly abnormal if it had not happened. And by the same token, it is apparently inevitable and only the normal procedure of evolutionary process that nationalistic cultural differences will gradually become fused into a more homogeneous culture which will be as characteristic of the United States as that of France is for France, or that of Great Britain for Great Britain. In short, sooner or later Americans will be instinctively "pro-American" instead of "pro this" or "pro that," just as, say, the Englishman is instinctively pro-British, however much he may personally like or dislike certain attributes of non-British cultures. What our own American culture will be like, after it has become homogeneous, cannot be foretold now while it is still in the process of amalgamation.

At the present moment of our exposition, however, we are primarily interested in the general question of individual and class exploitation versus national exploitation,—with all the racial, religious, and national heterogeneity that has been its concomitant in the

United States,—because of some of the possible general effects of the growth of a national productive unification and of increased urbanization upon this heterogeneity. After all, industrialization demands at least a modicum of co-operative spirit and at least a partial suspension of individualistic and group differences. Up to this point in our momentary disquisition we have presented some of the familiar sources of conflict between the individual and the social group, as well as between the rural and the urban, during the time that our harmonic series apparently approached saturation in the post Civil War period. Of course it has been quite obvious for years that the United States has become urbanized in respect to its material goods and tools. Nevertheless let us now suggest, briefly, without pretense to originality, how the inhabitants of the Union may also become more urbanized in their mental attitudes and more socialized in their thinking as a result of the possible attainment of the saturation point after 1929. This brief discussion will be of value not only in helping the reader to visualize the meaning of our saturation point, but also in serving as an introduction to the material of subsequent chapters.

Let us return to a consideration of the individualism of frontier days which, as we saw, was not entirely inconsistent with what the psychiatrists might term paranoid-tendencies.

b) The Urbanization and Socialization of Mental Attitudes.

We have spoken above of paranoid-individualism. Though the term “paranoia” is well recognized clinically, it perhaps merits definition here. The paranoid is essentially an egocentric person who wishes to have the economic and social rewards of group-organization without

abandoning any of his own individual liberties or prerogatives. From his own point of view, the paranoid tends to consider himself right and to believe the world owes him both a living and a very special consideration. With this fundamental asocial split from the sobering realities of the group, the paranoid may dispense with reality entirely, and recede into a dream-world with himself as the center, in the form of Napoleon or of Maria Theresa. Or he may retreat from the group to a lonely farm, or some other aloof hermitage. Or he may try to dominate over the group by methods which, though they may be essentially cruel, are justified in his mind by his own ideas of "morals" and "righteousness." He may be a humble street-corner crank, or he may be the president of a great corporation, or of a university, or even, conceivably, of the United States. He has a formula for everything, is better at giving advice than at receiving it, and loves to delegate responsibility without, however, delegating authority. He often crusades, either for righteousness or against evil. He frequently loves to talk about "freedom" and "human rights," although in his personal life he is often autocratic and even at times sadistically inconsiderate of others. Yet behind his mask of arrogant superiority, one frequently sees an abysmal feeling of social inadequacy or of personal inferiority. A new country, like the United States, is almost bound by necessity to contain a high percentage of paranoids. First of all, its newness attracts them. Second, the paranoid survives better in lonely isolation. And third, a person with this predisposition tends to become paranoid if left either alone or too constantly in the company of strangers with different ideas and sentiments than his own. The well-recognized and marked tendencies towards paranoia in the United States was a concomitant of its newness and could probably find a counterpart in almost any other

new country. Its dangers to the state are obvious. Let us see what has been happening to it, in terms of national urbanization.

American paranoid tendencies may be felt to have reached their highest point in the last World War when the whole country, under an attack of mass-hysteria, crusaded "to make the world safe for democracy," with all the delusions of grandeur, utopia, persecution, and self-righteousness that are the stereotyped symptoms of this most vicious of mental diseases. However foolish and costly the crusade may have seemed to many afterwards, it nevertheless was amply supported at the time as we all believed in the righteousness of our cause. Moreover we must not forget that the crusade may have served a certain useful purpose both temporarily and permanently as far as the United States was concerned.

Temporarily, and for the duration of the war, all Americans were equal, and everyone forgot his national origins and his individualism, either willingly or under the coercion of an often quaintly sadistic nature. We laid money and man-power on the altar as never before or after, and the clergy and the academic world dedicated themselves to the paranoia, second to none. Everyone had a noble cause to live for, with the emergence of "Utopia," an inevitability, once the "Hun" had been destroyed. Cruelty of disposition and nobility of character had a common outlet in a common cause in which we all believed until our putative allies gathered around the table at Versailles.

Permanently the experience was of value as the whole population was unsettled down to its roots in all the outlying parts of the United States. To be frank, just enough young American boys became acquainted with the brothels of Paris, and just enough small-town graduates were moved into larger cities for war-work, in order to under-

mine "Utopia" and many of the other schizoid delusions as far as these were concerned. Mental attitudes became urbanized if not cosmopolitanized as the youth of the nation tasted of the big cities that had been forbidden in the days of rural isolation. Once the war was over, a noticeable change became manifest throughout the entire population. Instead of singing "Over There" and "Just a Baby's Prayer at Twilight," merry throats now chortled, "How are you going to keep them down on the farm?" and "Don't sell the old farm, give the damned place away." The previous well-recognized pathology of self-righteous repression yielded to the equally well-recognized pathology of rebellion of the 1920's, with their gangsters, with their clandestine drinking, with their promiscuous copulation, and with elderly matrons donning horn-rimmed spectacles Paris-bound for a little culture themselves. Urbanity was the order of the day, and the migration to the city began. It was an astonishing age, as we look back upon it now, and see the extent to which the mental attitudes of an entire nation of peace-loving farmers and essentially small tradespeople became not only urbanized but even cosmopolitanized as the individual tended to succumb to the social.

But if these were possibly some of the psychological and sociological factors attending the rapid urbanization, what may the economic factors have been?

c) The Accelerated Expansion of the Industrial Revolution with the Emergence of Petroleum and Electricity.

The economic factors in the United States since the Civil War all tended towards a greater urban industrialization with the advent of the practical application of steam engineering and notably with the application of chemistry

and physics to petroleum and electricity. The advent of steam-power in the middle nineteenth century contributed greatly to an increased homogeneity of the whole territory. Yet the enormous strides of physical and chemical engineering, particularly since 1914, did more than anything else to tie us into a national, homogeneous group even if at an almost unhealthily rapid speed. Of course in this connection there was also the effect of abnormal international conditions upon our internal organization which should not be forgotten.

Let us turn now to a brief review of the rural position of national urban-rural organization. Up to 1919 American agriculture had exported quantities of its products abroad. Yet when our late Allies at Versailles, whatever their intentions may have been, went actually quite far in Balkanizing Central Europe and in sowing and cultivating the seeds of local nationalistic conflict, they delivered a blow to international trade in general and to American agricultural exports in particular. Though much of Central Europe was living ill-clad at a starvation level of existence, they nevertheless could not afford our farm products. Furthermore the great demands for agricultural products during the World War had opened new agricultural terrains throughout the world which now competed with ours. Then, too, if only in order to recuperate financially, the British are said to have retired ever more into Empire-preference with a certain concomitant manipulation of monopolies on raw materials and of monetary control that could not but be deleterious to us. And finally our own government with a certain indecision in tariff-policy exacerbated our agricultural problems. For these and many other reasons, our agriculture had to compete on a world market and was depressed long before 1930. Most of us did not note this agricultural depression because of

the rapid urban industrialization that occurred after the World War. Yet early in the 1920's rural residence went into a discount.

Since 1919 the industrial exploitation of the physics and chemistry of electricity and petroleum developed with lightning rapidity. Nature does not contain many such stores of energy and material, and the potentialities of these two were fully appreciated by our industrial leaders. Instantly cities began to expand with great activity and urban residence jumped to a premium, not only because of higher wages but also because the first fruits of the new exploitation of petroleum-electricity went to the city-dwellers. Farm-dwellers, already depressed, abandoned their farms and trekked to the cities whose attractions were advertised by radio and moving pictures to a population which as a whole had become urban-minded during the World War.

With this trek to the city, farm-abandonment began with the vicious circle of a fall in farm values and of a rising rate of foreclosures. As a result of the inroads of great arterial highways, the little country towns began to shrink, and the entire United States became more a functional whole. No one with enterprise cared to stay on the land as long as the cities sought labor at high wages.

Nevertheless there was a joker in the urban industrial activity which apparently escaped general notice at the time. The activity consisted of two components, one permanent and the other highly temporary. The permanent component was the continued manufacture, distribution and maintenance of the new line of electrical and petroleum products which, after the great peak of production attending the initial introduction, would settle down to a fairly constant rate. The temporary component was the initial capital outlay in the form of plant construction and

of plant expansion which, when once completed, passed over into the category of things to be maintained.

Just as the urban activity was divided between the permanent and the temporary, so too were the long run chances of employment of the urban workers who did not see this until it was too late. Though many bought houses, radios, autos, stocks and the like in the belief that the then existent increasing rate of industrial expansion would continue indefinitely, the fact remained that, sooner or later, the capital-outlay portion of the expansion would begin to contract as the task of capital-outlay became ever more nearly completed. The amount of necessary capital-outlay depends upon the demand for the finished goods of that outlay. Inherent in the situation was a peak of production at which the rate of acceleration suddenly would turn into a rate of deceleration. This peak was at last reached in capital-outlays, though its effect was aggravated by the fact that as the rate of capital-outlay decreased, the rate of consumer-purchase also declined as unemployment increased and wages declined.

d) The American Panic of 1929; the growth of social thinking.

Since the maximum peaks inherent in the industrial activity were not apparent at the time, the reversal of rate from that of acceleration to deceleration caught many off their guard. We who had been so sure in our almost completely materialistic egocentricity were suddenly laid low by the economic forces of nature. At first it was incredible that serious misfortune could really befall us, and many refused to believe that it had. But as urban values also began to decline in the vicious cycle of falling values, rising rate of foreclosure, rising unemployment, rising relief and

tax-rate, then the sober realities of the situation dawned upon us. Though here again our fundamental paranoia began to assert itself.

We all became suddenly reminded of "humanity," of the Bill of Rights, of great humane purposes as we tried to forget the crassly egocentric days of the 1920's. Because of much that was occurring in Europe, we perhaps confused our thinking about economic problems by introducing concepts of "free speech," "freedom of inquiry," "individual liberty," and the like, which probably contributed little to the economic solutions, if we may judge by the results. In the meantime, the forces of social-economics presumably continued to operate. There began a trek back to the land, with an increase of suburbanization, while our industrialists tried to continue the manufacture, distribution and maintenance of the new line of products, and even adding to them from their research laboratories according to the traditions of American progress.

The purpose of our present review of events in the near past, however, is not to moralize nor to offer *ex post facto* advice, but rather to suggest the extent to which the attainment of our hypothetical saturation-point has served to break down a certain, perhaps exaggerated, "individualism," and to establish in its stead a growing feeling of cosmopolitanism and of social thinking. Much of this growing feeling of cosmopolitanism and social thinking was doubtless due to the outbreak of the German revolution in its struggle for *Lebensraum*. The organization of what we might call the Anti-Nazi hate-crusade with its attendant propaganda and boycotting, though still too recent to be evaluated, doubtless served to familiarize much of the American populace with social doctrines of the possibility of which most had never even dreamed. In this connection the

author does not mean necessarily to approve of the wisdom of an organized international boycott at a time when international trade was approaching stagnation, nor necessarily to endorse the beneficence to American economics of concentrating much of the national attention upon Central or Eastern Europe at a time of unsettlement at home, nevertheless he is inclined to believe that the constant public discussion of the European revolutions probably helped more than anything else to instruct the American people about the existence and nature of underlying social forces and of economic drives, and to bring them to the profound realization of certain unescapable facts. If the author reads the times correctly, we see today the importance of *work* in any social-economy, and the value of a plan of organization that is soundly conceived in terms of fundamental dynamics, and apart from all phraseology. We evidently sense, as a nation, the truth of the old scientific assumption that like things under like conditions behave alike, and that once a human population, *a*, is subjected to the conditions that had been imposed upon a human population, *b*, it is only too likely to behave largely as *b* behaved under those conditions.

In short, our social and mental attitudes have undergone an enormous change since October, 1929, when individualism, in the opinion of many, apparently reached its peak.

e) Summary and Prospectus.

But at this point we must pause and remember that the above descriptive material proves nothing in and for itself, but merely reviews certain familiar sociological and psychological counterparts of the urbanization of the United States since the Civil War. At no time during the preceding disquisition on post Civil War conditions have we

noted the importance of the distribution of the sizes and number of communities according to a harmonic series. Indeed in the course of this chapter we have apparently striven to demonstrate how the sizes and number of communities attained a saturation point in 1929, only in order to proceed to a discussion of sociological and psychological considerations for which our harmonic series became completely otiose in the interplay of individual, intranational and international forces.

And yet the apparent disappearance of all traces of the harmonic series, once we diverted our attention to the day-by-day phenomena, may have been of real value to our investigation by reminding us of the risk of over-simplification in the analysis of almost any social phenomenon. That does not mean that our brief excursus on recent history has necessarily vitiated our previous observations on the matter of homogeneity and of saturation; rather does it mean that we must investigate more deeply.

Hence in the next chapter (Chapter Three), let us discuss the possible import of our principle of community-size in terms of the movement of masses of materials through industrial processing; in short, let us discuss, if only qualitatively, the possible relationship between the growth of communities on the one hand and the growth of industrialization with its proverbial specialization of labor and of mass-production on the other. This done, we shall turn in Chapter Four to a consideration of the place of one nation among its fellow nations of the earth, and of the possible dynamics of international intercourse. With some knowledge of the import of the international background, we can return, in Chapter Five, to an analysis of internal national organization, this time in relation to the distribution of consumable goods of national production. And in Chapter Six, we shall close the present national part of our investi-

gation of social forces by studying the problem of "cultural drives," which, with all their psychological connotations for group and individual, seem to go far in determining the particular kinds and vogues of consumable goods.

And if we were to return at the end of Chapter Six and reconsider the above historical disquisition, we might find that it was on the whole more intimately connected with our harmonic series than we may now feel to be the case.

CHAPTER THREE

Towards the General Law of Social-Economic Development

I. INTRODUCTION AND GENERAL ORIENTATION

It becomes evident from even the most superficial knowledge of the history of man that we should by no means necessarily find communities always ordered in respect to size according to a harmonic series, if we could proceed backwards through history to the dawn of mankind. On the contrary, as we went backwards, we might come upon a condition of such minimal social organization that we should hesitate to speak of communities at all. And yet when we view the sizes and number of communities in the United States in 1930, we find, once and for all, that they do approximate a harmonic series very closely. Hence it is only natural to inquire into the nature of the possible forces of development that may lead from the minimal social organization of earliest times to that of a harmonic series today. Let us in the present chapter inquire into the nature of these possible forces of social-economic development.

But before we proceed a single step in our present inquiry we must make clear one very important point. The observation of the distribution of American communities, say, in 1930, according to a harmonic series was empiric; that is, we have observed it to be in fact the case. We do not know why it is the case,—that is, why we find this distribution instead of some other. Of course we are probably correct in not ascribing the appearance of this peculiar distribution to random chance, particularly because of the nature of the other and similar distributions previously

presented. Furthermore we should not be considered naive if we *assumed* that the distribution of communities according to a harmonic series resulted from the natural operation of some system of automatic checks and balances of forces,—provided that we made it perfectly clear that our assumed checks and balances represented merely an assumption, and not something that we imagined that we had already proved.

Now in the present chapter we are going to assume explicitly that we have observed a national distribution of communities according to a harmonic series, and also *that the appearance of the harmonic series in this connection is the natural result of some system of automatic checks and balances in the field of dynamics, into the nature of which we shall now inquire*. In other words, we are explicitly making an assumption of the existence of forces seeking balance in our equation of the harmonic series; and we shall proceed on the basis of this assumption to inquire into the general question of what these forces might be, and how they might in general operate so that a minimally organized human society of earliest times could develop into the condition we have observed for communities in the United States in 1930.

Our procedure will be as follows: First of all (1), we shall discuss in simplest mathematical terms certain aspects of our harmonic series in the attempt to show how the harmonic series might emerge mathematically from what we shall term a minimal degree of social organization,—that is, from no social organization at all.

Then (2), we shall take an imaginary population of minimal social organization and, in the form of a lemma, start organizing it ever more under very definite specifications of the economical handling of labor and of materials;

in this lemma we shall observe how communities will arise and grow in size. This lemma will constitute a working model.

This done, the situation will be quite curious. The reader will have on his one knee, as it were, a simple mathematical discussion of what we shall call the *equation of the generalized harmonic series*, according to which a minimally organized social economic system could develop until its communities reached a condition whereby they would be distributed according to a harmonic series. On his other knee the reader will have the working model of a population that has been organized from a minimal degree of no communities, to one of a fairly high communal organization. No matter how much the reader may feel that the mathematics and the model may belong together,—and the reader may put them together if he cares to,—nevertheless the author must insist in advance that he has not proved that they do inevitably belong together. In short, our lemma, or working model, will not be a *theoretical proof*, as science understands that term; therefore we cannot argue from it that “the well-ordered society” will follow our formula with the same inevitability, say, that a falling apple will follow the formula (or law) of falling bodies.

Our next step (3) after the lemma will be to present sets of quantitative data from several non-American countries which illustrate quite clearly the applicability of our formula (1), and, for all we know to the contrary, perhaps to some extent, our lemma, (2). In other words, we shall have a formula which we shall call the equation of the generalized harmonic series; and we shall have quantitative data from countries which can be described quite faithfully by this formula; and we shall have a lemma, or

working model, of a developing population. Hence the reader will have three different analyses to appraise.

Finally (4) we shall take our previously mentioned assumption and discuss general questions of "value," "pressure groups," "cultural goods" and the like in terms of it.

2. THE UNORGANIZED AND THE ORGANIZED; A PRELIMINARY MATHEMATICAL STATEMENT

In "number there is strength"; in "organization there is strength"; can it perchance be that *strength*, for the attainment of an objective, is but the organization of the numbered? That the strength of small numbers who are highly organized may be the equivalent of that of large numbers who are but poorly organized? Clearly we might ultimately measure comparative strengths, if we but knew what is to be understood under the term *organization*. For we know much about numbers.

If we now imagine a completely unorganized group, living in some terrain, the only thing we can say about the group is that the size of the group will be equal to the number of its members. And indeed, our first step now as we seek to organize this group will be to count its members in order to find out how many there are. Let us say that there are n number of persons in our group; and if we wish to make a very simple and completely safe mathematical statement about this group, we might remark that its sum, Sn , is equal to n , and can be found by counting each individual member, thus:

$$Sn = 1_1 + 1_2 + 1_3 + \dots + 1_n$$

where the subscript for each number gives the ordinal rank in which we count our members. Let us call this preceding equation the equation of the minimal degree of social-eco-

nomic organization: it is an organization of theoretically equal members differing only in the ordinal number of rank which we arbitrarily give them.

Now clearly a social-economic system of minimal degree of organization must evolve very far before it can appear as a saturated equation of the harmonic series, and we might well imagine that thousands upon thousands of years of social-economic development must elapse before the minimally organized group will appear as a harmonic series. Nevertheless only a comparatively short time seems necessary for the highly organized to dissolve into the much less highly organized. And indeed we can perhaps most easily learn of the evolution of the lower to the higher, by studying in simplest mathematical terms the retrogression of the highly organized into the more lowly organized.

Let us now start with our completely saturated equation of the harmonic series, and note how easily we reach that of the minimal degree of social-economic organization. Our equation of the harmonic series is as follows:

$$Sn = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}$$

This equation can be expressed differently without in any way altering the value of any single member if we remember that any number can be viewed as the first power of itself (e.g. $2 = 2^1$; or $a = a^1$). Hence we may state our equation of the saturated harmonic series as follows:

$$Sn = \frac{1}{1^1} + \frac{1}{2^1} + \frac{1}{3^1} + \dots + \frac{1}{n^1}$$

There is no difference between this equation and the preceding; we but use this form to make the next step more transparent. For our next step involves only an operation with the exponent, 1, that we have just added.

If it is true that the first power of any number is equal to that number itself, or that $a^1 = a$, it is also true that the zero

power of any number is equal to 1, or $a^0=1$. Let us now substitute the zero for our previous exponent, 1, and see what happens.

$$Sn = \frac{1}{1^0} + \frac{1}{2^0} + \frac{1}{3^0} + \dots + \frac{1}{n^0}$$

which equals

$$Sn = \frac{1}{1_1} + \frac{1}{1_2} + \frac{1}{1_3} + \dots + \frac{1}{1_n}$$

which equals

$$Sn = 1_1 + 1_2 + 1_3 + \dots + 1_n$$

or the minimal degree of social-economic organization. Hence we can pass from the highly organized to the minimally organized by one simple mathematical operation with the exponent; and hence we can pass from the minimally organized to the highly organized by reversing the order of this operation. Let us summarize.

If we state our equation in sufficiently general terms to include both the minimally and the highly organized, we should have some such general equation:

$$Sn = \frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} + \dots + \frac{1}{n^p}$$

in which, by definition, the minimal degree is represented by $p=0$, and the degree of saturation of a harmonic series by $p=1$.

Now the problem arises to find out by what actual steps in terms of the movement of matter and energy we might make the exponent $p=0$ become the exponent $p=1$. In the interest of objectification, let us imagine that we have a bin full of kernels of wheat, and that all the kernels are identical in form. We might count out the number (n) kernels of wheat in the bin, and represent them thus:

$$S_n = \frac{1}{1^0} + \frac{1}{2^0} + \frac{1}{3^0} + \dots + \frac{1}{n^0}$$

Our next step is to arrange these kernels into piles so that (1) the successive piles will represent the proportions of a harmonic series, and so that (2) every kernel will be included in some pile, and so that (3) the smallest pile will consist of one kernel.

Now let us ask how many kernels there will be in the largest pile after all kernels have been arranged according to the equation of the harmonic series which is:

$$S_n = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}$$

Obviously, if the last member of the series, $\frac{1}{n}$, is on the one hand $1/n$ th of the first member, and on the other hand only 1 kernel, then it follows that the first member, 1, will contain n times as many kernels as the last member; hence the first member of the series will contain n kernels. Indeed we might write the actual series as

$$(S_n) \cdot n = \frac{n}{1} + \frac{n}{2} + \frac{n}{3} + \dots + \frac{n}{n}$$

From this series we should know precisely the number of kernels necessary for each pile, if we but knew the value of n . But we could not determine the value of n , in light of our previous studies until we had established the index fraction,

which would be $\frac{n}{(S_n)n}$. Yet instead of concerning ourselves

now with the question of the index fraction, let us be quite practical, and in our imagination roll up our sleeves, go to the bin, and try, by brute experimentation, to arrange all our kernels into piles according to a harmonic series. We

shall see that there are two ways of accomplishing this feat of arrangement: (a) by organizing the residue into a small arbitrarily established harmonic series, and (b) by progressively increasing the size of the exponent from 0 to 1.

(a) *The first way of arranging the kernels: the organization of a residue.*

The first way of arranging the kernels is to make an initial small number of piles of kernels in proportions according to a harmonic series; thus we might put one bushel in the first pile; one-half bushel in the next, one-third bushel in the third, and so on down the line until we came to the smallest pile consisting of one kernel, with the balance of the kernels of wheat left unorganized in the bin for the time being. After taking this initial step, we might write

$$Sn + (\text{Residue}) = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} + (\text{Residue}).$$

Then we should have to organize our residue by bringing it into this series. Let us go to the bin of unorganized wheat and, by easy stages, step by step, (1) increase each of our above n piles by giving to each pile a number of additional kernels which would be a *constant fraction* of each pile's size; thus, for example, we might double the size of each pile, or treble it, or increase it by fifty percent; as long as we increased each pile by a constant fraction, our piles would preserve the proportions of a harmonic series. Our next step (2) would be to increase the number of piles (n) so that the smallest pile $\left(\frac{1}{n}\right)$ would always consist of one kernel of wheat. In this fashion our residue would gradually disappear into harmonically seriated piles of wheat, and our equation of the harmonic series would be both balanced and saturated.

This first way of arranging the kernels of wheat by organizing the residue is possibly the way the United States became organized, and it is a perfectly legitimate way of organizing a population of entities. It is, however, not the only way.¹

(b) The second way of arranging the kernels: the increase of p from 0 to 1.

We come now to the second and, for our present purposes, far more important way of arranging our kernels of wheat into piles according to a saturated equation of the harmonic series. That is, we are now going to let our general equation

$$Sn = \frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} + \dots + \frac{1}{n^p}$$

change from $p=0$ to $p=1$. What would such a change entail?

To begin, let us take a group of, say, 100,000 kernels and put them into the equation, first with $p=0$, and then with $p=1$. With $p=0$, the equation would be:

$$(1) 100,000 = \frac{1}{1^0} + \frac{1}{2^0} + \frac{1}{3^0} + \dots + \frac{1}{100,000^0}$$

¹If we state our subsaturated formula in more general terms, it becomes even more interesting, thus:

$$Sn + (\text{Residue}) = \frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} + \dots + \frac{1}{n^p} + (\text{Residue})$$

Here we have the possibility of organizing our bin of wheat by simultaneously (1) increasing the size of p from 0 to 1 as we (2) also move the residue into the seriation. This more general way is probably descriptive, for example, of the growth of the Roman Empire or of the French Empire, as will be suggested in Chapter Four. This more general subsaturated formula is essentially a combination of the first and second way of arranging our kernels of wheat; we mention it in passing but to show that we have not ignored it.

and with $p=1$, the equation would be (in approximate numbers only):

$$(2) 10 = \frac{1}{1^1} + \frac{1}{2^1} + \frac{1}{3^1} + \dots + \frac{1}{10,000^1}$$

These two equations are instructive. As the size of p changed from 0 to 1, the size of Sn shrank from 100,000 to 10, and the size of n from 100,000 to approximately 10,000.

The sense of the two equations is that in the first equation we had 100,000 piles with 1 kernel to each pile, whereas in the second equation we had 10,000 piles, with the size of the smallest pile but $\frac{1}{10,000}$ of the largest. If we looked only at the second equation we could not tell how many kernels were in either the largest or smallest piles; nor could we in fact in the first equation, for these equations represent only the sum of the fractions ordered according to a given scheme.

For the purposes of our present discussion and of the ensuing lemma, let us now impose some arbitrary restrictions.

The first restriction is that the smallest pile, $\frac{1}{n^p}$, will always contain one kernel. The second restriction is that the total number of kernels to be arranged remains the same. In order to express this second restriction mathematically, we might state our formula thus:

$$A Sn = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{n^p}$$

In short, $A Sn$ remains constant, and $\frac{A}{n^p}$ consists always of one kernel.¹

¹Thus our previously presented formulae would become

$$1). 100,000 = 100,000^0 \times 100,000 = \frac{100,000^0}{1^0} + \frac{100,000^0}{2^0} + \frac{100,000^0}{3^0} + \dots + \frac{100,000^0}{100,000^0}$$

Let us now see what happens to our kernels of wheat as described by the above formula (hereinafter the formula of the generalized harmonic series) as p increases from 0 to 1.

With $p=0$, we must imagine that our kernels lie scattered all over the barn floor, with each kernel constituting a pile by itself. But as p increases towards 1, we collect the kernels into ever fewer different piles (i.e. the size of n decreases) whereas all piles grow in relation to their size. Expressed differently, as p increases from 0 to 1, the larger piles absorb the smaller piles; furthermore the larger any pile is, the ever larger it will grow at the expense of the smaller piles. And this process of growth in size and decrease in number will continue until the piles are arranged according to the proportions of a harmonic series, with $p=1$. (With p larger than 1, the series becomes convergent, a condition to be treated in a subsequent publication).

But instead of talking about kernels of wheat, let us speak about human beings who will congregate into communities instead of into piles. With $p=0$, every person will be a distinct community by himself. As p increases, individuals will congregate ever more together into com-

$$2). 100,000 = 10,000^1 \times 10 = \frac{10,000^1}{1^1} + \frac{10,000^1}{2^1} + \frac{10,000^1}{3^1} + \dots + \frac{10,000^1}{10,000^1}$$

In short, $A = n$, and $\frac{A}{n} = 1$.

In this connection the mathematical reader will note that p will increase discontinuously.

When applied to the populations of human beings, a constant A S_n assumes that births will counterbalance deaths, and that immigration counterbalances emigration,—an over-simplification which we assume for the moment for a greater ease in demonstration. Furthermore we are assuming that all kernels are alike and hence also all persons; in this connection, please see the following lemma in which differences in ages and in mental and physical capacities may be intimately responsible for our harmonic series.

munities, so that there will be ever fewer different communities, and so that no two communities will be of precisely the same size. And as p increases ever more, the larger communities will grow at the expense of the smallest communities; in short, the smallest communities will be absorbed into the largest communities. But let us remember one very important consideration. The largest communities will not grow by a constant proportion; on the contrary, the larger a community is in comparison with other communities, the ever larger it will grow. For all communities will increase at a rate that corresponds to the power of their respective sizes.

In view of the above facts we must seek dynamic reasons for the following phenomena in the lemma to which we now turn. First we must seek reasons for the emergence of communities of different sizes, and then reasons for the growth of large communities at the expense of the smaller ones, and finally we must seek reasons why the larger communities will grow ever larger.

To prepare for our lemma, let us take our kernels of wheat and scatter them at random over the countryside. Then let us imagine that they are human beings wandering about without any reference to one another—each person being his own community. This done, we shall count our persons, and, on the back of each, paint an identifying serial number. Once we have numbered our persons, we may write:

$$A Sn = \frac{A}{1^0} + \frac{A}{2^0} + \frac{A}{3^0} + \dots + \frac{A}{n^0}$$

and our individuals will have become a minimally organized social-economic system.

We are now ready for our lemma in which we shall organize this system with maximum economy. And as we organize this minimally organized system, we shall find

that communities of different sizes will emerge, and will grow at the expense of smaller communities, and will grow in such a fashion that the larger a community is, the ever larger it will become.

3. THE LEMMA IN WHICH A GROUP OF HUMAN BEINGS BECOMES EVER MORE ORGANIZED.

The only two possible economies at the disposal of our minimally organized group to become ever more economically organized we shall assume to be: (1) the greater specialization of materials, and (2) the greater specialization of labor. True, we can not prove exhaustively that there are no other possibilities nor do we yet know what these two economies mean. But we can show that the pursuit of the economical advantages inherent in these two will suffice to organize our group more economically, and to exert an important influence upon their communal grouping in a way that will be apparent as we proceed.

a) The rise of a number of different communities under the specialization of materials.

Since we have already numbered the individual members of our minimally organized system, let us give them a common problem on the solution of which they must work with a maximum conservation of energy. Any common problem will suffice for our purposes of greater organization; let us select for them the very simple and urgent problem of repelling a threatened invasion to the terrain at some point, A, on the border. Since our individuals have as yet absolutely no weapons of any sort, they can only fight with their fists. And our first social-economic problem will be to get them all over to A with a minimal expenditure of energy (i.e. a maximum conservation of

energy) so that they can fight with their fists. But now the question arises as to the proper routes for them to take to A. Before answering this question let us see what we mean by a minimal expenditure of energy, for their routes will depend entirely upon that.

(i) *The concept of the shortest energy-distance.*

If the members of our imaginary population are to proceed to A with a minimum expenditure of energy (or, as the physicist would say, with a minimum of work) then each person in our population must proceed to A by a route which would consume the minimal amount of his energy, no matter whether that route is the shortest distance or not. Thus, for example, if a mountain stood between one of our individuals and his objective, A, he would take either the route over the mountain or one around the mountain, depending exclusively upon which route would consume less energy. In other words, he would proceed to A by the shortest *energy-distance*,—a distance which by definition will be the one that consumes the least energy (i.e. requires the least work). And throughout our entire lemma, every person will attempt to proceed or act only over shortest energy-distances to objectives. In other words, we shall postulate, that in the attainment of an objective of whatever sort, all persons will strive to solve all problems involving space (and, for that matter, time) by minimizing the expenditure of energy. In this connection we must not forget that by tunnelling through mountains, by bridging streams, by draining swamps and by otherwise removing impediments in the way, one may establish routes that will conserve both time and distance; nevertheless we are assuming explicitly that tunnels, bridges, swamp-draining and the like are to be undertaken only if they save energy. The problem,

then, of how to save energy in the attainment of objectives will be the primary problem before us in organizing our imaginary population. And we commence at once by asking the members of our population to proceed to A by the shortest energy-distance.

But do we want to ask our persons to calculate all these shortest energy-distances only in order to arrive empty-handed at A to fight with their fists? Would it not be well to have them carry some weapon or missile with them to the front? But if so, which weapon or missile would be most economical in view of the entire situation?

(ii) *A tool as an economy of energy; the concept of social-economic advantage, positive and negative. Value.*

The moment we consider having our minimally organized soldiers carry some weapon to the front, we are faced with the problem of deciding which weapon will be most economical. And before deciding which weapon will be most economical, we must determine what we mean by the economy of any weapon.

Any weapon is but a tool, and any tool but a means for the attainment of an end. If the end is the killing, wounding and routing of an enemy, then we call the tool a weapon; nevertheless, regardless of its name, the weapon has all the properties of a tool. At the risk of seeming repetitious, let us again ask wherein the economy of a tool lies.

The economy of a tool may be said to lie in the differential between the energy expended in manufacture, distribution, use, and maintenance of the tool on the one hand, and the energy saved by using this tool on the other hand,—all in terms of the attainment of a definite objective in a given situation. If the energy expended in the

manufacture, distribution, maintenance and use of the tool is more than that saved by using the tool, then the tool has no social-economic advantage; or, if one will, it has a *negative social-economic advantage*, and one does well to throw it away. On the other hand if the total energy expended upon making, keeping, and using the tool is less than that saved by using the tool, the tool has a *positive social-economic advantage*.

Yet in terms of what may it be said that a tool has a positive or a negative social-economic advantage? Clearly the positive or negative social-economic advantage of any tool can be envisioned only when that tool is compared with other possible tools in respect to their comparative capacities for attaining a given objective. Hence, as we use the term, there is no social-economic advantage inherent in any mass or shape of material until (1) it becomes potentially serviceable for the attainment of a given objective, and (2) only if its serviceability can be compared with that of at least one other tool. These two prerequisites are essential for any evaluation.

The reader may wish to reflect upon the second prerequisite: (2) only if its serviceability can be compared with that of at least one other tool. The quandary might arise: Suppose there is no other tool present for comparative purposes? But to this we answer that there will always be another tool present for comparison. For, as we have defined a tool, any instrument serviceable in the attainment of an objective is a tool. For example, if our soldiers arrive at A without any non-physiological tool, they can use their hands as tools, or their feet, or their heads as battering rams, or their teeth; in short, the members of a person's body may be viewed as tools for the attainment of objectives. The value of any of these tools, whether they be physiological or material artifacts, is com-

parative. We shall not ask in this connection the far-reaching question whether one could find a condition in which no original tool is present to serve as a comparative standard for a better tool; instead we shall simply ask our soldiers to seek an ever more economical tool, or tools, than they already possess.

Hence we shall not deliberate at present about which of all possible weapons would be the most economical weapon for our soldiers. Instead we shall ask them to find one that is more economical than their hands, feet, heads, teeth and so on.

Let us have each of our soldiers bring a good stout club to the front at A, on the assumption that the club would be a more economical tool than the bare fists and other parts of the body in killing, wounding, and routing the enemy at A; or, in other words, that the manufacture, distribution, maintenance and use of the club would be less costly in energy than the amount of energy saved over the use of bare fists—all in terms of units of dead, wounded and routed enemies.

*(iii) The location and exploitation of raw materials.
Routes of transportation. Striation. Communities.*

Once we have selected a club as a weapon, we are faced by the problem of procuring the club in the most economic location. The only use our soldiers will have for the club will be at A. Hence it may be a waste of time and energy to have our soldiers carry their clubs any farther than necessary in coming to A. It would be ideal if there were a grove of trees suitable for clubs right at A; then each soldier could rush by shortest energy-distance to A, procure a club at A, and begin fighting. But if the nearest source of supply of clubs was a distant grove at B, then

we should ask our soldiers to proceed by shortest energy-distances to B, select a club there, and carry the club by shortest energy-distance, $|BA|$, to A in order to club the enemy.

But now let us notice what has happened. As our soldiers rush first to B and then to A, communities will arise, at least temporarily, at both B and A. The soldiers nearest to B will arrive at B as a first contingent, and will tarry there long enough to wrench out branches and fashion clubs, before running to A. While they tarry at B, other soldiers will arrive and repeat the action, remaining later than the first contingent because they arrived later. Hence, at least for a time, B will be more populous than the rest of the entire terrain except A. After all soldiers have procured clubs and set out for A, B will be deserted, and we shall have only one community in the terrain, namely at A, where the populace will be engaged in the manufacture of dead, wounded, and routed enemies.

Nevertheless the shortest energy-distance between A and B should not escape our attention; for this specific distance takes on even greater importance once the problem arises of replacing broken clubs. Since B is the nearest grove to A, soldiers who break or lose their clubs will have to run back over $|AB|$ to B for a new club. Hence $|AB|$ emerges as a *route of transportation* of soldiers (by legs) and of clubs (by soldiers) as long as battle continues at A, and as long as the grove can provide clubs. A *route of transportation* then is to be understood as the shortest energy-distance between two related centers of activity.

Of course, before continuing further, we must remember that our soldiers will return to B for replacements only if in their judgment it is more economical to do so than to continue fighting with their fists; in this connection we must assume that our soldiers are intelligent enough to

see how to conserve energy; hence intelligence (i.e. the ability to discern ways of saving energy in attaining objectives) will be classed as an economic good which our soldiers possess. Yet what would the problem of an economy of replacements entail? Let us suppose, for example, that a given number of clubs must be replaced by the soldiers each day. Then the farther away that B is from A, the longer it will take soldiers to replenish their clubs, and the greater the number of soldiers who will be absent from battle for the sake of replenishing munitions, and the less effective will be the army left to fight at A. Hence the farther B is from A, the lower will become the social-economic advantage of a club, until a maximum distance is reached where the advantage of a club becomes negative over bare fists. If B lies beyond this maximum distance, then the soldiers, having once exhausted their supply of clubs, must continue the fight with bare fists, because their bare fists will have a greater social-economic advantage than new clubs to be manufactured at, and transported from, the now distant grove at B. Of course our soldiers might wish to retreat en masse toward B until they reach a point where the clubs will have again taken on a social-economic advantage. But our soldiers' general must weigh and decide such matters of retreat.

If, however, B is strategically located in respect to A, in the sense that clubs still have a social-economic advantage over fists, then replacements are in order. A community will arise at B consisting of soldiers replacing their clubs; the population at B will consist of transients; nevertheless it will be a genuine community since we have never classified communities in respect to the transience of their dwellers. As long as the battle rages, under these conditions, there will be a community at both A and B, and a transportation route $|AB|$.

In this connection we might introduce a new term which will be of great future serviceability: *striation*. As soon as the transportation route |AB| arose connecting A and B, our total terrain became *striated* (Latin *stria* = channel) in the sense that its population became concentrated in respect to the approximation of a straight line with two terminals, A and B.

The moment we alter the terms of our economic-system, either by defeating the enemy at A, or by finding a more advantageous tool, our striation changes. Let us now introduce a more advantageous tool and observe what happens to our communities and transportation route, (i.e. *striation*).

(iv) *A tool as a specialization of materials.*

As soon as our soldiers selected a club for a weapon they specialized in materials, for clubs do not occur in nature apart from human social-economic systems, except as accidents of growth or of geologic process. There was not only a specialization of materials in selecting a club rather than a stone, but also a specialization in the sense that branches or shoots had to be selected for length and caliper and reduced to a most economical size by breaking (i.e. fabrication or manufacture). In short, the material environment was suddenly specialized, in the sense that the environment was classified on the one hand into actual or potential clubs, and on the other hand into all other things. Potential clubs were fabricated into actual clubs, and all clubs were transported to the front. Had our weapon been a stone to throw, no new factors would have been introduced; instead of speaking in terms of groves and trees, we should have spoken in terms of gravel-banks,

quarries and the like. And our soldiers would have been selecting and fabricating stones of most economical size as they previously had done in respect to clubs.

Now it would seem that as a group specializes in ever more different materials, ever more different communities are likely to arise. For example, let us have our soldiers use bows and arrows instead of clubs or stones. Of course our soldiers will find the bows and arrows more valuable than the clubs or stones, only if the soldiers can produce, transport, use and maintain the bows and arrows with the expenditure of less energy than the clubs or stones in terms of units of dead, wounded, and routed enemies. For otherwise, if such a large portion of the army had to be absent while engaged in the manufacture and transportation of bows and arrows that only a few would be left to use them, then clearly more killing, wounding, and routing might be effected by the more humble club or stone. Let us assume, however, that bows and arrows do have this positive social-economic value.

Since our bows and arrows consist of wood, stone, feathers, and strings, we shall have to seek sources of these raw materials. If all four are to be found in one spot, this spot may be considered the same as our B above, with our previous demonstration of the club serving, *mutatis mutandis*, here. Otherwise we shall have two, three, or four sources of raw materials. Let us assume that we shall have four,—one for flint, one for wood, one for feathers, and one for leather thongs. Each of these four sources will be a center of fabrication, and hence a community, however transient its inhabitants.

It would seem to follow, then, that the more we specialize in materials for our tools, the more likely it may be that diverse communities will arise.

v) *The segregation of waste-materials and the origin of communities of various sizes.*

But our soldiers will not use stones, wood, feathers, and the like as they occur in natural state. Stone must be chipped into arrow-heads, wood must be worked into shafts and bows, feathers must be plucked from fowls, and bow-strings made from the hides, say, of deer. In short, only a portion of the total raw-material will be used, after it has been segregated from the waste-material. The problem arises as to the best location for this segregation of waste materials.

Inasmuch as it is uneconomical to carry an unnecessary mass of material at all, the more immediately our soldiers make their arrow-heads, bows, shafts, feathers, and bow-strings at the sources of these raw materials, the greater their saving of energy, if we assume that they have no further need of the flint chips, wood-refuse, and fowl and deer carcasses. Hence they will tarry at their sources of raw-materials not only in order to procure them, but also to fabricate (or semi-finish) them. But they will tarry not a moment longer than this, for they will be needed urgently at A to face the enemy.

Yet while our soldiers are tarrying in communities at each of these sources of raw material in order to rid their products of waste-materials, the population of these various transient communities will differ in size according to the time it takes to produce the totality of articles needed by ridding them of the waste material. That community will be largest where the process of semi-finishing consumes the most labor, for here our soldiers will tarry longest to complete this labor. Thus, each soldier might spend seven days in making an arrow-head, six days in making a shaft and a bow, two in making the bow string,

and one in getting the feathers. If we imagine our soldiers constantly coming from the battle to the first source of raw materials, and proceeding from there to the second, the third, and the fourth, then we can understand that on the whole the sizes of our communities would be in the ratio of 7 to 6 and 2 to 1 respectively, provided, of course, that one bow sufficed to shoot only one arrow; since it is more likely that one bow would shoot many arrows, the replacement of bows would be less than arrows with the result that these numerical ratios would have to be altered. In any event, not unless the continuous manufacture of each part of every replaced article consumed precisely the same amount of labor, would all our communities of semi-finishing be of precisely the same size.

And the more different materials our soldiers use, in increasing their specialization of materials, *the more our communities would tend to grow in number and differ in size.* (The reader will remember a similar statement made in connection with the wheat kernels in our discussion of the generalized harmonic series).

But where will our soldiers assemble their bows and arrows?

(b) The growth of communities in relation to their size under the specialization of labor.

We have seen above that a number of different communities will arise from a specialization of materials. We shall now see that these different communities may tend to grow in relation to their sizes (the larger increasing ever more) under the exigencies of a specialization of labor. Obviously a specialization of materials and of labor can proceed simultaneously; we are discussing first the one and then the other only because of the exigencies of exposition. But let us continue.

We closed our last section above with the question: Where will our soldiers assemble their bows and arrows? We remember that up to this point there has been no specialization of labor; hence each soldier must fabricate for himself arrow-heads, a bow or bows, arrow-shafts, thongs, and some feathers,—at four differently located places. That is, we must imagine each soldier engaged in the following operations: First he carries at location 1 to make arrow-heads; then he goes with these arrow-heads to location 2 where he plucks a fowl; with feathers and arrow-heads he proceeds to location 3 where he procures some raw-hide; with raw-hide, feathers, and arrow-heads he proceeds to location 4 where he fabricates a bow or bows and arrow shafts. Where now does he assemble these semi-finished goods into the finished bows and arrows before proceeding to the front at A? Clearly he can assemble the finished bows and arrows at location 4, or at A, or at any point on the shortest energy-distance between 4 and A.

Yet the moment we raise the question of replenishing broken bows and arrows, we raise the problem of having our soldiers return from A to locations 1, 2, 3 and 4 in order to make additional bows and arrows. Let us indeed immediately raise the question of replenishments, and see how our soldiers will return to their previous locations. This simple question of most economical replenishments will lead to a specialization of labor.

- (i) *The origin of junction-points according to the formula, that the sum of all products of mass-moved by energy-distance moved remains a minimum (i.e. the minimal total of mass \times energy-distance).*

Once our group is engaged in the double task of fighting the enemy at A and in fabricating bows and arrows at

locations 1, 2, 3, and 4 for use at A, the problem arises of finding the most economical transportation routes. This problem will be decided in one of two ways, depending upon the relationship of locations 1, 2, 3, and 4 in respect to A; that is, (a) whether these four locations are in a straight line of energy-distance with A, or (b) whether these four locations are not in a straight line of energy-distance with A. Let us take up each of these two cases in turn.

If (a) all four locations are situated on the path of shortest energy-distance so that in walking from the farthest location, 1, to A by shortest energy-distance one automatically walks through locations 2, 3, and 4, then the most economical transportation route for replenishments will be this single route of shortest energy-distance. A soldier in need of a new bow and arrows would proceed along this route to location 1, and return the same way after making his semi-finished products, and after assembling his bow and arrows between location 4 and A inclusive. This single-path striation might be highly unlikely, but it is by no means impossible. Nevertheless we need only add ever more sources of different kinds of raw materials until the probability of finding all locations in one line becomes negligible. Or, we need only move the front at A in such a way as to destroy the straight line. Either of these devices would result in (b) having our locations not in a straight line with A.

However, (b) as soon as our four locations cease to be in a straight line with the fifth point, A, then the question arises of establishing a further location, namely a *junction-point*, where the bows and arrows can be semi-finished. Let us see why this junction point, J, will be economical.

It is not maximum economy for our soldiers to carry any mass of material, including semi-finished goods, such as

arrow-heads and the like, over any route except that of the shortest energy-distance. Hence, except under the conditions of the straight line of (a) above, the determination of the most economical route or routes may be somewhat complex. Nevertheless some routes will be more economical than others, and we must now seek the most economical route possible under our conditions of (b). Let us first inquire into the underlying principle of economy of locating our most economical route and then ask how our soldiers can carry out this principle.

It is quite evident that we could open up shortest lines of transportation from A to each of the four locations, 1, 2, 3, and 4; we should have four transportation routes converging upon A, and each of these routes would represent the shortest energy-distance between A and the respective raw material. In this case, our bows and arrows would be assembled at A. But would these four routes be the most economical? Obviously not. For each soldier would be obliged to go back and forth over each of these four routes before he would have his semi-finished goods to assemble at A. Much time and energy would be saved if we could find another point, J, which would be nearer to the four locations, 1, 2, 3, and 4 and which could serve as an assembling point before proceeding to A. Thus there would be five routes of transportation, one each between J and the five points 1, 2, 3, 4, and A. But where would this junction-point, J, be located?

The junction-point, J, would be located in respect to the masses of materials to be moved from each of the four locations, 1, 2, 3, and 4 towards their ultimate objective at A. Of course if the masses of feathers, thongs, arrow-heads, and bows and shafts respectively were equivalent, then we might have less trouble in locating the junction

point, J, in respect to locations 1, 2, 3, 4, and A. For we might select as a junction-point the spot which would be the minimal sum of the distances to these five points. But unhappily our masses of feathers, thongs, arrow-heads, and bows and shafts are not the same; indeed the weight of an arrow's stone head is far more than that of an arrow's tail feathers. Hence if we locate the junction, J, as above indicated, we shall have located J uneconomically, because it takes less energy to carry a lighter material a given distance than a heavier material. For example, if one mass of material weighs twice as much as another, then the amount of energy necessary to move the larger mass one unit of length will be sufficient to move the smaller mass two units of length, if all other matters of friction and the like are equal. Indeed we may say in general that the amount of energy necessary to move a mass of material over a given distance is directly proportionate to the mass, if all else is equal. And this proportionality is of vital value to us in locating the junction-point, J.

The junction-point, J, in order to be located economically in respect to the movement of the masses of materials involved, must be located at a point whose distance from each of the five points (i.e. locations 1, 2, 3, 4 and A) will be the smallest total of the respective products of *mass-moved* \times *energy-distance*. In other words, J will be so located that the combined energy-distance of the five routes from it [i.e. (J to 1) + (J to 2) + (J to 3) + (J to 4) + (J to A)], when multiplied by the amount of energy consumed to move the respective masses of materials over them, will be a minimum. In short, a *junction-point* is so located that the sum of all products of *mass-moved* by *distance-moved* in reference to it is a minimum

(hereinafter we shall call this the *minimal total of mass \times energy-distance*). Hence we shall locate J in such a fashion that the total energy necessary respectively to move the feathers, the thongs, the arrowheads, and the bows and shafts to J, plus the amount of energy necessary to move these articles (whether semi-finished or completely assembled) from J to A will be the minimal possible amount.

And as we have argued about the location of J, so too we shall argue about the location of all other junction-points. In fact we shall say that in our lemma all striation (i.e. transportation-routes) will seek to represent at all times the *minimal total of mass \times energy-distance*, and hence at all times will seek to conserve energy as much as possible; and that a junction-point or junction-points will arise according to the exigencies of the *minimal-total of mass \times energy-distance*. Indeed in Figure Seven is given an arbitrary plan of our junction-point for ready reference. What we have said and shall say about this junction-point will apply automatically to all junction-points.

But now that we have located our junction-point so economically in relation to the materials to be moved, let us see how our soldiers will move these materials most economically.

(ii) *The Specialization of Labor as an economy in moving materials in a social-economic system.*

Our junction-point represented arbitrarily by Figure Seven below, is of greatest value only if our soldiers make use of it in the most economical fashion. Let us see what

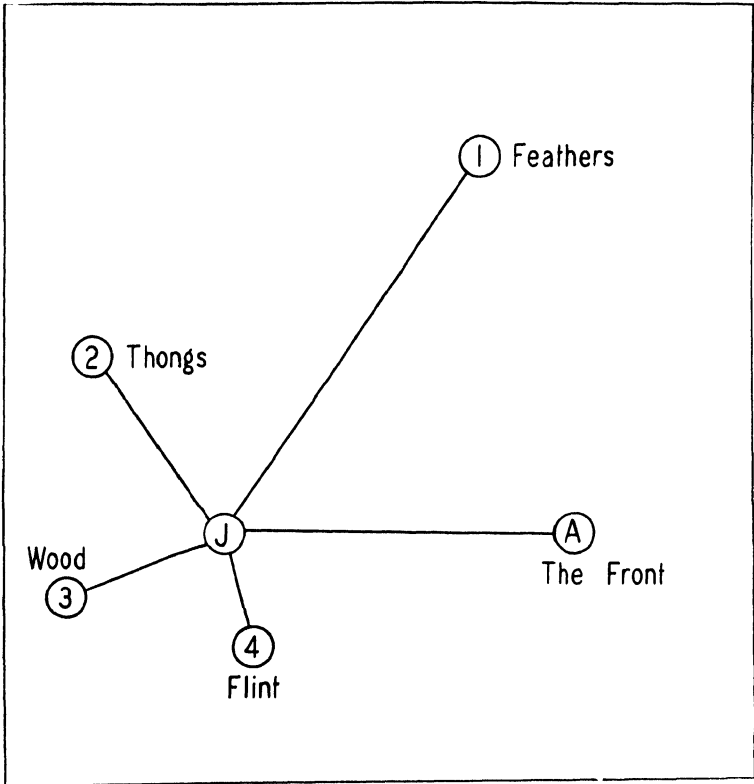


FIGURE VII. The location of a Junction-Point (J).

this most economical fashion would be. We remember that our objective is to keep as many fully equipped soldiers at A as possible. Our task is to keep these soldiers supplied by bows and arrows to be fabricated and transported by as few soldiers on leave as possible. We shall commence by seeking economies in transportation.

Since our soldiers will have to carry burdens over our routes in Figure Seven, we shall ask how much of a burden they should carry. It would be uneconomical to have a

soldier carry only one arrow-head, for example, when he could almost as easily carry two. On the other hand, it would be foolish to burden a single soldier with so many arrowheads that he would collapse en route. Let us assume off-hand that there is a load of "optimal efficiency"¹ which each soldier can carry without over-taxing or under-taxing his recuperative and regenerative processes. We shall call this load, E , and we shall ask our soldiers to carry at all times a load as near one of "optimal efficiency" (i.e. $\frac{E}{1}$) as possible.

Yet the moment we ask our soldiers to carry a load as near "optimal efficiency" as possible, while traversing the routes of Figure Seven, we automatically ask our soldiers to resort to a specialization of labor, as some soldiers are delegated to the tasks of delivering finished bows and arrows to the remaining soldiers fighting at A . Let us see how this is true.

If we want soldiers to proceed from A by way of J to each of the four points, 1, 2, 3 and 4, in succession, over our previously described routes, in order to bring back a quota of bows and arrows, then we shall have to send enough soldiers so that, in bringing the finished bows and arrows from J to A , they will be carrying the "optimal" load for their strength (i.e. $\frac{E}{1}$). Yet during the entire time they are gone from A in quest of these bows and arrows, they will not be carrying the "optimal" load. First of all, they will be carrying no load from A to J as they set out. Second, if they use J as a center of collection and

¹Quotation marks indicate that we have borrowed the term from popular usage without specific definition. Actually any such load of "optimal efficiency" (or, later, "efficiency") would depend much upon the distance to be traversed, the time available, and on doubtless many other factors

of assembly of the parts, they will carry no load down each of the four routes; thus at least half of the distance of the total round-trip will be spent carrying no load at all, and even if they carried loads of "optimal efficiency" the balance of the distance, the efficiency for the entire expedition would not be $\frac{E}{1}$. Yet they will not carry all loads of "optimal efficiency" the balance of the distance, because each of the arrow-heads, the thongs, the feathers, and the bows and shafts will weigh less alone and apart than they will when assembled into bows and arrows. That is, if our detail of soldiers will find the finished bows and arrows a burden of "optimal efficiency" as they carry them from J to A , then they certainly will not find that, say, the thongs will be an "optimal" load for them over the route, say, from location 1 to J . Thus, without specialization of labor, our "efficiency" will be low. Let us now arrange our soldiers so that their efficiency will be increased.

There are five routes of transport: four routes converging at J , and one leading from J to A . Let us detail one set of soldiers to each of these five routes, so that each detail, in carrying its burden over its route, will be transporting at "optimal efficiency." The size of each detail will depend upon the masses of material to be transported. These men would all be carrying burdens at "optimal efficiency" $\left(\frac{E}{1}\right)$ while going in the direction of A , and would be carrying no burden while returning for more; hence their "efficiency," in respect to sheer distance, would be $\frac{E}{2}$. Yet in assigning definite persons for specific tasks, we have specialized labor. And we have seen that there is an economy in the specialization of labor in the problem of

moving masses of materials over distances in the specialization of materials.

Of course we could make our porters still more efficient by having them carry something on the return journey, such as the soldiers wounded in battle to be cared for at our remotest points. In other words it is economical to have traffic move two ways, in trying to make $a=1$ in the function $\frac{E}{a}$. Yet we ignore this and related matters, such as specialized artisans at our various sources of raw material and at J . For we are here interested in showing that there is an economy in the specialization of labor even though all persons are equivalent in size, strength, form and possession of skills.

(iii) The growth of junction-points in number and in size under the specialization of materials. The diversity of social-economic activity.

In the preceding section we have shown that (1) the emergence of a junction-point, (2) the specialization of labor, and (3) the increasing degree of efficiency ($\frac{E}{a}$ with a decreasing to 1 as the degree of efficiency increases)—that all these three factors are intimately associated, once a social-economic system specializes in materials. In the present section we shall but show that, as we increase our specialization of materials, the number of different junction-points will increase, although they need not all be of equal size.

Should we choose to provide our soldiers with all the technique of modern warfare, we might well use the entire terrain. And this would entail the emergence not of one but of many junction-points, unless all the materials happened to be located in a freakishly few spots. Let us now

give our soldiers not one but many weapons, with these weapons differing widely in the kinds of materials entering into them and in the types of labor expended upon them. We might have a junction-point for the union of iron ore and coal, and another for the union of rubber and sulphur, a third for copper smelting, a fourth for refining fibres to be woven into textiles, a fifth for the union of textiles and rubber for rubberized goods, a sixth for the union of refined copper, steel, and wood for automobiles, and so on. It scarcely needs further demonstration to show that the terrain would be a cob-web of striation with junction-points dotted all over it in accordance with the natural distribution of raw materials and the equation of the *minimal total of mass \times energy-distance*. We should have a large number of junction-points; and in addition to the junction-points, we should have a large number of points of production of raw materials. All of these points would have populations of inhabitants, permanent or transient, or partially permanent and partially transient, and these populations at these points would be communities. Hence as we specialize ever more in materials, we are likely to increase the number of communities. Let us now ask two questions about these communities: (a) what can we say about their sizes, and (b) what can we say about their activity.

As to the question (a) concerning the sizes of our communities we can predict nothing significant as yet, except that there is no reason for assuming that they will all be of the same size. After all, the size of any community, as far as our analysis up to this point can ascertain, is largely determined by the number of hands necessary to fabricate, distribute, use and maintain materials. If we lump all this human activity together under the heading, "*work*," then we may say that the sizes of communities will vary

in accordance with the amount of "work" to be done. Yet we are none the wiser for this new term, "work," because we do not know how much "work" is to be done. Furthermore, at any moment in any community, a more economical tool may be discovered to reduce the amount of "work" and thereby reduce its "working" population. Hence, since we can answer nothing about (a), the sizes of our communities, let us ask about (b) their activity.

As to the question (b) concerning the activities of our communities, we are on somewhat surer ground. The activities of some communities will be more diverse than those of others. If we resolve a community's activities into their fundamental *processes*, saying that each community is engaged in "processing" materials by means of one or more different *processes*, then we may indeed say that communities may differ widely in the number of different *processes* that they use. For example, the mining of coal, or of iron ore, or of copper ore will each involve a set of different processes at the respective mining communities. The junction-points where the ores are smelted by the combination of materials will also have their sets of processes, and similarly the junction-points (not necessarily different junction-points) where the base metals of iron and copper are worked into semi-finished state for further specialization of materials at junction-points of manufacture. At the junction-points for finished manufacture, such as that of automobiles, telephones and the like, the diversity of processes may become very great, indeed far far greater than at some of the previous junction-points. In other words, to repeat, communities will differ widely in the diversity, or variety, of their processes of treating materials. Let us call these differences in the diversity, or variety, of a community's processes, differences *in the diversity of social-economic activity*. The word *activity*

is preferable to the word *process*, because it emphasizes the human activity involved. The process may be that of boring a hole, or of tightening a bolt, or of pushing a button, or of carrying a hod, or of laying brick, or of taking inventories, or of balancing books—yet it is the activity of human beings in performing these processes which is of importance to us.

Now if communities differ in the diversity of social-economic activity, they will also differ, by the same token, in the kinds of jobs their inhabitants will perform. The jobs will differ in their needs for strength, skills, intelligent decisions and the like. Hence communities will differ in the diversity of their jobs, or, if one will, in the diversity of human capacities necessary to perform the communities' jobs. And as a community's jobs become ever more diverse, so too, we might say by way of definition, its numerical coefficient of diversity of social-economic activity becomes correspondingly greater. We cannot hope to estimate this coefficient for the communities of a social-economic system, nor do we need to; we need only know that it is there, and to note the effects of this coefficient. The chief effect of this coefficient will be to cause communities to tend to grow in relation to the size of this coefficient, or, as we shall now say, in relation to the degree of the social-economic diversity of their activities.

- (iv) *Communities grow in relation to the degree of the social-economic diversity of their activity. The concept of man as a raw-material and as a waste-material in a social-economic system.*

Let us now see what happens to our communities with their different diversity of activity as we begin finding persons to perform the diverse jobs of their diverse processes. We shall commence by making an obvious remark about a

human being: man may be viewed as a raw material, as a source of energy, and as a tool; hence there is the social-economic problem of the economical production, distribution, use and maintenance of the animate object, called *man*. Let us now inspect man in his capacity as a raw-material which is of chief concern to us now.

Obviously if a man is serviceable as a tool (e.g. a typesetter) or as a source of energy (e.g. a porter), then a baby, being that which becomes a man, may be viewed as a raw material, just like a pile of coal or of iron ore. Let us commence with the infant human being, thereby dodging the eternal question of priority between the "hen and the egg." Where shall we find these babies?

Since babies are born of parents, we shall find them where parents are found, namely, in communities. Furthermore, if we assume for the sake of argument, that babies are born at a more or less standard rate per unit of total population, we may conclude that each community will produce births by a constant fraction of its size; thus if community A is twice as large as community B, then A will have twice as many births per year as B, unless we find some favoring or disturbing factor to birth in the size of a community. Furthermore, unless we can discover some good reason for moving babies from one community to another, thereby consuming energy in transport, we shall have to let our babies grow up in the communities where they are born. Hence it follows thus far that each community will consist of the same proportions of each age-group.

But since human beings may be used as tools and sources of energy, human beings may also pass into the classes of waste materials and of obsolescence in the general production and operation of human beings. For example, a child

crippled by disease might be viewed as a waste material. Similarly a man crippled at work, or beset by the infirmities of old age, might be viewed as a waste-material, or as obsolete machinery.

In other words, and by way of summary, we may classify the persons of a human social-economic system during any interval of measurement as *productive* and *unproductive*, be the causes of the unproductivity that of infancy, disease, constitutional incapacity, senility, or whatever else they may. And we have no reason so far to suppose that there will be a greater proportion of unproductive persons in one community than in another.

Since unproductive persons must be clothed, fed and otherwise maintained, it will be economical to make as many persons productive as possible, no matter what the causes of their unproductivity may be. And our first task in finding jobs for the unproductive is to determine why they are unproductive.

In answering this question let us first retrace our steps and assume that there is no specialization of labor in our entire social-economic system. Who, now, would be unproductive in a social-economic system which had no specialization of labor? Clearly, all those persons would be unproductive who could not perform every task, or process, of the entire social-economic system. Thus a person, in order to be productive, would have to be strong enough to perform the heaviest tasks, speedy enough for the fastest tasks, patient enough for the most patient, mentally alert enough for the most intelligent, and, by the same token, possess quick eyes, refined ears, skilled muscular coordination and all the attributes in kind and degree for each and every task in the entire social-economic system. With these high prerequisites for productivity, there would be an enormous percentage of unproductive persons even in a

social-economic system with a very low degree of specialization of materials. But what is more significant is the fact that as the system became ever more specialized in materials, the diversity of its activities would increase ever more, thereby adding ever more to the capacities prerequisite in every person who wished to be productive, and thereby excluding ever more persons and increasing ever more the percentage of unproductive persons. And, for all we can see to the contrary, *each community would have the same percentage of unproductive persons under the condition of no specialization of labor, and this percentage would increase as the specialization of materials advanced* (if we assumed that there would be any communities at all under no specialization of labor). Quite obviously any advance in the specialization of materials without any specialization of labor would be resisted by the cost of the concomitant increase of unproductive persons.

Let us find jobs for unproductive persons by seeking special tasks for special strengths and weaknesses; in other words, let us specialize labor. Yet where shall we look for those tasks? Since we shall need a great diversity of tasks, we must seek those tasks in communities with the highest diversity of social-economic activities; and we shall find specialized tasks in communities in relation to their degrees of social-economic activities.

But now let us note what happens as we begin to move our hitherto unproductive persons into productivity by bringing them into communities in relation to their degree of diversity. If on the one hand (a), *without specialized labor*, all assumed communities will have the *same constant percentage* of unproductive persons, nevertheless on the other hand (b), with *specialized labor*, the percentage of unproductive persons in a community will in general decrease in some inverse relationship to the communities'

comparative degree of diversity of social-economic activity. Yet (c) as the social-economic system specialized ever more in materials, the unproductive in communities of less diverse activity will tend to go and find jobs in the communities of more diverse activity, to the end (d) that with the increase in specialization of materials, communities will grow in relation to their comparative degree of social-economic diversity.

This last step above, (d), is very important, because it tells us that some communities of a system may grow at a faster rate than others, as the system increases its specialization of materials and of labor. Naturally there is no chronological cleft, or dichotomy, between the specialization of materials on the one hand, and of labor on the other, as we have been assuming in the interest of exposition; fundamentally it is a question of specialization of materials-labor, with the two phenomena intimately intertwined. If we choose to term an advance in the specialization of materials-labor as an *advance in civilization* (by definition), then we may say that as civilization advances in a country, then communities tend to arise in that country—some communities more diverse in their activity than others—with persons of special talents, gifts, or accomplishments tending to migrate for employment to the communities of greater diversity. This is but a homely statement of the general proposition we are discussing: communities tend to grow in relation to the degree of diversity of activities, and hence tend to differ in size.

This general proposition may strike the reader as being somewhat incomplete because the diversity of activity of a given community may suddenly increase or decrease because of the introduction either of a new tool (process) or of a productive use for waste-products and so on. This possible feeling of the reader is quite justified:—there

will be a flux, and our picture up to this point is indeed incomplete. Yet it is incomplete only because we have made no provision for the consumption of the goods we are producing. The moment our population begins to consume what it is producing, as civilization advances, that moment our communities *will tend to grow in relation to their sizes* (i.e. the exponent, p , might tend to increase in our equation of the generalized harmonic series) which is the proposition that our lemma is discussing.

Let us ask our population to consume what it produces, and see what happens.

(v) Communities grow in relation to their size (the larger the community, the ever greater the increase) as civilization advances, and as the social-economic system consumes what it produces and produces what it consumes.

Up to this point we have paid no attention to the consumption of the goods produced by our social-economic system. For all we have said to the contrary we are still delivering our goods exclusively to the front at A, which we undertook originally to defend. Nevertheless during this defense our entire military and civilian population must be clothed, fed, sheltered and entertained by the production of the system itself, since this system has no other source of production. Let us however make peace and inquire into the economies of consumption, as the social-economic system produces what it consumes and consumes what it produces. If we concentrate our attention now upon consumption rather than upon production as previously, that does not mean that the two are separate; rather they are at all times most intimately connected—for, after all, to be perfectly explicit, consumption is but a matter of further processing our materials as they

pass on their way out of the system as waste-materials (cp. Chapter Five).

Let us suppose that all persons will produce (as much as necessary) and also consume (as much as possible) of the social-economic system's supply of goods. Since every person in the system is a goal, or objective, of production, then all transportation routes will have a two-directional traffic in the general interchange of goods. Because of this fact of double-direction of flow of goods, all striation and junction-points must be located in respect to the amount of materials to be transported to and from communities for production and for consumption.

Now it is clear that transportation costs can be saved by having our chief centers of production as near as possible to our chief centers of consumption. The reader may protest that that will be the case by and large anyway; and the author agrees that that would indeed be the case under static and ideal conditions of civilization. Yet he adds that, in the case of an advance in civilization, where the specialization of materials and of labor increases, to the end that new factories and new tools are constructed, then the location of these new processes will be attracted by communities *in relation to their size* as possible centers of consumption for the new line of goods, within the exigencies of the general equation of *the minimal total of mass \times energy-distance*.

To repeat the question: what happens to our communities as a social-economic system advances in civilization in the sense that it specializes ever more in both materials and labor while refining ever more upon tools and skills? To state the answer: An advance in civilization would seem to cause the communities of our social-economic system to grow in relation to their sizes. This answer seems legitimate because (a) the factories producing the new tools,

(b) the factories using the new tools, and (c) the persons using the new skills, will all be most economically located nearest to the markets for the new goods, and hence in relation to the sizes of the markets. Since these markets are also automatically both centers of consumption and centers of distribution, these markets, being in fact communities, will tend to grow in relation to their size, with the larger becoming ever more the larger, as civilization advances.

For (1) the more that a social-economic system specializes in materials, then (2) the more, by definition, it is likely to specialize in processes, which (3) increases the labor component in the total cost of the goods, and therefore (4) makes the location of production ever less dependent upon the sources of raw materials and hence ever more capable of distributing its labor in locations most economical for consumption—namely, in cities in relation to their sizes.

So much then for our lemma which was intended to demonstrate: as a social-economic system advances in civilization, communities of different size tend to appear and these communities tend to grow in relation to their size,—the larger the community, the ever larger the increase,—if the system consumes what it produces, and if it pursues the economic advantages inherent in the specialization of labor and of materials.

Let us now summarize here the chief steps of our lemma thus far presented.

- (A) The rise of a number of different communities under the specialization of materials.
 - (i) The concept of the shortest energy-distance.
 - (ii) A tool as an economy of energy; the concept of social-economic advantage, positive and negative. Value.

- (iii) The location and exploitation of raw materials. Routes of transportation. Striation. Communities.
 - (iv) A tool as a specialization of materials.
 - (v) The segregation of waste-materials and the origin of communities of various sizes.
- (B) The growth of communities in relation to their size under the specialization of labor.
- (i) The origin of junction-points according to the formula that the sum of all products of mass-moved by energy-distance moved remains a minimum (the minimal total of mass \times energy-distance).
 - (ii) The specialization of labor as an economy in moving materials in a social-economic system.
 - (iii) The growth of junction-points in number and in size under the specialization of materials. The diversity of social-economic activity.
 - (iv) Communities grow in relation to the degree of the social-economic diversity of their activity. The concept of man as a raw-material and as a waste-material in a social-economic system.
 - (v) Communities grow in relation to their size (the larger the community, the ever greater the increase), as civilization advances, and as the social-economic system consumes what it produces, and produces what it consumes.

So much then for our lemma as such. Implicit in the lemma was the fact that communities will decrease in

number in a total population of constant size as civilization advances. In our example of the wheat-kernels, some pages back, we noted why the number of communities would decrease as the size of the exponent, p , increased; and, at the end of Chapter Two, while discussing the saturation-point of the United States with its panic in 1929, we saw that recently, in the United States, small communities appeared to have been under heavy absorptive pressure from larger communities. Since this point will again confront us later, let us devote a few pages here to making explicit this matter of the decrease of number (n) as p increases with a constant population.

(vi) Communities decrease in number as civilization advances in a hypothetically constant population.

In the previous portions of our lemma we noticed two factors: (a) the equation of the minimal total of mass \times energy-distance indicates the most economical location of junction-points, as far as the movement of masses of materials is concerned; on the other hand, (b) the more inhabitants we can locate in the fewer communities of a social-economic system, the greater will be the economy of distribution, because it will save energy in the transportation of finished goods to the ultimate consumer. Hence, in general, there is a force pulling into the larger communities not only new production but also the older and established production. Let us show how this will arise simply from a greater specialization of the tools of transportation. We shall commence by imagining first that horses and wagons are our only means of transportation.

If the transportation means are only horses and wagons, then communities must be established along all transpor-

tation routes at intervals equal to the average day's trek of a draft horse. The communities will be provided with provisions for the rest and refreshment of horse and driver, and hence will each be objectives of commerce in food, fodder, spirits and the like.

But as soon as railroads are established, with longer intervals of hauls before refuelling and "recuperation" at railroad division points, many of the previous horse-communities will cease to have economic justification and will either radically decrease in size if not actually disappear even down to the village store with its little post office. This phenomenon has been quite familiar to most of us today. Furthermore the advent and perfection of the automobile will liquidate even more of the small communities. However we must not believe that all the economic needs of these small communities will suddenly evaporate. On the contrary the inhabitants of these communities will still need consumable goods as before, even though the horse may have become antiquated in respect to many of its previous tasks. It is merely that many of the inhabitants in the smaller towns will be able to produce and consume goods more economically in the larger communities, to which they will accordingly move.

Now, in the general equation of the minimal total of mass \times energy-distance, new economies in respect of energy-distance, that is, in respect of moving a given mass of material, for example, over a longer distance with the same amount of energy, may be used in a twofold manner: (a) more mass may be moved over the same interval of distance during the same interval of time, or (b) the same amount of mass may be moved farther and faster. The first (a) increases the amount of material passing through the social-economic system in a given interval of time. But

the second (b) will permit of a decrease in the number of junction-points, as the material is simply speeded through the smaller and less important junction-points into the larger and more important junction-points. Under this second condition, (b), it is of course an economic loss to carry masses of material beyond the nearest point where they can be combined for the removal of waste-materials; nevertheless, this economic loss can be compensated for by the savings in distributing finished goods to the former inhabitants of the smaller junction-points who now have moved into the larger communities. Thus, for example, it is quite conceivable that both iron ore and coal will be carried unnecessarily far to a smelter beside an automobile factory, so that the entire labor in this smelter may be integrated with that of the automobile factory, in order to effect savings in the support and supervision of labor.

We need not imagine, incidentally, that the production once located in the smaller communities was necessarily removed to the larger communities. On the contrary it may have fallen bankrupt before the competition of similar and newly established businesses which were economically better located in the larger communities. In other words, the larger communities sucked up the business of the smaller communities in the manner of an octopus. This seems to have been very largely the case, incidentally, with small communities in the United States in the last few decades. During that time we heard much from the larger cities about the excellence of "free competition", as the small-town tradespeople, succumbing to mail order houses and the high-pressure salesmanship from the larger communities, donned blue-shirts and trekked with dinner-pails to work for their former competitors in the larger communities. Of course there may be another side to this picture, as we shall see in later chapters when the

question of organized labor arises. Yet in the opinion of the author, the above-discussed forces seem to be responsible for the liquidation of many of our small towns and in no small measure, perhaps, are also responsible for much of the social bitterness and economic fear in the country today as millions of persons wonder what it is all about and whether it has all been necessary.

Incidentally, one point must not escape us. We have been arguing tacitly in this section in terms of a stable population which neither increases nor decreases in size over the years. Obviously a rapidly increasing population can permit communities to grow in relation to their size without decreasing the number of communities in the system—up to a theoretical point of saturation. In the United States the rapid increase in population through births and immigration did indeed save many otherwise doomed communities for a while. Yet let us not forget the recent saturation-restrictions upon alien immigration in the 1920's, and the generally growing, and economically understandable, hatred of arriving aliens in the 1930's. Furthermore it is yet to be seen that our birth-rate will not decrease during our present condition of saturation. But we shall return to this matter of American saturation later in Chapter Four.

For the present let us leave our lemma for whatever it may be worth as a qualitative discussion of phenomena that may or may not be related to the generalized harmonic series:

$$A S_n = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{n^p}.$$

With this qualitative discussion behind us, we shall turn now to actual sets of data and see that the exponent, p , can in fact have values lying between 0 and 1. So far

we have proved nothing—either that p will increase much beyond zero, or that $p=1$ represents absolute saturation (with p larger than 1, the series becomes convergent, a condition which the author will treat in a subsequent publication).

Nevertheless our lemma seems to suggest that there are two fundamental “forces” in opposition: the “*force of production*” and the “*force of consumption*.” The “force of production” tends to attract the population as near to the sources of raw materials as possible (to save transportation) and hence to make many different communities. The “force of consumption” tends to attract persons into as few communities as possible (again to save transportation in distribution). And perhaps that is the meaning of our co-ordinates under our assumed minimizing of energy.

4. EMPIRIC TESTS; PRESENT-DAY INDIA AND THE DEVELOPMENT OF GERMANY

Our chief task now is to present some actual data in support of the general proposition that with advancing civilization the size of the exponent, p , increases between the limits of 0 and 1 inclusive. Since a graphical presentation of the data will be both most complete and most economical of space, let us ask how the graphical representation of our generalized harmonic series will appear, as the exponent, p , increases from 0 to 1.

For the reader's convenience are presented in Figure Eight five different lines representing graphically the generalized harmonic series with exponents of 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1, respectively. These lines were not drawn with any specific or constant S_n in mind; they are of the same length and but indicate differences in slope.

The reader will note that perhaps the chief characteristic of all the lines which are drawn on Figure Eight is their *straightness*. The second characteristic is that the *slope of the line* becomes ever steeper as the exponent increases.¹

Our next step now is to present data, and we shall commence with that for India.

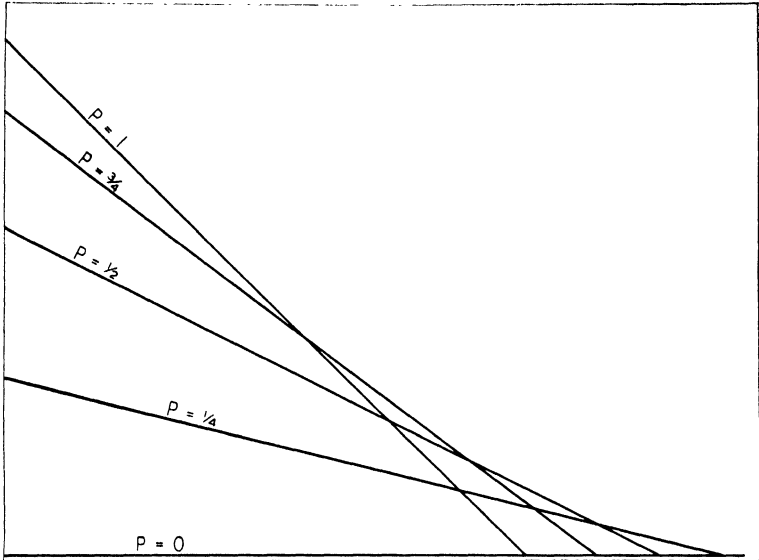


FIGURE VIII. Slopes of lines corresponding to arbitrary values of P in the generalized-harmonic series.

a) Communities in India in 1911, 1931.

Since perhaps the chief characteristic of the graphical representation of our equation is the straightness of the line connecting points representing the sizes of the communities in the social-economic system, we shall first present

1. In the technical terms of mathematics, the slopes of these lines are in each case the negative of the exponent, p ; and thus our lines in Figure Eight have the slopes of 0, $-1/4$, $-1/2$, $-3/4$, and -1 respectively. The line for $p = 1$ is that of the harmonic series previously discussed.

data for the primary purpose of testing this hypothetical straightness. Thus if the lines presented are on the whole straight, we shall conclude that the communities of that social-economic system are following on the whole our generalized harmonic series.

In Figure Nine are presented the data for communities of India in 1931, the best data of this sort available for India, and, in addition, the corresponding data for 1911 which are included for comparative purposes even though, according to official admission, they are perhaps not as complete and as perfect as those for 1931.

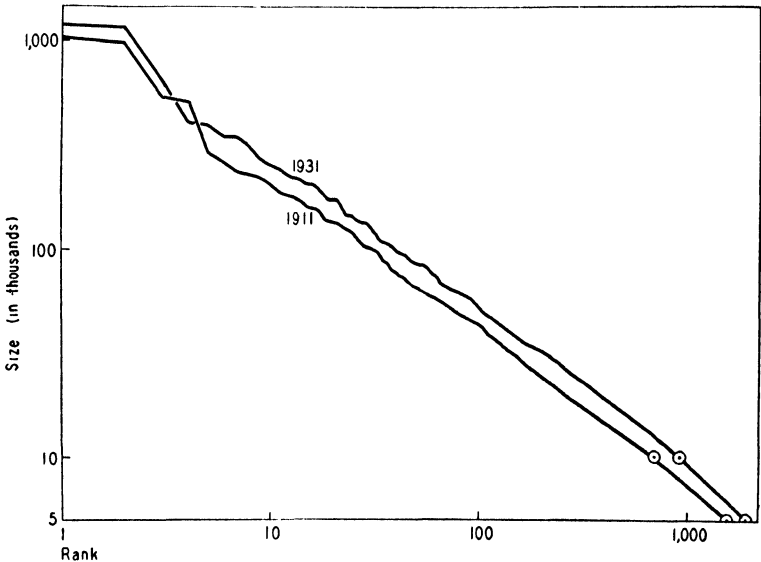


FIGURE IX. Communities of India in 1911 and 1931, ranked in the decreasing order of size of population.

We note at once that the lines of Figure Nine are approximately straight and hence may be considered an approximation of our general series. The fact that the

point for the first and largest community is below the extension of this line is probably ascribable to the condition of alien imperialism prevailing in India today,—a topic to which we shall return inferentially in discussing the social-economics of empires in Chapter Four following. Suffice it for the present to say that many of the functions of the otherwise chief community of India are performed elsewhere, and indeed probably in London. Yet straightness is not the only characteristic of our two lines for India.

The two lines are roughly parallel and of the same slope, except for communities of the upper seven or eight ranks where there is a curious crossing of lines that might well be ascribed to a possible reclassification of city-limits, or to possible alterations in methods of enumeration on the part of the Indian census bureau. The parallelism of the two lines indicates that communities did in fact grow during that twenty-year period by some constant fraction and not in relation to their sizes. If India was even approximately saturated in 1911, her subsequent growth by a constant fraction was possible only because of the introduction of labor-saving devices during that twenty-year period. Yet why did not the size of the exponent, p , increase?

The question why the size of the exponent, p , did not increase is far-reaching and one which cannot be even approximately answered apart from a study of the nature of conditions throughout the entire British Empire, to which we shall not turn until Chapter Four. Nevertheless we might suggest even here that the people of India during the above-mentioned twenty-year interval probably may have had little of the social-economic benefit of the economies effected by such labor-saving devices as may have been introduced. In other words it may have been more a question of pushing a greater amount of materials

through the system than of introducing new tools and techniques; factories may rather have been multiplied in number than have been improved in kind, on the whole. Though more persons may have gained a livelihood as a result of this multiplication of number, and of such refinement as there may have been, nevertheless the general standard of living may not have risen appreciably. Furthermore, India's consumption has probably not been entirely the chief objective of India's production. The technical refinements of twentieth century ingenuity were probably imported to a large extent in a finished state into India. The products of Indian economic activity, whether raw, semi-finished, or finished, were probably not designed primarily for Indian consumption, but on the contrary had to no small extent foreign export as an objective, with the natives sharing only to a negligible degree in any profits from these exports which might otherwise have been represented by equivalent imports to be poured back into the Indian distribution-system in lieu of the exported goods, and for the better standard of living of all Indians. It would seem plausible that one cannot on the one hand skim off all the surplus of production above the minimal requirements of subsistence, and deliver this surplus into the laps of alien and absentee exploiters, say, in England, and on the other hand expect civilization to advance under this skimming process. There is perhaps good reason, then, why the exponent, p , for India has not increased.

India represents our first case of social-economic *host* that is being exploited by a social-economic *parasite*,—the terms *host* and *parasite* being used in a very precise and by no means in a pejorative or depreciatory sense. Doubtless the parasitic exploiters have greatly improved living conditions in India from the viewpoint of Western Civil-

zation; they have, for example, abolished sutteeism, lowered exorbitant interest rates, curbed the autocratic powers of the maharajas when these were in conflict with the interests of the exploiters, and preserved local rites, customs, religions—indeed even furthered them—when such were in the interest of, or not detrimental to, the exploiters. We shall pick up this thread of thought again in Chapter Four; in order to recognize it later, let us identify it with the remark: advancing civilization often renders otiose if not predatory that which most aided its advance.

Summarizing our data in Figure Nine we find that our lines are straight, yet both of the same slope, with the exponent p being about .8 in each case, as estimated by rough eye measure. We have suggested a possible reason for this apparent sameness of slope, in suspecting that there was not all told an appreciable advance of civilization of the total social-economic system of India proper during this period. Of course there may have been a very considerable commensurate advance elsewhere in the Empire at India's expense.

But we are none too sure yet about the empirical aspects of our theoretical exponent, p , to warrant a further discussion of the Indian social-economy. Let us turn to another set of data, namely that of Germany.

b) Communities of Germany, 1875-1939 (May).

Germany is an example of a country which has advanced greatly in civilization through the effects of an increased specialization of materials and of labor. Since her boundaries have been on the whole about the same until recent years, she represents a social-economic system of a comparatively high degree of independence. Here if anywhere we should expect to find (1) a progressive, steepening of

slope, (2) while the size of the exponent, p , increases, (3) as material civilization advances (i.e. as labor and materials become increasingly more specialized).

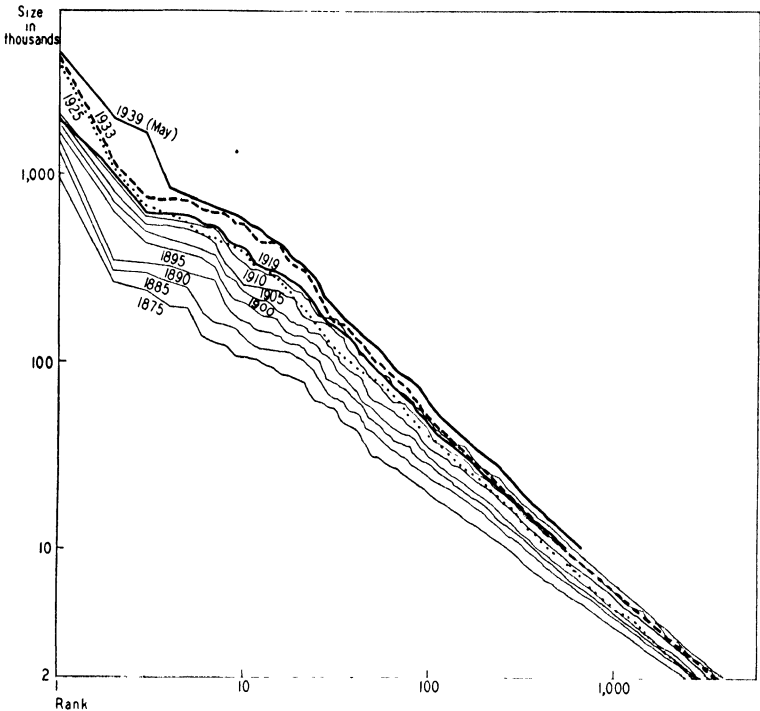


FIGURE X. GERMANY. Growth of populations of communities, 1875-1939 (May) ranked in the decreasing order of size.

In Figure Ten we present the census data for German communities of 2,000 inhabitants or more for the years 1875, 1885, 1890, 1895, 1900, 1905, 1910, 1925, 1933, and, in addition, for communities of 10,000 or more in 1919 and May, 1939. In these data we do indeed find: (1) fundamentally straight lines, (2) an increasing slope (i.e. an increasing size of the exponent, p) with passing years,

(3) an approximation of a harmonic series in the data for 1939; (4) a decrease in the number of communities of more than 2,000 since 1910. This German material would seem to give a direct and positive confirmation of the discussion of our lemma.

These data for Germany happen to be of maximum interest for our studies in general; and because of the similarity of some of the German curves to those of the United States, the German data may well be of interest to us Americans in particular. We shall discuss these data in summary now, and return to them again later as we present other relevant German data. In discussing all data, including the German, of course, we shall proceed frankly, and dispassionately, hewing to the line as nearly as we can see it, and letting the chips fall where they may. In the present study we are interested in disclosing the principles of social-economics, and in nothing else.

There are three particularly interesting characteristics of the German data. First of all (a) the lines were on the whole becoming ever more nearly straight during our period of measurement. Second (b) the slope of the lines became ever steeper. And third (c) the slope for 1939 approximates fairly closely that of a harmonic series. This last characteristic, (c) will concern us but little, because we have little more to add at present in respect of a harmonic series than what we have already advanced previously, in Chapter One. Since we are at present more interested in the change of slope than in the straightening of the line we shall first turn to the change of slope, merely remarking that (a) the straightening of the line was probably largely connected with an increase of homogeneity (i.e. the greater unification of Greater Germany).

In regards to the slope (b) which differs from the slopes of all previously presented data, there was (i) clearly an

increase perhaps since 1875, and certainly since 1885, in the general direction of $p = 1$. Theoretically this increase in slope may mean an increase in the specialization both of materials and of labor, notably since the 1880's; and we know in fact that Germany entered into a very great period of industrialization on or about that time. Yet (ii) during this general increase in slope towards $p = 1$, one epoch seems to come to an end in 1919. At least the slope jumps markedly between 1919 and the following census in 1925. Furthermore (iii) the period between 1919 and 1925 is attended by the loss of a number of communities of size larger than 2,000. Of course the loss of these communities may conceivably be viewed as compensated for by marked increases in the sizes of the larger communities that remained. Nevertheless (iv) the increases since 1919 in the larger remaining communities were not systematic in the sense of being homogeneous; on the contrary there were serious evidences of heterogeneity since 1919. But we note (v) that a considerable amount of this heterogeneity has disappeared since 1933 as is apparent from the data for 1939 (May). So striking, indeed, are the general changes, with the marked increase of the slope since 1919, that we shall perhaps do well for the present to concentrate our attention on this later portion of the data.

The accelerated increase in slope since 1919 would seem to indicate an accelerated increase in post-war industrialization which in turn was possibly very intimately connected with the reparations and indemnities connected with the treaty of Versailles which burdened the German social democracy and exacted amounts into the billions and billions of dollars. The heterogeneity of the upper portion of the curve resulting from a shifting of population was probably also related to the treaty of Versailles. We may not ascribe this shift to the actual losses of popu-

lation in ceded territories such as those of Alsace-Lorraine, Silesia, and the Corridor, because in 1919 there were no indications of this striking heterogeneity even though the lost territories had already been ceded then. But we may very well ascribe some of this heterogeneity to the losses of the sources of raw materials and of centers of capital industries, such as of steel and coal that were present in enormous quantities in Lorraine and Silesia; for these losses, unless free trade had prevailed, would necessitate a complete rearrangement in the country's entire striation if it were to survive. We know of course that there was no free trade then; indeed we remember that the French added to the economic unsettlement of Germany by fostering a separatist movement in the Rhineland, by occupying the Ruhr, by aligning Poland, Czechoslovakia and the rest of the Little Entente into a political union under the avowed purpose of preventing Germany from ever arising industrially again, even though, in the last analysis, this plan of French and Little Entente politicians might have resulted in the ruination and starvation of literally millions of Germans and other Europeans who had been previously organized economically under the conditions of one social-economic system whose existence depended largely upon an export-import trade. We mention this historical policy of encirclement and of economic coercion during the years following Versailles, in the belief that it may have been somewhat connected with the changes in the German data since 1919. In other words, the system of automatic checks and balances of natural forces which we have assumed to exist and to be responsible for our generalized harmonic series, may, if existent, be a part of a great system of natural balance (cp. Chapter Four) which one does not molest without caution, as action elicits reaction in the great proverbially universal drive for sur-

vival,—a drive, from the consequences of which no living organism and no body politic is apparently immune, and a drive in which, perhaps, one may say “in union there is strength” and “in number there is strength,” without exception, as the moving finger writes. But be all that as it may, and apart from all ethical considerations, let us inspect the German data further.

Now the data for 1939 show that the line has become much more nearly straight, and we may suspect that some of this straightening may be ascribed to the annexation of Austria and the Sudetenland which, though evidently economically closely related with Germany, nevertheless, at least in the case of Germany and Austria, had been reportedly prevented by French and Czechish foreign policy from forming the customs union reportedly desired by the inhabitants of German and Austrian republics. We pose the question whether the hypothetical forces behind our lines may not be connected with the supposed forces of “Lebensraum.”

Suffice it to say in summary that on or about 1919, as our data show, the German social-economic system received a severe blow to its equilibrium and that it proceeded to re-establish some sort of equilibrium in the terms of greater homogeneity and of increased slope. We shall later find in general that any disturbance to the equilibrium of any social-economic system tends automatically to set forces in operation within that system to repel the source or to neutralize the effect of the disturbance in order to restore equilibrium.¹ However we shall by no

1. This is but a special case of Henry Le Chatelier's famous principle first established in the field of thermo-dynamics and subsequently considerably extended in scope. Though our findings seem to confirm this principle, we do not and shall not assume the principle as an axiom of nature except insofar as we can demonstrate its existence in our field.

means find that the restored condition of equilibrium is necessarily always in all respects the same as that previously existent before the disturbance.

Our German data, together with our Indian data have done more than yield empiric confirmation of our theoretical lemma-demonstration of the existence of our series. They have also served inferentially to broach very interesting general psychological problems of cultural goods, of ethical evaluation, and of class-identification and the like. Let us turn now to a brief discussion of some of these broader psychological problems in order to show that their existence and nature have not been ignored, even though our attention has been the while engrossed in a detailed study of certain aspects of the organization of matter and energy.

5. COROLLARY CONSIDERATIONS AND THE PROBLEM OF ETHICAL AND AESTHETIC EVALUATION OF SOCIAL-ECONOMIC DATA

It is not enough simply to present data and to draw conclusions. One should also attempt to draw corollary inferences that may serve later as working hypotheses. Above all, one should attempt to harmonize any apparently new interpretations of nature with our older and inevitably more thoroughly established preconceptions. If successful, these attempts will not be without some general expositional value on the one hand, and may be of help in avoiding unnecessary future controversy on the other. Happily these attempts at harmony or reconciliation will not be difficult in our case, for, as the reader has doubtless felt by now, we have not been engaged so much in saying the new as in expressing the old and generally known in a somewhat newer form. If we now work with

preconceptions, it is only in the interest of a general synthesis between what we feel and what we find.

Man, having two hands, loves to speak in terms of antitheses: the right, the left; the good, the bad; the beautiful, the ugly; the sick, the healthy; the disease, the cure; and so on. Yet all of these antitheses of expression refer to underlying ethical or aesthetic evaluations which may or may not be completely in accord with facts. Furthermore many of these expressions of antitheses are capable of mobilizing political opinion to the point of social-economic action, which may or may not be in accord with the best interests of a social-economic system. In short ethical-aesthetic evaluations, once expressed, constitute potential propagandizing which in turn may also be viewed as left or right, good or bad, beautiful or ugly, sick or healthy, the disease or the cure, and so on. Let us, in the interest of concinnity, inspect some of these terms and see how they might be applied to the phenomena of a social-economic system. If we begin with our last antithesis, disease-cure, we shall in time wend our way through the others.

a) The problem of ethical evaluation: disease and cure.

In recent years we have heard much about "diseased" social conditions for which "cures" have been prescribed or applied without our devoting much attention to what conditions deserved to be viewed as "healthy." Obviously the terms *disease* and *cure* make sense, only in reference to some normative condition, called *health*, in terms of which one may hope to define *disease* and *cure*. Once we know what a healthy condition of a given thing is, we may simply define as disease that which brings the given thing out of a healthy condition; and we may define as a cure that which returns it to a healthy condition. The main

thing to determine, then, is: what is a healthy condition?

For the sake of clarity let us work with an analogy. That is, let us pretend that in the reader's living-room there is suspended from the ceiling a costly, delicately fabricated and highly fragile chandelier. Let us say, by way of definition, that the chandelier, as it hangs from the ceiling in equilibrium, is in a healthy condition; indeed let us say in general: *the equilibrium of forces in any system (i.e. statics) is a healthy condition*. Now let us suppose that an artisan working in the room lets his ladder fall against the chandelier, setting it in motion. The force setting the chandelier in motion is a disease since it brings the chandelier out of a condition of equilibrium. As the chandelier swings back and forth we must say that this pendulation is a cure, because it is bringing the chandelier back to equilibrium again. The pendulation is not disease nor health, but is a cure; the most that we can say about a cure is that it is healthful, even as the disease is unhealthful. But now let us suppose that the pendulation causes the chandelier to become detached from the ceiling and to fall to the floor. In that case the chandelier could not stand the pendulation-cure because of a weakness inherent in the constitution of the chandelier's attachment. If the artisan had rushed to the rescue he might have stopped the pendulation and returned the chandelier to its original healthy condition; though the pendulation was a cure, the artisan's remedial help would have been a better cure. As the chandelier breaks from the ceiling, that break is a new disease; and as the chandelier falls it is a new cure; and as the chandelier lies on the floor broken into a thousand pieces, it is in a condition of equilibrium and of health. Of course we can not light it, and we might not care to have it on the floor; nevertheless it is in a condition of equilibrium; many a patient discharged as cured from a hos-

pital may not be in his original condition or fit to have around, although he is, according to our terms, cured.

Now, we may foolishly so prize our smashed chandelier that we advertise for an artisan to repair it. If the artisan repairs it, is he a cure? Let us pause before answering this question. Since the chandelier on the floor was in equilibrium, it was also in a healthy condition by definition. Hence as the artisan works with it, he is a disease until the chandelier hangs again in equilibrium from the ceiling,—that is, he is a disease from the viewpoint of the previous condition of equilibrium of the chandelier on the floor, though possibly a cure from the viewpoint of the previous equilibrium of the chandelier hanging from the ceiling.

Hence what is to be called *cure* and what *disease*, in our analogy, would seem to depend upon what precise condition of equilibrium is to be called *health* as a point of reference. The most interesting feature of our analogy is perhaps that the chandelier sought and attained a condition of equilibrium of forces. In fact the above history of our chandelier might be viewed as that of a path through a field of opposing forces, among which the likes, dislikes and wealth of the owner, together with the active capacities and needs of the artisan have their places.

Perhaps the same applies to the hypothetical conditions of *health*, *disease* and *cure* of a social-economic system which may be seeking a condition of greater equilibrium as it takes a path through a field of assumed opposing forces, among which the likes, dislikes and wealth of the hypothetical "owners" together with the active capacities and needs of the "artisans" have their places. We do not know what the terms, "owners" and "artisans," mean, nor indeed what actual correspondences there may be between the chandelier and a social-economic system. We

remember that the most interesting feature of the history of the chandelier was that it sought and attained a condition of equilibrium of forces, even though one of the conditions of equilibrium attained was that of lying on the floor, smashed into a multitude of pieces. And we might suspect that only the assumed skillful artisan saved it from attaining the further condition of equilibrium of lying on the town dump. We do not know just what the artisan did; but, since we assumed that he was successful, we may perhaps assume that he repaired the chandelier by wisely operating within the very forces of nature in terms of which the chandelier was to achieve and preserve equilibrium in its position of attachment to the ceiling; and perhaps a prerequisite of the artisan's success was his knowledge of the forces in terms of which his problem lay.

Similarly we do not know just what the social-economic "artisan" should do to "repair" a social-economic system. But perhaps a prerequisite of the artisan's successful social-economic repair would be a knowledge, on his part, of the forces in terms of which his problem lies. It may be that the laws of these forces cannot be disclosed; in that event it might be fortunate if, as far as a living social-economic system is concerned, there were a system of automatic checks and balances that tended to preserve the system as such, according to the idea that "Nature is the best doctor."

Or it may be that the evolution of social-economic "medication" will recapitulate the history of medical science which emerged from a condition of charms, chants, and weeping-and-wailing with all the paraphernalia of priestly and Brahministic medicine-men of high rank, into a condition of greater scientific exactitude. In this event, the social-economic system whose social-economic prac-

tioners had farthest advanced scientifically would be the one which would enjoy certain advantages.

Hence, if the terms "disease" and "cure" are to be used in connection with social-economic phenomena, then the problems of "correct" diagnosis and of "proper" therapy would seem to be in place also, if a social-economic system is not to suffer, or even die, of charlatanism. Yet in terms of what we may call either a diagnosis, "correct," or a therapy, "proper," is a question which we leave with those who are accustomed to use the terms "disease," "cure" and the like.

In this connection our analogy may have served a useful purpose in helping expose the fallacy of the all too easy and frequent belief that one can label social phenomena as diseases or as cures without first establishing at least some criterion of normative health. In suggesting that an impingement upon a social-economic system tends to elicit a corrective response, do we not automatically suggest the main outline of the essentials of the problem of *health-disease-cure* whose further elucidation is not materially aided by the subjective application of these terms? Thus, for example, if we view the Treaty of Versailles as the disease, then we might view Mussolini and Hitler as cures on the one hand which may in turn become diseases on the other, which may in turn elicit cures elsewhere and so on indefinitely. The fabric of action-interaction-reaction is too closely interwoven to admit of off-hand subjective evaluations of health-disease-cure in the social-economic field, although our inclination to make these evaluations and the nature of the evaluations we make are naturally indicative of the kind of persons we are and the degree of intellectual maturity and emotional poise we may possess, and may be further useful as data for appraising the

nature of the social-economic system in which we make our "moral" evaluations.

Since we find no way to assess in ethical or moral terms an entire social-economic system, let us inquire into the tools, and the products of the system, and seek some sort of evaluation there.

b) On the value of tools in the solution of specific problems in a given situation.

There is a certain tendency among us to prefer the elaborate tool to the simple tool, or to no tool at all. At the risk of appearing repetitious let us inquire into the nature of a tool to see whether it has any inherent value. We shall commence with the now familiar idea of the *specialization of materials* and briefly repeat that the chemical elements, as well as their combinations and mixtures, differ in their properties. In order not to appear more profound than we are, we might illustrate differences in material properties by pointing to wood, porcelain, steel, dynamite, human flesh and the like as examples. Furthermore materials differ in their value as tools in performing given tasks. For example, if a man is obliged to remove a large, deeply embedded stump, he might use his bare hands, or a piece of porcelain, or a stick of dynamite; each one of these special combinations would be serviceable as tools in removing the stump. Yet may we say that all these serviceable tools are necessarily of equivalent value for the man trying to remove the stump? Obviously they are not necessarily of equivalent value, for much time might well be saved in removing the stump by the man's using one tool rather than another. Thus, if the man were equally expert in using his hands, a piece of porcelain, and dynamite, and if all three were equally available for his

use, then the dynamite might well be the most economical tool for him to use.

But let us explore this question of the economy of tools still further. Will the stick of dynamite always be more economical for everyone everywhere in removing a stump? No, clearly not. If the amount of time and energy expended in procuring and using the dynamite were greater than that of grubbing the stump out by hand, then the hand would be a more economical tool. For example, if the stump were in the heart of a remote jungle, thousands of miles from the nearest source of supply of dynamite, with foot-travel the only means of transportation, then it might be far more economical in time and energy for the man to grub out the stump by hand, if he must, rather than to trek by foot a thousand miles to fetch a stick of dynamite. In short, the total economy of a tool includes the energy necessary for procuring the tool.

Now let us review what we have said. In the first place we have observed that there is an economy latent in the fact that materials differ in their properties, in the sense that one kind or combination of materials may perform a given task with the expenditure of less time and energy than others. But we have also observed that this economy inherent in the nature of materials is available only in terms of the total situation of a given problem; thus, what may be a more economical material for use as a tool in one solution may not be more economical in another. Hence we may not say that one tool is inherently better or worse, or more valuable or less valuable than some other tool except when both tools refer to the performance of some definite task within the givens of some definite social-economic system. The bare hand may be of far greater value in the performance of a given task than the most costly tool. In itself, then, to prescribe a tool has no

inherent economy, and it would seem to be a matter of prudence not to force one's tools of any conceivable sort (material, intellectual, or "spiritual") upon another person without first seeing whether these things will really be more economically serviceable tools for that other person in the solution of his problems.

And as we have argued of tools so too we shall now argue of cultural goods and of their significance, or meaning. In treating of cultural goods under a separate heading, we do not imply that in the last analysis they are anything other than tools of behavior—a consideration, however, which can be more advantageously treated in Chapter Six. We shall simply show that cultural goods, in whatever way they may be defined, possess in themselves no inherent ethical or aesthetic virtue apart from the frame of reference of the needs and givens of some particular social-economic system.

c) Cultural goods and the meaning thereof.

Up to this point we have made no mention of the kinds of consumable goods produced. If we may assume that the United States and Germany both represent essentially harmonic series in the size and number of their communities, and if we may assume that the converse of our previous theoretical discussion of specialization both of materials and of labor is essentially correct, then it would follow that both the United States and Germany had used their materials and labor with great economy. But that does not imply necessarily that they used the same materials in the same amounts or in the same way to the same ends; it means only that they have used matter in an economical way. Thus the tools or products of one system need not be those of another. Certain materials may be more readily available to the one than to the other so that

the one may use them more than the other; and this differential in materials may well be reflected in differences in the articles produced. We shall call these differences in the articles produced *cultural differences*, and shall say that the *cultural goods* of a social-economic system are the kinds of actual tools and goods (of any sort) used or produced in the solution of the system's social-economic problems. Obviously a given article may *mean* more to one system than to another.

The question arises now as to the *meaning* of any particular item, class, or group of cultural goods at any time. By definition we shall say that the *meaning* (subjective-objective) of any example of cultural goods of any social-economic system at any time is the purpose of that example as it passes into the system, and through the system and out of the system in terms of conditions under which the laws of forces operate in that system. Thus the meaning of a rag around an American child's bleeding finger includes all the conditions under which the forces in America behaved to produce the rag, the child, the bleeding finger, and the rag around the bleeding finger. *Meaning*, then, is evaluative in so far as every cultural good has a social-economic value, positive or negative; furthermore *meaning* is also structural (or, as we shall later say, *striated*) in the sense that it localizes the how, when, and where of the forces involved. Obviously we shall never be able to segregate the evaluative from the structural of meaning, nor shall we ever be obliged to, either in this study, or, as far as the author can now anticipate, in any future study. The cultural anthropologist, for example, in studying an artifact, must not only classify the artifact according to chronology, to geography, to the "race" of fabricators and to the material of fabrication, but he must also classify it in terms of the forces and tools used in its

fabrication, and above all in terms of the needs it was to fulfil—that is, in terms of all the givens of the total system at the time of the artifact's use and before. One needs only to walk through a museum of cultural anthropology to note the practically impossible task of ever actually calculating completely the meaning of any cultural object displayed. Yet, if one walks through the museum with this definition of meaning in mind, one cannot but be struck by the gorgeoussness of some humble artifact of early man when viewed as a solution of a complex social-economic problem in a human system of very humble givens.

Though the meaning of any cultural good can probably never be precisely calculated, its definition serves to suggest the fallacy of the easy and all too frequent belief that one culture is inherently "better" or "worse" than another, simply because the evaluator happens to "like" the cultural goods of the one more than those of the other. Every person presumably likes what he likes and dislikes what he dislikes; yet the moment a person projects his ethical-aesthetic likes and dislikes into the inherent and intrinsic properties of the cultural goods he is assessing, saying that they are inherently and intrinsically "better" and "more beautiful," or "worse" and "less beautiful," then the egocentricity of his judgment may have reached a condition of psychopathology.

Cultural goods can be better or worse in any conceivable ethical or aesthetic sense only in reference to their capacity for meeting the exigencies of some social-conomic system. Of course, a person walking today through a museum of cultural anthropology cannot but be impressed by the great technical-artistic strides made by man since earliest human history. Yet the sagacious observer does well to reflect upon one aspect of these earliest cultural goods: should our own social-economic system ever be reduced to

the givens of early human society, then these cultural goods of early human society would be far more valuable than those of our present-day society. Thus, were we to lose or dissipate our resources, our means of communication and our processes of production, then the ability to fabricate some of these humbler-looking artifacts of early man might well be a far greater asset in surviving, than the knowledge of many a more complex modern technique.

To summarize, we can find no way of assessing ethically or aesthetically any cultural goods, no matter how defined, except within the frame of reference of the needs and givens (whatever they may be) of some particular social-economic system. In a later chapter (Chapter Six) we shall return inferentially to the problem of assessing goods ethically and aesthetically within the frame of reference of the needs and givens of some social-economic system.

Thus far we have been completely unsuccessful in arriving at positive conclusions in this entire problem of ethical and aesthetic evaluations. Nevertheless, let us continue further and inspect first the problem of tradition and cultural lag, and then the problem of individual membership in conflicting social-economic classes. For, after all, cultural goods change in kind, either because the old sources of materials become exhausted, or because new sources of materials, or new kinds of materials or new ways of processing materials are discovered; hence traditional ways of behaving may change with changes in the traditional and established striation. Unhappily changes of this sort are not always viewed unanimously as being "more beautiful" or "morally better"; indeed changes of this type may precipitate considerable intra-systematic conflict. Let us inspect this general question of cultural change in a social-economic system; we shall approach it from the broad background of the system's striation.

d) *The Problem of Evaluating Changing Terms of Production in a Social-Economic System.*

Under this heading we shall ask whether it is "virtuous" or "wicked," "beautiful" or "ugly," and so on, for a social-economic system to change from its *status quo*; and we ask this question even though we have not yet succeeded in evaluating any *status quo* as "virtuous," "beautiful," and so on, or the reverse, because apparently a preliminary evaluation of the *status quo* has never been considered necessary for an evaluation of changes from the *status quo*. Thus, for example, the people of the United States may accept the present organization of the United States with reasonably good grace, for better or for worse; nevertheless, let any change or alteration be attempted in the country's organization, and the population begins to stand up and either wave its arms in glee or shake its fists with wrath, while shouting terms compared to which those quoted above are but mild shadows. How, now, are we going to decide whether changes should be viewed as positive or negative in any ethical-aesthetic sense, and by changes we shall mean, in this case, changes in the terms of the system's production?

In any general discussion of changes of terms of a social-economic system we do well to find at the very outset some underlying fact or principle of the system that can serve as a point of reference for any changes in the terms of the system. Thus, we might select the system's striation (i.e. its routes of transportation of materials) as a point of reference, and ask how any changes in terms in the system's behavior might influence the system's striation, whether positively or negatively; that is, for example, whether the changes might either save or waste the system's energy in its movement of materials through its

striation. Indeed let us select striation as a point of reference for our study of the evaluation of changes of terms, and, for the sake of brevity, further limit our present study to changes in terms of production, since, as we shall see, whatever we find about changes in terms of striation may apply *mutatis mutandis* to changes in all other terms. But, before proceeding further, let us first (i) review briefly certain broad implications of our term, striation, and note not only that it is a term, let us say, of social-economics rather than of social-dynamics, but also that it is so wide in its scope that we cannot easily imagine any other more fundamental term. Then (ii) we shall arbitrarily change a few terms, either by letting a system exhaust an important raw material, like coal, or by letting the system discover a more economical tool, such as the steam railroad. This will introduce the problem of substitutes, and the whole question of economic duress. At this point (iii) "political parties" will arise and argue, and we shall hear much about "tradition" and note the meaning of the terms, *polarization*, *cultural lag* and *perseveration*, all in reference to the system's striation. In closing we shall find that whether a change will be called "good" or "bad" by a given person may depend largely, if not entirely, upon how this change will affect that person.

(i) *The Implications of Striation; Social-economics versus Social-dynamics.*

Previously we have defined the striation of a social-economic system as the routes of transportation over which the system's materials are moved through processes of manufacture, distribution, and consumption. We defined the routes as the shortest energy-distances, and noted that the actual topological location of these routes depended in general upon two factors: first upon the topographical-

climactic-geological features of the terrain including the raw materials used, and second upon the comparative amounts of raw materials used. This second factor refers to nothing more than the previously discussed fact that the more materials a system moves, the more economical it becomes to straighten routes of transportation by digging tunnels, building bridges, draining swamps and the like. These two factors of terrain and of masses to be moved are of such fundamental importance in our study that the author asks the reader to do him a curious favor in order to illustrate the wide implications of our definition of striation. The reader, after all, is a member of some social-economic system. If he will now obligingly light a cigarette, he will remember that all his movements of matches and other masses of materials will by definition be a part of the total striation of the social-economic system to which he belongs. Now may the reader observe whether in lighting a cigarette he does in fact seek to move the materials involved over shortest energy-distances in reference to his smoking.¹ We mention this simple matter of lighting a cigarette, in order to suggest that our persistent preoccupation with the general problem of striation is not without deliberate design. Although we are at present engaged in discussing such things as changes in the terms of social-economic production with the potential conflict that that implies, nevertheless we shall discuss these changes now in such a fashion that a minimal amount of repetition will be necessary in later chapters when other kinds of terms of organization are discussed.

1. The reader is reminded that there are many brilliant psychological experiments, notably in Gestalt Psychology, which have worked successfully with the concept we are calling "shortest energy-distances." Though we do not appeal to these findings for help in this study, we do not mean to imply *ex silencio* that we are not aware of their prior existence.

Let us now pause in the midst of our general inquiry and ponder the words: materials travel over shortest energy-distances to their objective. We note that we are not arguing merely that materials move and hence traverse distance. Our argument goes a step further and broaches the question of movement of materials over a course consistent with the maximum possible conservation of energy. Perhaps at this point and in connection with the whole problem of changes in terms of production, with concomitant changes in goods and tools, we should remind the reader of a salient point of our entire investigation which, after all, is one of *social-economics* and not merely one of *social-dynamics*. That is, we are not merely arguing that there are forces (i.e. dynamics) involved in the movement of masses through a social-economic complex; for as long as masses are moved, forces will be involved. Furthermore we are not merely arguing that these forces, whatever they are, will behave according to fixed law, in the sense that like things under like conditions will remain alike; all science is inclined to assume a fixed law for everything, and would never impute rashness to an investigator who entered the social field with this preconception. But we are proceeding a step further and are attempting to establish what no one of us dares assume except as a working hypothesis: a social-economic system *seeks* to move its materials with maximum possible economy; in short, we are arguing that social-dynamics is really social-economics—an argument which is useless unless substantiated by theoretical and empiric proof. We are of course not the first to argue in this direction, nor are our data the only available data; indeed we should be laughed out of court if we seriously suggested, in the light of physical findings, that masses of materials, once in a social system, began suddenly to move without any reference to a con-

servation of energy in terms of the system. Throughout our entire previous lemma we built our system not merely by moving materials, but by moving materials with the greatest conservation of energy that was possible within the needs and givens of that system. Thus the striation of a system represents a striving for the maximum possible conservation of energy in moving materials of the system within the terms of the needs and givens of the system.

Now, in order first to summarize, we may say that if a social-economic system behaves with maximum economy in the terms of its givens while moving all materials, then its striation will consist of all the routes of minimal energy-distances in terms of the needs, tools and other givens of the system; furthermore all its communities, materials, tools, or anything else capable of movement must be located and behave in respect to these shortest energy-distances; in short everything (i.e. all the givens) of our social-economic system will behave at all times in terms of its striation.

Yet what will happen to the striation of a social-economic system if some of its givens are changed, either by the exhaustion of materials, or by innovation in processes?

(ii) Changes in terms affect striation.

Let us suppose that an extremely important raw material, like coal, becomes suddenly exhausted in a social-economic system; what then? If the original striation was one of maximum economy before the exhaustion of coal, the striation would be out of balance after the exhaustion of coal, for the original striation had been located in terms of movements of masses of coal which are no longer made. With the exhaustion of coal, many of the previous communities would have become uneconomically located. If a

new source of coal were located in some different part of the terrain (or by importation¹), then there would arise the need for a new striation, that is, for a *restriation* so that all materials moved after the exhaustion of the coal, will be moved over shortest energy-distances. And we shall now see that any *restriation* will bring some economic duress at least to somebody in the system, whether the cause of the *restriation* is the exhaustion of an old material, or the discovery of a new and better process or material. We have only arbitrarily selected the exhaustion of coal as an example of change of terms of production.

If no new source of coal can be located, then a substitute (hereinafter, by definition, an *Ersatz*) must be found. Let us assume in our case that the cord-wood of distant and hitherto neglected forests is selected as the most economical *Ersatz*. Yet the selection of this particular *Ersatz* might very well cause two further alterations: (a) an alteration in the striation, i.e., a *restriation*, and (b) an alteration in the nature of the cultural goods as all the irreplaceable by-products of coal were removed from the system.

The *restriation* (a) would entail the founding of new routes of trade and new communities at the cost of abandoning some established routes of trade and of some established communities, and hence would cause loss (i.e. "*economic duress*") to those members of the social-economic system whose livelihood had been previously dependent upon the now abandoned routes and communities. Furthermore (b) the now necessary changes in the nature

1. Since we have never specified in what form, or kind of place, our raw materials should appear, we may consider as raw materials our imported goods, no matter how technically finished the goods may be; and we may consider the port of entry the source of these raw materials from the point of view of the importing system.

of cultural goods would cause "*economic duress*" to those whose livelihood had been previously dependent upon the processing of coal for which the processing of wood failed to provide a substitute. For example, the producers of coal-tar products would suffer economic duress, and indeed go out of business if they could not somehow procure their raw materials. Indeed the economic duress resulting from a wholesale attempt to substitute wood for coal, say, in the United States today would be staggering, and its effects upon our cultural goods almost inconceivable. The readjustment would demand the greatest social discipline and the maximum exercise of our technical wits. Of course everyone in our system would not necessarily suffer to the same extent. Indeed the owners of the forests or of the land along the new routes of transportation might even prosper.

We have spoken of duress as attending restriction, and this duress seems to be in general true to a greater or lesser extent for a larger or smaller number of the population. Even if the restriction should result from the discovery of some new or better source of raw material, or of some new or better tool or process of handling raw materials, some hardship might result for those whose previous well-being had been tied up with the old. Though we might notice only the smiling faces of the ones who profited from the emoluments of the new striation (i.e. the restriction), there nevertheless would be those who suffered. To clarify this point let us take as a typical example the advent of the railroad, which obviated in many instances the great social-economic value of the previously used canals. Though the country as a whole and the railroad owners in particular were rejoicing over the railroads, the canal owners and those whose occupations and communities had been predicated upon canal activity, were doubtless adversely affected,

because the trains necessarily restricted much of the country. And in due course the automobile also appeared as a new and, in many cases, cheaper means of transportation; the country again rejoiced as a whole and the automotive and petroleum industry rejoiced in particular; yet from many of those whose livelihood had been dependent upon the railroads there were complaints, as there were indeed also from those who had been connected with the horse-and-buggy activity.

Hence we note that some persons may be adversely affected, if only temporarily, by the introduction of a new tool or material, as well as by the exhaustion of an old material, because the one as well as the other may necessitate restriction. Viewed from the personal interests of those adversely affected, any restriction, no matter how justified economically, should be resisted. Hence it follows that innovations of any sort in a social-economic system may tend to be resisted by at least some members of the system. Indeed we might suspect in general that *a social-economic system tends to resist anything that might cause restriction*. In other words, *a social-economic system tends to persevere according to its established striation*. It may not succeed in persevering long, nevertheless it will tend to persevere as long as possible. The term *conservation of striation* is not without possible meaning.

(iii) *Political parties take part in ethical and aesthetic evaluation. Tradition, polarization, and cultural lag.*

It is evident that some persons will be more affected, unfavorably or favorably, by restriction than others. Indeed affect, whether unfavorable or favorable, seems to be a matter of degree in a social-economic system. Never-

theless if we summarily say that those *most favorably* affected by a restriction constitute the *positive pole* of the restriction, while those *most unfavorably* affected constitute the *negative pole*, then we may suspect that a social-economic system is *bi-polarized* during a period of restriction. Should we find that a given system is constantly being restricted, then we should have to conclude that it is constantly bi-polarized.

Proceeding further, if we roughly define as a *political party* the group of persons whose interests lie at either of the two poles of restriction, and if we term the positive pole the *left pole*, and the negative pole the *right pole*, we may suspect that there will be a gradation of feeling from left to right as the population is graded during the period of restriction from those most favorably affected, down through those not affected one way or the other, on out to those most unfavorably affected. Though theoretically there may be any number of different political parties, one each for each grade of positive or negative feeling, nevertheless, except under conditions suggested implicitly in a later chapter, there are not unlikely to be roughly two main parties and a neutral group in respect to any given problem arising from restriction: the "left party," the "right party" with the "center" or neutral group in between. Of course the membership in these parties need not necessarily outlast the solution of the given problem of restriction; indeed the emergence of a new problem of restriction might make political bedfellows of previous antagonists, and the reverse. Yet during the solution of the given problem, party membership might be fairly rigorous. If now we call the old restriction the "traditional" restriction (from Latin *tradere*, meaning "to hand down," say, from grandfather's time) and the new restriction the "reformed" restriction

tion (from Latin *reformare*, "to remould," etc.), and if we let the right defend traditional striation and the left defend reformed striation, then we may reasonably expect to find that the center, while being both wooed and threatened by both sides from whose fighting and victory it may profit but little, will preach "intelligent compromise," if not actually write an essay in Latin on *Concordia*.

While this hypothetical fighting continues between left and right, the restriation will lag pending political decision. We might even say that *there will often be a cultural lag during restriation*. By *cultural lag* we mean a period in restriation during which the social-economic system in following the older and now no longer most economical ways possible, is not behaving most economically in terms of all its givens, old and new,—of which it is aware.

And so, in practice in a given social-economic system, there may occur these intervals of cultural lag during which materials are not moving with maximum possible economy in terms of the system's givens. We can say that a cultural lag is uneconomical, by definition. But we cannot say whether it is morally or aesthetically "good" or "bad," without first putting ourselves as it were, into a pair of boots of some member of the system itself. In this case we should first have to determine whether the pair of boots was to come from the left, right, or center, or one each from any two of them. It seems indeed that we have again failed in finding worth while objective criteria for any ethical or aesthetic values inherent in social-economic phenomena, this time in the phenomena of change of terms of production. We may not say that such values are simply non-existent outside of the verbal level of censorious criticism; we can only say that we fail to find what these terms refer to. Another investigator may be more successful. Of course we may have conceived our problem too

narrowly in our present objective analysis. Let us, then, in a final attempt at a solution of the problem of ethical-aesthetic evaluation,—a problem which is said to weigh so heavily on many present-day academic minds—let us depict a social-economic system in the throes of great economic duress resulting from extra-systematic and intra-systematic disturbances to its equilibrium. Here, if at all, we shall find the ethical-aesthetic criteria we are seeking.

e) The "human" side of our general equation; misery loves company; ethical-aesthetic evaluation and personal identification with class-interests.

The reader may feel that in our objective analysis we are overlooking "the human side" or the "psychological aspect" of our equation, that is, the hopes, fears, loves and ideals of the persons living in our communities. Instead of replying that an acidly objective analysis may lead in time to a very dispassionate understanding of "the human side" and the "psychological aspect" of our equation, let us ask the reader what the forces may be that govern the hopes, fears, loves and ideals of the persons living in our communities. Since the reader is one of these persons, let us help him in his answer by conjuring up in his imagination a condition in this country where a radical restriction would be necessary (*absit omen*) and where political strife would reach the boiling point (*etiam absit omen*).

Let us imagine that the people of the United States found itself facing an urgent need for restriction. For example, let us suppose that we had lost a war, that our conquerors had taken our treasure and had exacted billions of dollars in tribute from our industry over years to come, all because, say, of the way we treat our women and children (or for some other real or specious reason). They

have annexed the greatest portions of our natural resources, such as our mineral wealth, have cut corridors through our territory, split the country into subsidiary nations which are forbidden to join a customs union, and finally caused our neighbors, Canada and Mexico, to be hostile to us while the victors themselves through boycotts and hostile propaganda attempted to appropriate whatever was left of our foreign trade. In short, let us imagine that America has been Balkanized. For the sake of more precise reference, let us even suppose that this Balkanization resulted from a Northern defeat during the Civil War when the British backed the Southern Confederacy, with the French Empire thoroughly established under the monarchy of Maximilian in Mexico, and the French and British vying for whatever remained of value in our territory. What would the reader, a citizen of the United States, do under these conditions? In this connection the reader might refer to the instances of heterogeneity for the Civil War period as they appeared in Figure Six of Chapter One. The problem is one of ethical-aesthetic evaluations; the reader cannot be called to account because of his judgment which is private.

Obviously restriction and Ersatz would be necessary, and political parties would arise. During the attendant depression in which millions of Americans faced starvation and the ruination of hopes and happiness, and while perhaps hundreds of thousands killed themselves, we should doubtless find that some fared less badly than others, while a few might even profit. The reader's reactions to the situation might depend to no small extent upon how he was affected by this condition. If he had relatives or friends abroad who would lend him capital, he might make a fortune out of the deranged markets by acquiring valuable sites, factories and processes from those obliged

to sell at any price; in this event the reader might well feel that the Balkanizing peace treaty, though bad, was not really without its merits, and he might publicly believe that if America behaved docilely for twenty or thirty years, the victors might be moved to compassion. Let us designate as *internationalists* all those who may have helpful friends or relatives abroad, or whose support is not entirely from within the nation.

But that is not the reader's only possible reaction. Even without relatives abroad he might own banks or stores which might still profit somewhat either by lending money for the restriction or by now selling the Ersatz, instead of the originally genuine article, for a profit; and though these profits might be but slight, they could be invested very favorably during the duress of restriction; under these circumstances the reader might well consider the possibility of associating with the previously discussed class of internationalists and vote for a status quo, or a gradual solution over the years, lest he lose his personal advantages under a more radical movement. And so we might continue down the line until we came to the large mass at the bottom who, fearing destruction under the acute economic duress of the restriction, might well desire to procure life for themselves and for their children.

If the reader were a member of this mass, he might point out that he and his would be ruined, destitute or dead of starvation during the twenty or thirty years in which the victors were expected perhaps to become moved to compassion; he might cull the victors' history for incidents showing that they often ruined, bled or even extirpated peoples if it was profitable. Even while the reader was thus speaking, fellow citizens of his class might be starving about him. This then is the imaginary problem, in which

the reader himself will select the course of action which seems most righteous to him. Incidentally, there is nothing to prevent the reader's sacrificing such advantages as he may have in order to cast his lot with some other class. Thus, for example, a person of wealth who is potentially an internationalist, might well elect to fight, thrive or die with the third class (hereinafter the *home front*). Or if poor, he might try by sycophantism to become a retainer of, say, an internationalist.

The solution of this problem is not indicated by the nature of the problem itself. Those with advantages might win the day, preserving their advantages and letting the now superfluous members of the third class (home front) become reduced in numbers by starvation and privation until the total population had shrunk to a size that could be supported by the resources of what had been left of the United States. In this case the reader would either survive or disappear, according to his class-membership and the elements of chance; though this would be a bitter solution, the victors would doubtless say: "Brave little America!" just as we all said: "Brave little Austria" in the post-Versailles period.

On the other hand the forlorn and forgotten of America's home front might not consent to die so easily. Instead they might prefer to organize and risk their lives on the battle-field with the faint hope of restoring the United States to a functional entity and of securing life to themselves and to their children, rather than to sit inactive and face certain starvation; since America's neighbors are assumed to have been avaricious, self-seeking and intransigent, America's home front would scarcely consult their feeling in the matter; in fact, it would "play politics" in which all is said to be fair. Yet no sooner would America's home front start to organize, than the international-

ists and otherwise privileged persons in America might well seek to throttle the organization, lest the home front involve them in a war which, once lost, might so enrage the former victors that they would wreak further vengeance on America. If successful, the internationalists and the otherwise privileged would put down and keep down the other Americans, even if they had to enlist the military intervention of the former victors in the process. In that case the reader would be either among those putting down, or among those being put down, depending upon the class with whom his feelings of "right" and "the more beautiful" had identified him.

Yet if the internationalists and the otherwise privileged failed in their attempt to crush the home front, then as many of the internationalists and otherwise privileged as were able, would take as many of their possessions as possible abroad as refugees where they would perhaps seek to organize the like-minded internationalists and otherwise privileged into boycotting America, into adopting an antagonistic foreign policy against America, even into invading America in order to put out of power the home front government of America. In view of this hostility towards America from the actively organized American refugees abroad, the home front might consider confiscating the property not only of the refugees but also of their relatives and like-minded, even putting them under surveillance as a potential menace to the American state. And the reader would either confiscate or be confiscated, and so on, depending upon the class with which his feelings had identified him. Furthermore, the more the American refugees succeeded in increasing the economic duress in America, the more bitterly the American home front would fight the internationalists and otherwise privileged with retaliatory measures at home, and, if possible, also

abroad. No matter how much the friends and relatives of the internationalists left in America might protest of their love of America, the home front might remember that the internationalistic refugees had likewise once so protested.

At this point there might arise a great humanitarian cry abroad supported by the press and radio if these were perchance under the influence of the internationalists and otherwise privileged. Americans at home would be upbraided for their confiscatory, intolerant, brutal and inhuman behavior towards the internationalists and so on. For though it is frequently said that "all is fair in love, war, and politics," it is also frequently observed that that cause is likely to appeal to moral evaluations which has not fared too happily in the game of politics! Aroused by an inflammatory press and radio, the Europeans and the rest of the "Civilized World" might be led into a great humanitarian war—that is, a preventive war—against those remaining in Balkanized America who had once and for all preferred, if need be, the risk of the battlefield to the certainty of large-scale starvation.

And as the war proceeded, the reader would be in the ranks at home or in the advancing armies from abroad. A blockade might be declared upon America and Americans would be thrown upon their resourcefulness for producing every kind of Ersatz. As the war proceeded, all would have to become ever more alike in the home front, with a minimum of differences in thoughts and opinions (cp. Chapter Six). Individual action would be dictated entirely by the exigencies of the organized home front group (cp. Chapter Five); persons would do or not do, speak or not speak according to the needs of the total social-economic system (cp. Chapter Six). We might define this condition as one of *totalitarianism*, in which a

social-economic system introduces as far as possible a complete specialization of labor and materials in terms of the objectives of the entire system, and affecting every physical and mental act of every person. Though we shall return by implication to *totalitarianism* again in a later chapter to note that a system is not unlikely to come into this condition in order to defend itself against annihilation as a system from within or from without, we may remark even now that a system, once in such a condition tends also to purge as waste elements all those members that cannot or will not function primarily in terms of the total system.

After this imaginary war is over, if the American home front is defeated, it can resume its starvation and the emigrés can return again to their America, bringing their possessions with them. But if the American home front wins and reconstitutes the United States, then it has an entirely different set of reconstructive problems. In this case, incidentally, the emigrés and refugees abroad will have problems of their own, too.

Now if the reader will but go over the preceding broadly outlined imaginary conflict and identify himself with one side or another, he will sense, we feel, "the human side" or "the psychological aspect" of our equation, that is, the hopes, fears, loves and ideals of the persons living in our communities once the question of serious restriction emerges for one reason or another. We repeat: for one reason or another, because there are other causes of restriction than those of foreign invasion, as we shall see, once we are done with this chapter. And yet these other causes of restriction will be found so closely similar in their forces that the same arguments will apply, and indeed the same imaginary conflict will serve, to illustrate them. So much then for this imaginary condition of Balkanization which,

incidentally, might very well have resulted from a Southern victory in the Civil War. It should be remembered that our selection of the United States for an imaginary Balkanization was purely arbitrary. Any other social-economic system would have served equally well. Indeed the French Revolution, or the more recent revolutions in Germany and Russia can, in part at least, be considered represented in our above imaginary description. It has not been our purpose, however, to attempt to describe any given historical "revolution" in particular, but to describe, in a sense, all revolutions in general, insofar as they have in common the conflict of the "ins" versus the "outs,"—with hungry or worried foreign neighbors,—and to describe the general conflict in such a way that we may feel to what great extent our moral or aesthetic evaluations depend upon the side, by and large, in which our economic interests lie. Later we shall see what some of the factors may be in determining which side will most elicit a given person's active or passive support.

f) Summary: External and internal impingements upon striation and extrovertive and introvertive reactions.

Thus far we have found no empirical criteria for the evaluation of hypothetical ethical or aesthetic qualities inherent in social-economic activities as such. Hence, for our part, we shall have to enclose certain terms in quotation marks,—“moral,” “ethical,” “beautiful” and the like,—in order to remind ourselves that we have not been able to define the terms empirically. On the other hand our discussion of the problem of moral and aesthetic evaluation has not been without value for our studies, for it has shown the possibly intimate connection between economic factors and at least many so-called moral and aesthetic factors. However we know from experience that

an appeal to "moral" values can be an important factor in mobilizing action inside or outside a social-economic system with very serious potential consequences to the manner or even the possibility of survival of that system. Our imaginary picture above of hypothetically Balkanized post-Civil War conditions, not only serves to objectify our present discussion of ethical-aesthetic evaluation, but also serves incidentally to correlate our present discussion, on the one hand with our closing remarks in Chapter One about homogeneity in the United States after the Civil War, and on the other hand with our general problem of international conflict in Chapter Four following.

Up to this point we have been exclusively preoccupied with the economics of a single social-economic system without any reference to impacts or impingements from alien social-economic systems whose members also seek to live, prosper and be secure. In Chapter Four we shall inspect the interaction of groups of competing national social-economic systems. Yet even now we can note one striking feature of any social-economic system: any threatened change of its terms of existence may be resented, and any actual impingement is likely to organize, or *polarize*, the system in order to expel, or neutralize the effect of that impingement. Impingements may come from without or from within the system; for example, the system may be attacked by an alien system from outside its borders, or an internal force from within its borders. Hence its polarization may be *extrovertive* (i.e. turned towards the outside) or *introvertive* (i.e. turned towards the inside) respectively. The American revolution was primarily an example of extrovertive polarization against alien domination, whereas the American Civil War exemplified primarily an introvertive polarization. Nevertheless, in neither example was the impingement exclusively external

or internal. In the Civil War, for example, we were also standing our ground against European interference.

As we come to the end of this chapter we but remind the reader that its course commenced with a consideration of the implications of our generalized harmonic series as p increased from 0 to 1 under the assumption of certain constants. This course led through a lemma in which we watched how a group of human beings under conditions of minimal organization "developed socially." Then we saw the quantitative data for communities in India and in Germany, and we noted with what great propriety we might describe these data in terms of our generalized harmonic series with values if p lying between 0 and 1. And finally we discussed the verbal labels of pathological, moral and aesthetic coloring, that today in America are frequently applied in an evaluative sense to social-economic phenomena by many persons in the various academic, political, religious, commercial and other walks of life.

We do not know how correct our principles may be in describing the assumed underlying laws of social-economic forces. If they are incorrect, they should of course be ignored. But insofar as they may be correct, they describe at least some of what may fairly be called the laws of history from whose operation no mortal can escape, and which will continue to function without the coaxing of the author or of any other student of social forces. It is evident that the manifestation of these assumed forces in operation is very complex; nevertheless we may not assume that the ultimate disclosure of the fundamental nature of the laws is impossible because of their assumed complexity.

Let us now continue with our study. Up to now we have set forth reasons for supposing that there is such a bio-social entity as a "nation" (or call it what one will),

and we have assumed explicitly that there exists a system of automatic checks and balances of social forces which would explain our empiric findings. Let us continue to operate under this assumption and inquire, in Chapter Four, into the problems of an international competition between national social-economic systems so that we may learn more about the possible meaning of international influences and of extrovertive reactions. This done, we shall return, in Chapter Five, to the internal organization of a social-economic system with special reference to the effect of the activities of internal pressure groups of the type we have but cursorily mentioned. And then, in our final chapter, the problem of the "comparative goodness" of cultural "goods" will be broached, together with that of the drives that may determine the same. Here we may perhaps find a reason to suspect that a national social-economic system is a social organism, like a hive of bees, or a colony of ants or of termites, which, even in respect to the minutiae of "psychological" and "cultural" behavior is seeking equilibrium.

Naturally, in discussing international and other forces, we shall keep our emphasis on the importance of physical goods. For "where your treasure is, there will your heart be also," according to the Prince of Peace. Of course, as we proceed, we shall find reasons to believe that there may be other treasures than the purely material.

CHAPTER FOUR

The International Organization of World-Terrain

Up to this point we have been primarily interested in the organization of the population of a single social-economic system while it was engaged in exploiting the resources of its territory. In the case of the United States we have seen a social-economic system emerge from within the confines of its territory; in the case of Germany we have seen a social-economic system break its bounds in order to acquire additional territory for the functioning of its system; yet in either case our emphasis has been primarily upon the system and not upon the territory, even though we have been able to understand the functioning of a system only in reference to some territorial background.

But now in Chapter Four we shall turn the problem around and place our primary emphasis upon the territory itself. For example, we might take the territory of combined North and South America as it might appear free from all human habitation; and we might introduce, in imagination, a sizeable population of persons who will increase in number until the resources of the entire terrain are finally exploited with maximum efficiency. The question would then arise whether in this case we should find that our population of North and South America constituted one single homogeneous social-economic system with one greatest community, or whether, in the course of its growth, the population had broken up into more than one system, with each system having its own largest community to serve as a quasi-nucleus for the entire system. In other words, during the ensuing pages of Chapter Four, we shall be engaged in asking the fundamental question of whether the extent and nature of terrain does not in the

last analysis determine the number of social-economic systems within its limits. And while we are engaged in asking this question, we shall also be simultaneously engaged in seeking an answer. So that the reader may know at once towards what final hypothetical conclusion we are heading in answering the above question, let us state our answer in advance: the extent and nature of the terrain will indeed determine whether there will be any human social-economic system at all and, if so, how many. Stated in terms of the entire surface of the earth, this conclusion implies, first, that no single social-economic system will ever long dominate the earth's surface, and, second, that the surface of the earth will indeed find itself populated by individual human social-economic systems (i.e. "nations"), which, third, may tend in the course of time to become loosely federated into groups engaged in what we may term "international intercourse." To illustrate the general purport of our conclusion we might take the analogous case of an acorn on the one hand and a piece of terrain on the other whose limits have been enclosed by a high wall. If we plant the acorn in this confined piece of terrain in the hope of growing an oak-tree, the result of our planting will depend upon the size of the piece of terrain. The piece may be too small for even one single oak tree, or just large enough for one, or indeed so large that it will accommodate a whole forest of oak trees. Of course in the case of our acorn, there is a tendency for the acorn to reproduce itself within the limits of its territory; and we shall close our chapter with reasons for believing that a human social-economic system may have the same tendency. In fact in our closing discussion of *war* and *peace*, and of "national hates" and of "national loves," and of the international competition for "the supplies" to meet "the demands" of preserving "our way of life," we may be

reminded quite forcibly of the rest of biological nature.

In the present chapter we have a long trek ahead of us that may not escape an occasional impression of discursiveness because of the nature of the topic; nor will this impression of discursiveness at times be decreased by the author's attempts to avoid any suggestion of an ethical evaluation of what are today highly controversial topics; for the more that he can demonstrate that the events of history are the results of natural law in operation, the more he will have succeeded in his demonstration.

As to our demonstration, we cannot in fact take a large uninhabited terrain and experimentally watch it develop under human habitation. Hence we shall begin with an investigation of actual present-day social-economic systems, and simply build upon our findings of the previous three chapters where the problem of homogeneity and of striation was discussed in considerable detail. Indeed the chief problem of this chapter, as we shall see, is fundamentally that of national-international striation, with the location of international striation dependent upon that of the national, and the reverse—the two being so very intimately inter-related that we shall never be able to fix a *permanent* boundary between the two.

Nevertheless, and in spite of the interrelatedness of national and international striation, the national does seem indeed to be primary over the international, both in point of evolution and in degree of force. Thus we shall see how the earth's inhabitable surface under the occupation of social man will eventually break up into rough social-economic (i.e. "state" or "national") units, whether as small tribes or as vast nations like the United States today; in other words, in the assumed all-inclusive balance of nature there is apparently a legitimate place for individual social-economic states or nations, just as there is

for individual colonies of bees or of termites. But as for the hope for a single world-wide all-inclusive homogeneous superstate with a single capitol, the author finds no historical nor dynamic justification for it, either in the human world or in the rest of the biological; indeed, rather the reverse. Loose international confederation is not only thinkable but, in the long run, even likely, yet not the superstate; and we say this mindful of the fact that man is probably but beginning his chapter in the evolution of animal sociology.

But let us turn to our investigation, now that we have finished this introduction and general orientation. We shall commence (1) with an inspection of the question of homogeneity and heterogeneity in our general equation, which will lead us (2) to an investigation of the distribution of all the large communities of the world. From then on we shall rapidly present data for communities (3) of the British Empire, (4) of Europe, (5) of the old Austro-Hungarian Empire as well as for Austria and Hungary, and (6) of France for the last fifty years. Our rapid review of these sets of data above, will broach (7) the whole problem of boundary-fixing, in the solution of which so much blood has been shed throughout the centuries. Then we shall take two typical examples of problems of world-striation, one (8) being hypothetically that of mediaeval Venice, and the other (9) being that of the present-day British Empire; the discussion of these two problems will lead us to the topic (10) of the "balance of power" and world-unbalance; here we shall discuss certain aspects of present-day international conflict between systems using what we shall call the *organic-contiguous solution* of their territorial problems and those using the *imperialistic-discontinuous solution*. This discussion will introduce the question of those organic-contiguous solu-

tions that possess what we shall call *multiple-nuclei*, first (11) in the hypothetical case of Russia, and then (12) in the possibly future case of the United States, where all may not be so completely balanced as some might believe.

With these general steps in mind let us turn to a brief inspection of the problem of homogeneity and heterogeneity as it appears in our equation of the generalized harmonic series.

1. HOMOGENEITY AND HETEROGENEITY OF THE GENERAL EQUATION

$$A Sn = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{n^p}$$

A convenient point of departure for the study of international-intranational striation and indeed the whole problem of terrain will be our generalized harmonic series,

$$A Sn = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{n^p}$$

(with p greater than 0 but not greater than 1) and our first remark about it is that the right hand member of the equation is an orderly series of fractions. We cannot add fractions to this series (except by increasing the size of n), nor remove fractions from this series (except by decreasing the size of n), without ruining the series. In short, all that we have said about homogeneity and heterogeneity in reference to a harmonic series in Chapter One, applies automatically, *mutatis mutandis*, to our generalized harmonic series here. Therefore we may say at once in terms of our generalized series what we said previously in terms of our harmonic series: if, in the terms of the generalized series, the whole is homogeneous, then the parts are not homogeneous; and, if one or more of the parts are homogeneous, then the whole is not homogeneous. Fur-

thermore, since our generalized series appears always as a straight line on log.-log. grid, a straight line will be a test of homogeneity.

For the sake of an initial orientation let us now pass rapidly in review the data for the world and for some of its parts, including the British Empire and its parts, Europe, France, the old Austro-Hungarian Empire, and post-war Austria and Hungary. With these data as a background, we can discuss such questions as world-striation, the balance of power, the dynamics of peace-treaties, and the like. The discussion of these questions will lead to the problem of confederations of states, from whence we shall return to some of the problems confronting the United States today.

2. THE DISTRIBUTION OF WORLD-POPULATION IN COMMUNITIES OF NOT LESS THAN 100,000 IN 1920

Our first set of data to be presented represents the sizes of communities throughout the world containing not fewer than 100,000 inhabitants at moments of measurements in or near 1920 taken from the *Statistique générale de la France: Résultats statistiques du recensement de la population*, Paris (1928) I, 134-139. Because of the nature of these international data, certain notes of warning are in order. First of all, the data were originally obtained by combining the data of individual national census reports, which (a) may or may not have used identical methods of census enumeration and statistical classification, and (b) may or may not have equally resisted temptations to express national pride in the statistics for their largest communities. On the other hand, the fact that these data were not all collected in 1920, need not seriously disturb us; a complete, simultaneously collected set of data for

1920 would probably not seriously alter the distribution of these communities as presented in Figure Eleven.

Before discussing the implications of these data, incidentally, we might remark that the size of the largest community, London, is represented by two points: (a) the lower point is the one given in the original published tabulation to which the reader is referred; (b) the upper point is the one for "greater London" which is included because

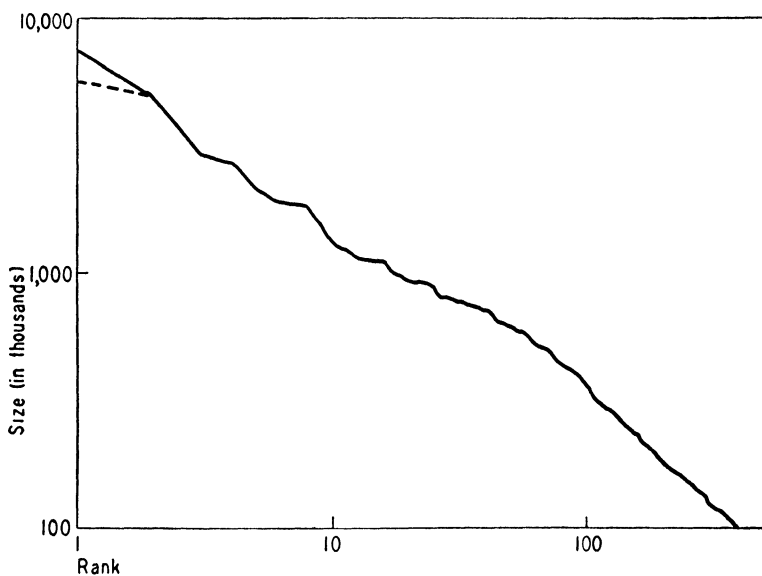


FIGURE XI. CITIES OF WORLD with at least 100,000 inhabitants (about 1920), ranked in the decreasing order of size of population.

it will be of importance to us in later comparative statistics (i.e., those for Europe and the British Empire). It might be suggested that the same problem and argument presented in connection with the size of "Metropolitan New York" in Chapter Two applies automatically to a greater or lesser degree to all the large communities in the

distribution before us now; yet this general problem of "metropolitan" communities is not of sufficient importance at this moment to merit more than passing mention.

We note that the line of Figure Eleven is on the whole reasonably straight and that, in the light of these data, the whole world was indeed to some extent a single social-economic system in 1920, at least as far as those communities are concerned which have not fewer than 100,000 inhabitants. Of course, one might choose to doubt that this line is absolutely straight. But, instead of attempting here to remove this doubt, the author merely states that after presenting additional relevant data, we shall return later to a further consideration of the question of the line's straightness and ourselves ask the following question: how must the earth's striation be organized so that the line of Figure Eleven, if it is really not straight, shall become and remain straight with some specific city as world-community of Rank One? For the time being we shall assume for the sake of argument that the line is straight. Furthermore we shall similarly assume that since the whole is homogeneous, the parts are not homogeneous, even though we already know from our previous figures that some of the parts (e.g. United States and Germany) have themselves a high degree of community-homogeneity in terms of a harmonic series.

3. THE COMMUNITIES OF NOT LESS THAN 50,000 INHABITANTS IN THE BRITISH EMPIRE, CA. 1921

In Figure Twelve are presented the data for communities of not less than 50,000 in the British Empire at about 1921. This compilation was made by the author from the official census reports of individual parts of the British Empire (see also Figure Thirteen).

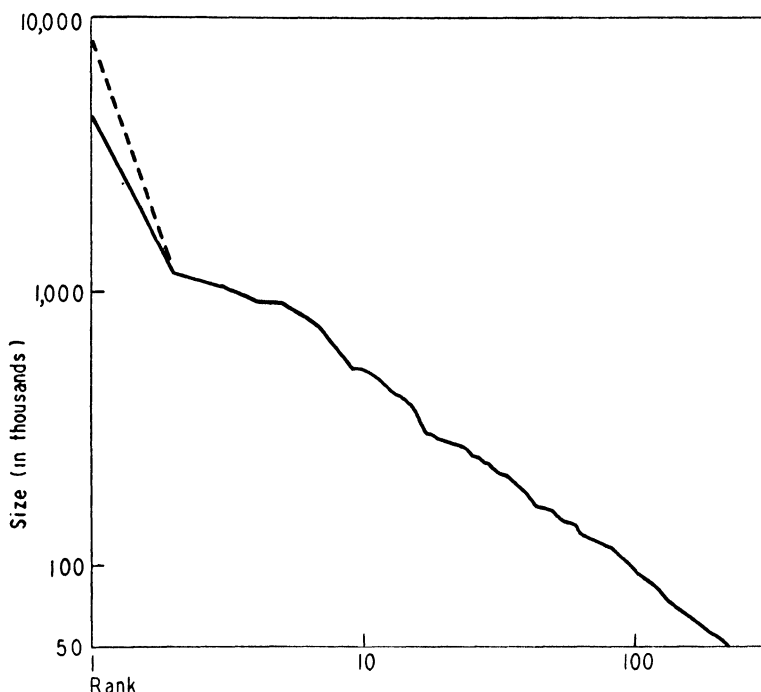


FIGURE XII. CITIES OF BRITISH EMPIRE with at least 50,000 persons (at about 1921) ranked in the decreasing order of size of population.

We note in Figure Twelve that the largest community, Greater-London, looms disproportionately large for community of Rank One for the British Empire. Since we noted in Figure Eleven that Greater-London was of just about the right size to be World-Community of Rank One, it is necessarily much too large for the communities of only a part of the world. In other words London is only incidentally the largest community of the British Empire because it is the largest community of the world.

And by the same token, the remaining communities of the British Empire seem disproportionately small in com-

parison with London. Communities of Ranks 2 through 5 seem moreover to be nearly horizontal in slope, whereas

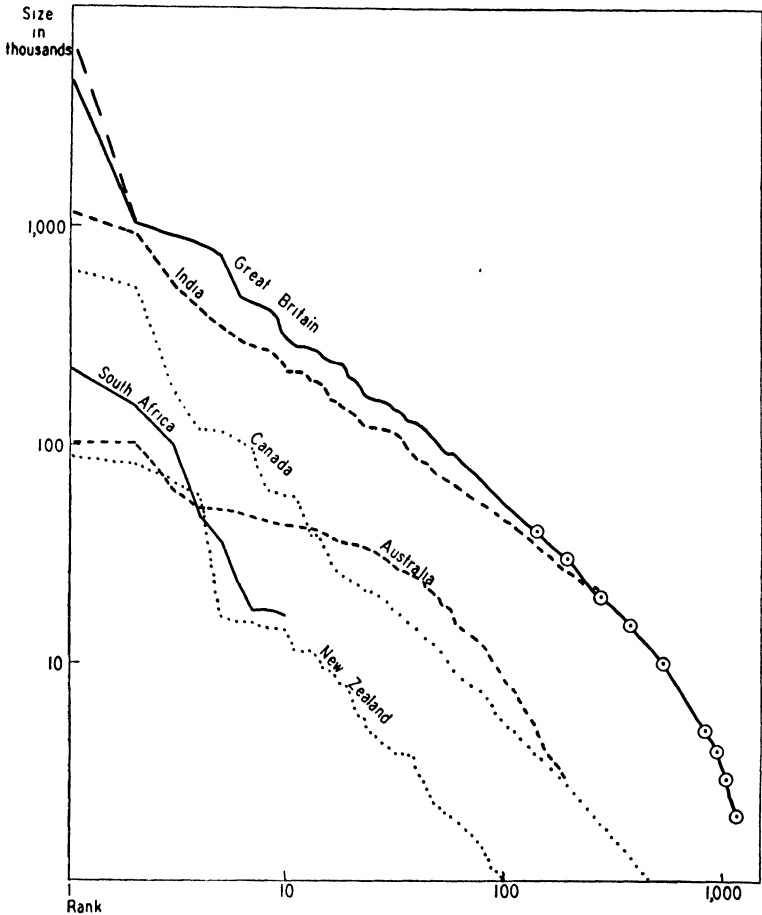


FIGURE XIII. COMMUNITIES IN CHIEF PARTS OF BRITISH EMPIRE (at about 1921).

the smaller communities yield a comparatively straight line of their own. Of course the straightness of this lower

portion of the line in Figure Twelve is probably to no small extent the effect of the straightness of the line for the communities of India presented in Figure Nine, Chapter Three. That is, the colossal population of India does much to swallow up the comparatively small number of lesser communities in the rest of the Empire.

In order to illustrate the nature of the chief parts of the British Empire of Figure Twelve, we present, in Figure Thirteen, the individual data for each of (1) Canada, (2) Great Britain (i.e., England, Scotland and Wales), (3) India, (4) South Africa, (5) New Zealand, and, (6) Australia.

In Figure Thirteen we note that only the data for Canada and India, as discussed previously in Chapters One and Three, reveal anything approaching homogeneity.¹

In sum, we may say that the British Empire as a whole and in part, except for Canada and India, was in a condition of heterogeneity, or of unbalance. Indeed the world as a whole, in respect to communities of not less than 100,000 inhabitants, possessed a higher degree of homogeneity in 1920 than the British Empire at about that time.

4. EUROPE AT ABOUT 1880 AND AT ABOUT 1926 IN RESPECT TO COMMUNITIES OF NOT LESS THAN 100,000

In Figure Fourteen we present data for communities of not less than 100,000 in Europe at (A) about 1880, and at (B) about 1926 (from *Résultats Statistiques*, op cit.). Of the two curves that for 1926 (B) seems off-hand to be

1. True the South African statistics represent apparently only an enumeration of non-negro persons; the author is not sufficiently informed about South African conditions to judge whether a more completely human enumeration would make the data more homogeneous.

a much closer approximation to a straight line, particularly in respect to the larger communities. For in 1880, the community of Rank 3 was out of proportion large in respect of the size of London; yet, in the intervening fifty odd years, this community, together with a few others, has been brought into line with Greater London.

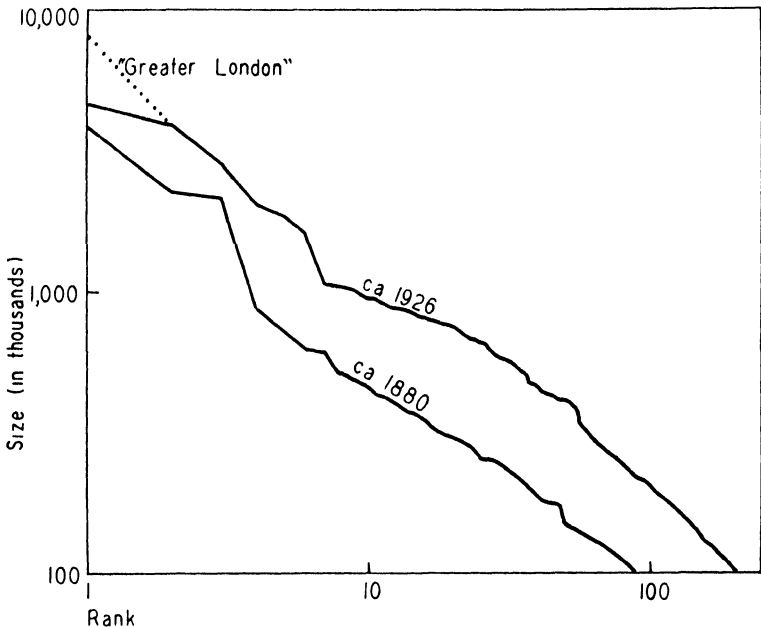


FIGURE XIV. CITIES IN EUROPE of not less than 100,000 inhabitants in (a) 1880 and in (b) 1926 (approximately).

It would be interesting to investigate the individual communities of this curve by name, and to discover what happened to which in the general upward growth from 1880 to 1926, to note how Paris yielded its rank to Berlin, for example, and the like. But any such specialized investigation belongs properly under the social-economic

history of Europe, rather than to the present study of general principles.

In the lower portion of the two curves of Figure Fourteen, we observe a greater linearity for 1880 than for 1926; indeed a marked concavity downwards has appeared by 1926 for communities smaller than one million suggesting the possible existence of additional communities of sizes smaller than one million, which, though lying outside the geographical boundaries of Europe, nevertheless should be reckoned as belonging to the social-economy of Europe.

In summary, Europe in 1926 with its concavity downwards was probably not an integrally balanced social-economic system by itself. And we do know that England, France and other European nations had important non-European colonies whose social-economic activity they tried to integrate into their own.

5. THE AUSTRO-HUNGARIAN EMPIRE IN 1910; AUSTRIA AND HUNGARY IN THE POST-VERSAILLES PERIOD

In Figure Fifteen we present three sets of data, all for 1910: (a) the data for the communities of the Austro-Hungarian Empire; (b) the data for the communities of Austria; and (c) the data for the communities of Hungary, including those in Croatia and Slovenia. These three sets of data are particularly valuable because they represent a social-economic system that was comparatively large geographically, yet very diverse linguistically and culturally. But before dwelling upon the implications of these topics, let us first discuss our handling of the data.

The data for the Austro-Hungarian Empire (a) represent a combination of the official data for Austria (b), and for Hungary (c). The data for Austria are complete whereas those for Hungary are only approximate (to a

very high degree) for communities smaller than 10,000. Because of this approximate nature of the Hungarian data, the combined Austro-Hungarian data (a) are also only approximate (to a very high degree) for communities smaller than 10,000.

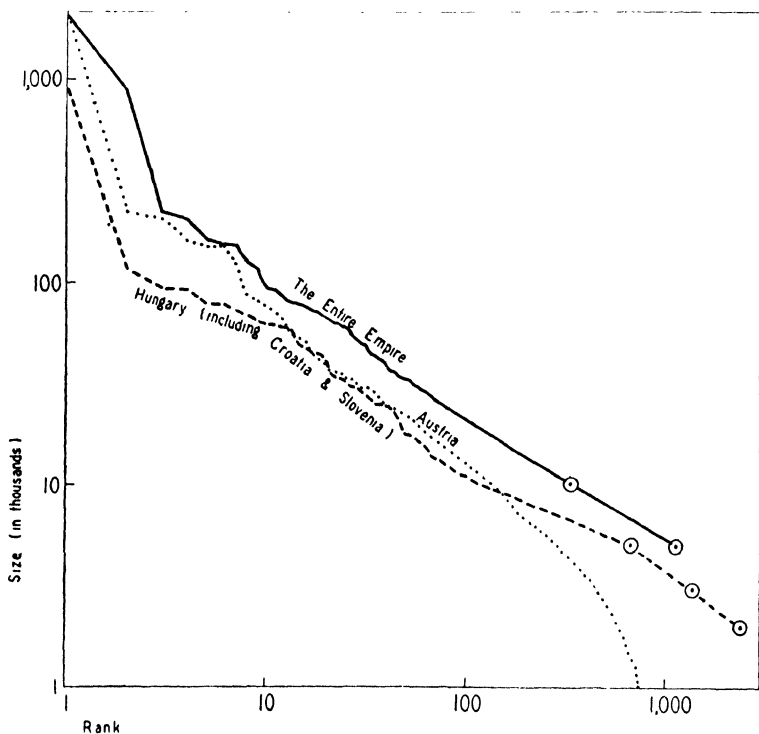


FIGURE XV. AUSTRO-HUNGARIAN EMPIRE, 1910. Population of Communities in (a) the Entire Empire, in (b) Austria, and in (c) Hungary.

It is evident from Figure Fifteen that except for the two largest communities (i.e., Vienna and Budapest), Austria-Hungary was a fairly homogeneous unit, with the exponent, p , of the series represented by this line being less than 1. On the other hand Austria (b) and Hungary

(c) were each independently grossly lacking in homogeneity. Here was then a clear case of two national groups that complemented each other social-economically. Nevertheless the top-heaviness of the two largest communities, Vienna and Budapest, indicate that, as a whole, the empire was not completely homogeneous. Since many observers have already suspected from other sources that the Austro-Hungarian Empire was over-centralized in its government, these statistics confirm previous suspicions. By over-centralization we mean essentially that a disproportionately large amount of the produce of the Empire went through the sewers of the two largest cities. Activities were centralized in Vienna and Budapest which might more properly have been located in what amounted to the social-economic background of two great aristocratic cities. We may suspect, in other words, that there were sizeable numbers of persons who preferred to live less economically in these two communities than outside them; these persons included not only absentee landlords and their retainers and servants whose wealth came from elsewhere, but also others, from inside and outside the Empire, for whom the great urban cultural emoluments to which they were exposed with or without significant participation, offered considerable social-economic compensation.

Let us now ask what happened to this empire. In Figure Sixteen are presented the official data for Austria in 1923 and 1934 respectively; and in Figure Seventeen the official data for Hungary for 1920 and 1930 respectively. We shall discuss first the Austrian and then the Hungarian data.

The Austrian curves for both 1923 and 1934 show very marked degrees of unbalance (*deficiency*), with far too many persons in the large communities, on the one hand,

or with far too few in the small communities on the other. The non-linear nature of the curve was emphasized even more between 1923 and 1934 by an increase in the number of communities containing more than 2,000 inhabitants.

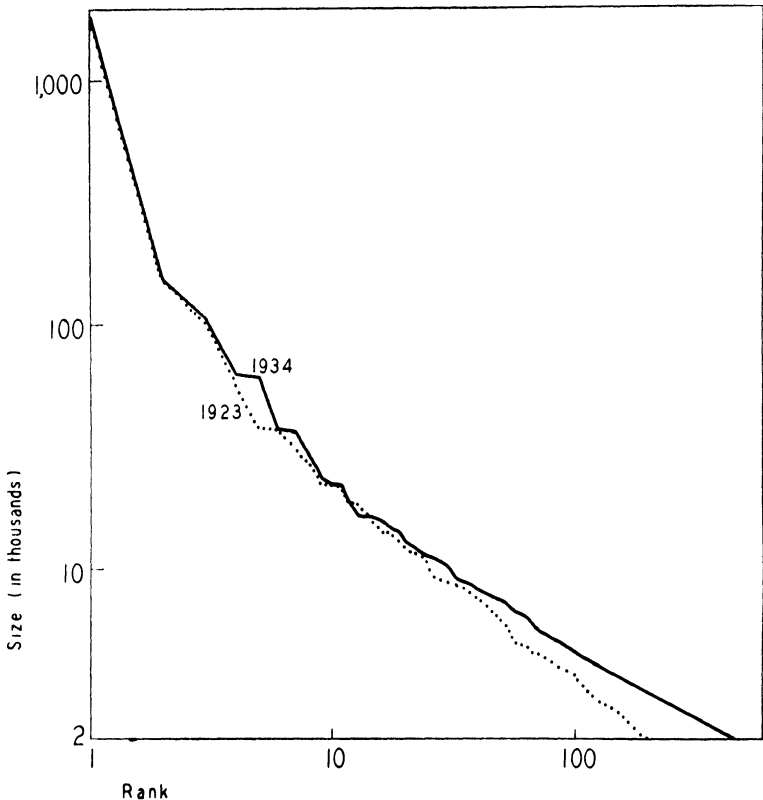


FIGURE XVI. AUSTRIA. Population of Communities in 1923 and 1934.

The Hungarian curves for 1920 and 1930 reveal also a quite noticeable unbalance with Budapest too large proportionately for the rest of the country. In one respect there seems to have been an attempt to correct this unbal-

ance. For we observe a general growth in the number and sizes of all communities of one thousand or more inhabitants.

In discussing the later history of the Austro-Hungarian Empire (Figure Fifteen) one cannot pretend, of course, not to have noticed the effects of the treatment it received

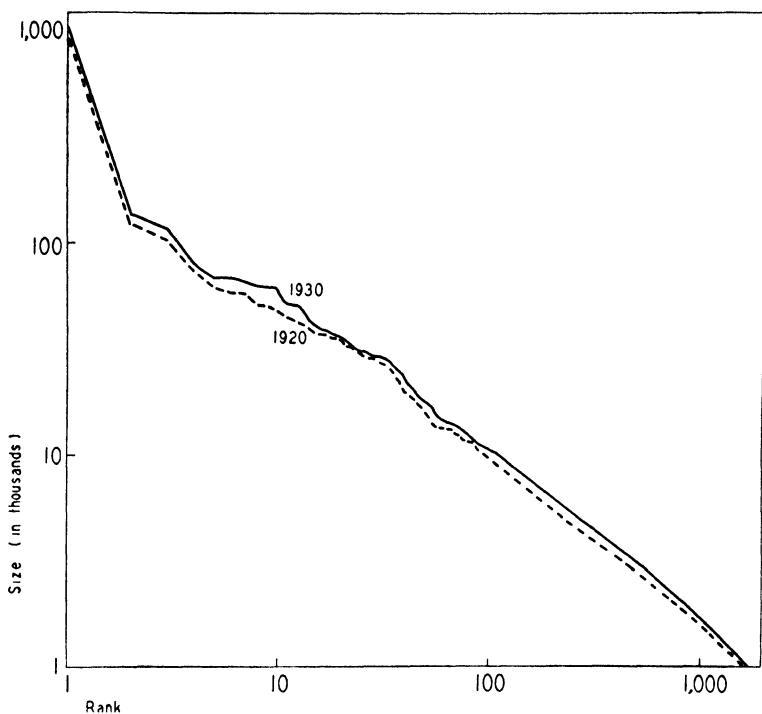


FIGURE XVII. HUNGARY. Population of Communities in 1920 and 1930.

at the hands, first of England and France, and then of the Little Entente, including Czechoslovakia, even though the old Empire itself was probably a top-heavy affair. The boundaries of Austria and Hungary seem indeed to have been drawn so that neither could survive with any pre-

tense at well-being, if our various, previous hypotheses be valid.

Of course we need not necessarily assume in general that all the social-economic activity of every system must inevitably occur within its political boundaries. Political boundaries may conceivably be but largely nominal, as is the case, for example, with the boundaries of townships in certain Middle-Western states of the United States. On the other hand political boundaries may be very real in the sense that they suffice to halt or otherwise impede the flow of goods. Which, now, was the case with post-Versailles Austria and Hungary? The correct answer to this question may explain much of their past and future history.

The post-Versailles boundaries of Austria and Hungary were actually very real boundaries in a social-economic sense, if we may trust the record. The boundaries of Hungary, for example, were said to have been drawn by France and England, avowedly so that sufficient Hungarians would be included as minorities in Austria, Czechoslovakia, Roumania and Yugoslavia to keep Hungary at odds with her neighbors for years to come; and these neighbors, with the exception of Austria, formed a Little Entente to keep Hungary in her place. Furthermore Austria, as we remember, was prohibited from forming a customs and monetary union with her neighbor, Germany, during the post-war period.

Let us pause for a moment to inspect the possible consequences of the diplomacy of the Gallic and Little Entente as it finally affected Austria. In Figure Eighteen are presented for didactic reasons the data for Austria in May, 1939, with the data for Austria in 1934. In view of the marked differences between 1934 and 1939, we cannot but conclude that somehow, during this interval, the assumed social-economic forces involved in this total

situation suddenly moved towards greater social-economic equilibrium. (Data for U. S. A. in 1930 are presented for comparative purposes.) We leave Figure Eighteen with the reader without further comment.

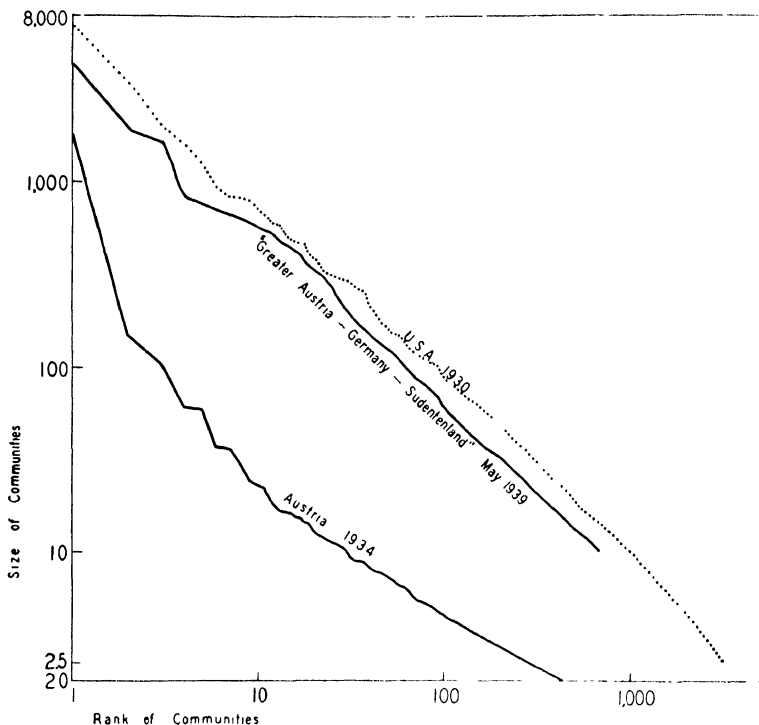


FIGURE XVIII. On "LEBENSRAUM."

6. THE DEVELOPMENT OF COMMUNITIES IN FRANCE, 1886-1936

We now turn to France and present in Figure Nineteen the official census data for communities of 100 inhabitants or more for the arbitrarily selected years 1886, 1911, and 1936; and for communities of 5,000 inhabitants or more

for 1926. Although the author has inspected all the available French census reports (none before 1886 seemed reliable to him), he feels, nevertheless, that, in view of the slightness of the changes in this interval of fifty odd years, the four curves selected may be viewed as typically representative of the main trend in which we are interested.

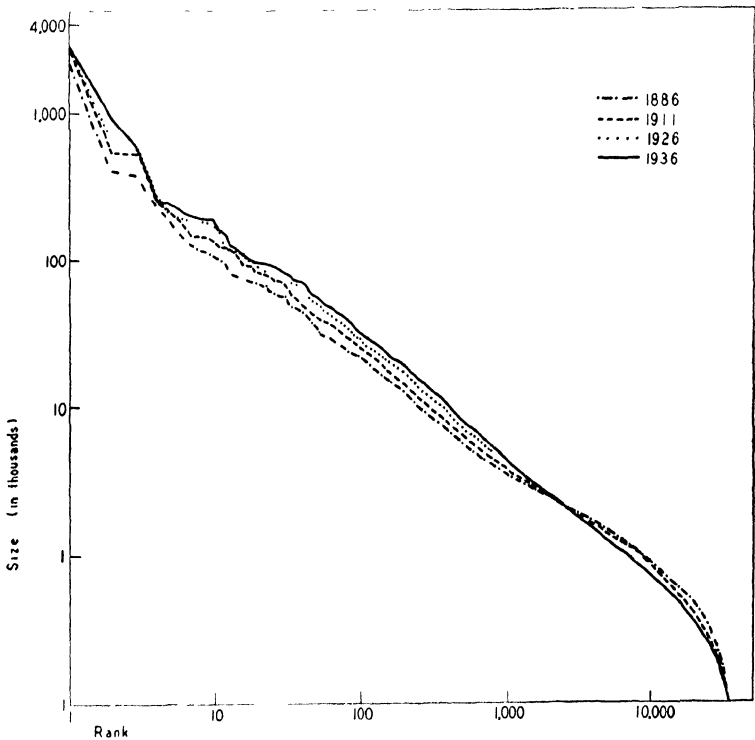


FIGURE XIX. FRANCE. Population of Communities, 1886-1936.

The French data are striking for several reasons. First of all, the largest community, Paris, is disproportionately larger than the eight or nine next largest communities. This preponderance of Paris may be ascribed, perhaps, to

some extent to the presence of foreigners who have found Parisian residence attractive. In 1921 there were 620,865 foreigners resident in Paris and its suburbs, out of a total of 1,550,449 foreigners in all France. Some of these foreigners may of course be productive in French social-economy in spite of their foreign citizenship; hence it would be unwise to generalize about them without additional information. Then, too, the preponderance of Paris may be ascribed to the effect of the previously highly centralized royal government of France which was not unlike that of Austria-Hungary,—a highly centralized government that has scarcely become appreciably less centralized in the Republic. And finally the preponderance of Paris, like that of London, may be ascribed to the fact of its being the chief community of an empire lying beyond the boundaries of France proper.

Yet the size of Paris is not the only interesting feature of the French data. Equally interesting is the quantitative picture of the other large French communities of 100,000 or more inhabitants. And even more interesting is the quantitative picture of the communities with less than 100,000 inhabitants. Let us consider in turn the communities with more than 100,000 persons and then those with less.

We notice that the communities of ranks 2, 3, 5, 6, 7, 8, 9 and 10, for example, have all grown at a faster rate than Paris since 1886, even though these ranks need not necessarily refer constantly to the same actual communities. Yet in spite of this general growth, the respective gains in these communities have resulted in an approach to a certain tendency towards horizontality in this section of the curve by 1936. In view of this indication of horizontality, or, if one will, of heterogeneity, one seems justified in wondering how nationally integrated the industry

of France may be. So much, then for the larger communities of France.

Far more important for our purposes are the alterations that have occurred among communities with fewer than 100,000 inhabitants. Though the slope of this portion of the line has not changed appreciably, the line has become straightened by means of a two-fold change at the pivotal point of about 2,000. Thus the communities with more than 2,000 inhabitants generally increased in size, while the communities of less than 2,000 generally shrank in size. In 1886 the line for this range was approximately straight only as far down as the communities of about 4,000 inhabitants, beyond which it bent out appreciably to the right until it reached communities of about 1,000 when it bent downwards sharply. In 1936 the line continues straight down to communities of about 500 where it bends down sharply, though less sharply than in 1886.

In sum, our French data suggest that France *on the whole* has become increasingly more homogeneous since 1886; the rural-peasant towns of France have become ever more firmly integrated into the total social-economy. It should be remembered, however, that in a certain sense these French data are incomplete, for France is really but part of a great Empire, and we have no real reason for segregating France from her Empire. Yet the picture of France in her Empire is commonly felt to be quite different from that of Britain in her Empire. That is, many believe that France's Empire is less integrated with France than the British Empire with Britain; hence we might believe that the addition of data from the entire French Empire would not appreciably alter the statistics for France. This belief, though doubtless in accord with popular feelings about France and her Empire, should probably not be considered too seriously without supporting quantitative data.

Nevertheless, the problem of France in her Empire broaches here the whole question of the "proper" fixation of territorial boundaries of any social-economic system,—a question that we have assiduously avoided answering up to this moment. Now that we have presented a very sizeable amount of quantitative data for communities within territorial limits, let us turn to the general problem of determining just where permanent territorial boundaries should be fixed between social-economic systems.

7. ON THE GENERAL PROBLEM OF BOUNDARY FIXING

In asking how one can determine just *where permanent territorial boundaries should be fixed*, we are at once guilty of asking a double question. More precisely stated our question should be, first, whether there can be such a thing as a permanently fixed territorial boundary, and, second, what factors will determine where a given territorial boundary should be located. For unless we can first establish that there is such an entity as a "permanently fixed boundary," we need waste no time in asking about its location. Nevertheless the very asking of the question is not without considerable didactic value as will become apparent, once we attempt to answer it. Though we are asking our question in reference to the territorial limits of what we call nations, we shall see inferentially that the same problems may well arise in reference to the territorial limits of farms, factories or any other similar entity; territorial limits, after all, are territorial limits, whether of farm, factory, or of nations. And we shall see that whatever passes as sensible or absurd in the one case, may well pass as sensible or absurd in the other, for reasons that we shall now attempt to set forth briefly.

Almost any peace-treaty, and practically every peace-treaty following a complete military victory over an

enemy, is concerned somewhat with the problem of fixing new national boundaries between the victors and the vanquished, in which the victor generally takes territory from the vanquished by force, with or without further pretext. This annexing of territory by force from another nation is not without occasional counterpart in civil life, where under duress one person or corporation procures real estate from another. Let us briefly note certain aspects of these counterparts in civil life. We need not enter into the various forms of duress used in civil life, such as the purchase of the mortgage on the land, or of the victim's other debts, for the purpose of foreclosing on him or of forcing him into bankruptcy. Rather let us but mention that the reasons for acquiring the new territory may be either to add to the wealth and security of the person who acquires, or to harm and embarrass the person who conveys, or both. Though there may be other motives, these are the main motives for acquiring land by duress. And in a very practical sense they are the motives behind the forced ceding of lands between nations, as are often publicly avowed at the time of peace treaties, if not during the war.

But a peace-treaty between two or more nations is frequently something more than the ceding of lands for the deliberate enrichment of the one or for the deliberate impoverishment of the other, or for both. A peace-treaty is often also a contract, or covenant, between the victors and vanquished which sets forth the new terms, both territorial and non-territorial, that shall govern the future conduct of the two nations. The question naturally arises whether there may be any restrictions of any sort upon the treaty makers. By first noting whether there are any restrictions of any sort upon the drawing of international treaties, we shall be in a position to inquire into the specific

restrictions that may apply to the ceding of territories, and hence gain insight into the problem of boundary-fixing in general.

In this matter of general restrictions, let us first ask whether the victor can force the vanquished to suspend the operation of the laws of physics in behalf of the victor. For example, could the victor demand not only the air-rights over the territory of the vanquished, but also that the vanquished must suspend the operation of gravity over his territory so that the victor's airplanes will not fall while traversing the newly acquired air-rights. Though there is nothing to prevent a victor from coercing his victim into agreeing to suspend the gravitational forces over his territory, nevertheless there is no way known for the victim to suspend the operation of the gravitational forces. Indeed we may say without further ado that every treaty or contract of any sort must be written within the terms of physical laws, if it is to be kept. Hence there is at least the restriction of physical law upon all treaties, covenants, or other contracts of any sort. For no matter what the treaty may say, the nature of physical law is not a matter for human contract.

But let us go a step further and ask whether the victor can force the vanquished to suspend the operation of the laws of biology. For example, can the victor force the vanquished to maintain his previous rate of agricultural and industrial production and deliver all agricultural-industrial products to the victor for his consumption? This exaction would imply that the population of the vanquished country would itself consume nothing of its own production in the form of food and clothing and the like, but simply produce indefinitely for the victor's consumption. Here again we must remark that though the victor could conceivably impose such terms as these upon the

vanquished, the vanquished could not possibly fulfil them, because the human body, even of a vanquished person, once and for all needs nourishment in order to live. And as we have argued about this particular example of the exigencies of biological law, so too we might argue about others. Thus, to continue, the vanquished could not contract to remain free from all illness, nor contract never to die, and so on. Hence we may say that there are restrictions of biological law upon all treaties, covenants, or contracts of any sort. That is, in other words and in the terms of an analogy, a cow has to be fed and otherwise tended if it is to give milk. Hence we may remark, without fear of controversy, that all treaties and covenants of any sort must also be written within the terms of the laws of biological forces, if they are to be kept.

But are there perchance other restrictions beyond those of physical and biological law which makers of treaties, covenants or other kinds of contracts should respect? For example, are there perhaps such things as psychological restrictions? That is, could the victor demand of the vanquished that he should no longer love, hate, fear or hope? Of course the victor could indeed coerce the vanquished into agreeing thereafter not to love, hate, fear or hope, yet whatever the assumed laws of love, hate, fear, or hope may be, we have yet to discover that man can completely control them even if he genuinely wants to. It follows then, for all we know to the contrary, that there may also be psychological restrictions upon international treaties or contracts as there are upon personal treaties or contracts. We might even suggest at this point that there may be potentially no greater source of social-economic turmoil than that exerted by a person in strategic administrative position, whether international, national, or intranational who does not appreciate the importance of these psycho-

logical restrictions, of which one is said to be: "every man has his vanity."

At this point the reader may ask what these physical-biological-psychological restrictions upon treaties or contracts may have to do with the general problem of boundary-fixing. To this question the author replies that boundaries can be drawn in such a way that those living within the remaining boundaries and desirous of surviving can in fact survive only by reversing either (1) the physical laws of nature, or (2) the biological laws of nature, or (3) the psychological laws of nature. Thus, for example, we might remove those territories of a social-economic system which contain the system's raw materials and arable land, so that the inhabitants of the land, in order not to die, would either have to conjure up matter and energy out of sheer nothingness, or else be obliged to exist from sheer nothingness. Or we could remove just enough of the essentials of life that the inhabitants would be reduced to little more than animals after the abandonment of all their previous cultural goods and ways of living with no other purpose in life than that of procreating their kind to serve as slaves of production for the victors. In other words, we might draw such a treaty as would completely break up the social-economic organization of a system and destroy its morale. Treaties of this type have perhaps not been unknown to history. Nevertheless the above discussion serves rather to illustrate how *not* to draw boundaries (if one perchance wants "peace"), than to establish an unequivocal method of "permanently fixing boundaries." Nevertheless, let us continue.

We have seen from the previous cursory inspection that the single act of removing territory from a social-economic system can suffice to infringe upon the laws of physical forces, or of biological forces, or of what we shall tenta-

tively term the assumed laws of psychological forces. This does not mean that the presumed laws of physics, biology, or of psychology cease to exist under these infringements—for no one can alter the nature of these laws—but rather that these laws, in operating naturally, may produce results quite contrary to those which the treaty-makers contemplated or desired. Thus, if we take the Treaty of Versailles as an example, we cannot say that this treaty in any way altered the nature of the laws of physics, biology or psychology, but rather that it so disturbed conditions in Europe and in the world that during the ensuing years the effects of natural law in operation were not perhaps those originally contemplated by the victors at Versailles. In using the Treaty of Versailles as an example, we do not pass “moral” judgment. We are merely pointing out that the subsequent reactions on the part of the vanquished were conceivably only quite natural and in order. Had the case been reversed, the victors would conceivably have behaved in a way similar to that of their vanquished. And the same would apply to us Americans, when, as, and if the United States, for one reason or another, came into similarly adverse conditions. That is, in other words and in the terms of an analogy, if we deliberately make the necessary moves to drive a man insane, we cannot be “morally” or “aesthetically” resentful if our victim behaves like an insane man.¹

Indeed let us tarry a moment with our analogy of an insane man by way of illustration of the possible exist-

1. The use of this analogy of an insane person should not be construed as casting a reflection upon any national government. Only the future can evaluate the respective “sanities” of the governments, say, of Britain, France, Germany and of the United States since 1933. Furthermore, “insanity” is not necessarily always a derogatory term; indeed he who does not lose his mind under some circumstances may conceivably have no mind to lose, if we may borrow a sentiment from Lessing.

ence of psychological law. No one is immune from insanity, and the removal of a person's property is doubtless one very effective means of precipitating insanity, as the reader can determine for himself by inspecting case-histories of patients in mental hospitals. Indeed in the course of the coming years in the United States the reader may conceivably lose his property under governmental fiat and have occasion to experience the reality, let us say, of "psychological law"; the reader's reactions, in that case, would doubtless seem quite natural to himself, as the reader himself might conceivably protest to the finding-board; but that protest, no matter how sincerely stated, might only incense the "moral" and "aesthetic" feelings of the finding-board who would dispose of him according to their own ideas of propriety.

Of course in connection with our present discussion of the assumed laws of physical, biological, and psychological forces, in connection with the problem of the possible fixation of permanent boundaries, certain frank remarks would seem to be in place. Thus we must again remind the reader that we are still working with the assumption that there is a system of automatic checks and balances of social-economic forces whose operation is responsible for our empiric findings. Speaking more generally, we are writing on the assumption that what we are calling social-economic phenomena are but the manifestations of natural forces in orderly operation,—forces into the nature of whose fundamental laws we are inquiring. From the viewpoint of our assumption, all that has happened in the remote or recent history of the world, whether in Europe, Asia or in the United States or elsewhere, has been natural,—whether a given individual likes it or not. According to our basic assumption, it would have been "unnatural" if it had not thus happened. Hence, if perchance

one does not like what has happened, then, if our assumption be correct, one should study the conditions (i.e. ahistorical Gililean laws) which determine events, and then seek in the future to control the determining conditions of these events. As far as the author can see, this insight into the laws of social-dynamics is a prerequisite to any future planned economy (including the location of boundaries that will be sound).

For illustrative purposes of the impersonal operation of natural law, we might use the analogy of a distinguished person,—say, of a celebrated scientist,—who, while climbing mountains, slipped over the edge of a precipice; whether we liked it or not, and regardless of the possible loss the slip might entail to the future of science, we must submit that our scientist, in the n th second of his fall, would traverse approximately $16 + 32(n-1)$ feet, according to the law of falling bodies. However much we might lament the accident, it would avail us nothing to rebuke the law of falling bodies for it. Only by avoiding the conditions that bring the law of falling bodies into operation can we hope to forestall the operation of the law. And *mutatis mutandis* with the assumed laws (of whatever kind) that control social-economic phenomena.

But now, that we have reminded the reader of the assumption with which we are working (though by no means alone), we must in all fairness remind the reader quite frankly that many eminent students of social forces apparently do not agree with us. Many of them frankly state: "There are no social laws!" Others of them proceed simply on the assumption that there are no social laws, even though they seem to lack the courage to say so. To all these persons one may honestly direct the following questions. First we might ask: Has science proved that there are no social laws? And to this question, the obvious

answer: No, we do not know that there are no social laws, nor may we assume that there are none simply because we have failed to find them. The next question: If there are no social laws, and if, then, all is random and accidental, why should we bother to make any predictions, or to plan any courses of social action since everything may be capriciously altered tomorrow? To this question we shall let those provide the answer who assert: "There are no social laws!" We might even continue and ask modestly whether the many graphical distributions in the figures of this book represent randomly behaving phenomena. If the answer is "Yes, they represent randomly behaving phenomena," then the many physical correlations which have hitherto been the bases of much physical law and which certainly in some cases show no greater degree of correlation than some of ours must be discarded together with our own and for the same reason.

Today social science is divided into two camps. And whether a person belongs to one camp or the other can be decided practically completely by whether he answers yes or no to the following question: Do you assume that in all natural phenomena, including social phenomena, like things under like conditions behave alike? Would that students of political theory might ask a certain few of their professors that!

As to the nature of possible social-economic laws, we can only say that our present investigation is attempting to add to our understanding thereof. Obviously no single person can hope to establish the entire body of assumed social-economic law with all its physical, biological and psychological phases. Nevertheless it is essential that every person in any way interested in the problem of social-relationships consider two possibilities: first, that social-economic laws may in fact exist, whether or not

anyone will ever succeed in comprehending them entirely, and, second, that a knowledge of the rudiments of social-economic law may be as great an asset to our well-being as our knowledge of the rudiments of physical law, particularly in devising peace-treaties or in drawing other human contracts. Indeed, to illustrate these two points, let us take the analogous case of physical law,—even at the risk of belaboring the topic.

For example, a person ignorant of physical law can design and execute a marvelously conceived physical edifice which will stand or fall depending entirely upon the actual soundness of the structure in terms of physical law. If the edifice stands,—well and good; the builder has been lucky. Yet if the edifice falls because of the laws of nature, the builder cannot reasonably accuse nature of lawlessness or of lack of “morality” because of any loss of life and property resulting from the disaster. Similarly with the effects of a great edifice like a peace-treaty which may be erected to a considerable extent in the domain of psychological and biological law without any reference to the possible nature of those laws; if the edifice stands,—well and good; the builder has been lucky. Yet if the edifice should fall because of the assumed laws of nature, the builder cannot reasonably accuse nature of lawlessness or of lack of “morality” because of the loss and life and property resulting from the disaster,—if one assumes that like things under like conditions behave alike. Though we shall return again and again to this argument in order to drive home the point that the assumed physical, biological and psychological laws of human conduct may be of importance in human social-economic activity, nevertheless, for the time being, we shall but remark that many treaty makers in the past have apparently set about their tasks of drawing boundaries upon the tacit assumption

that forces simply do not exist, or else can be ignored with impunity. It seems that the possible laws of human behavior must be considered in particular, before one can hope to draw a treaty or other covenant which will function with a minimal amount of friction. Indeed insofar as peace may depend upon the redrawing of boundaries, all possible psychological laws that might affect the fixation of boundaries should first be disclosed, or else new boundaries should be drawn only tentatively with the honest intention to alter them subsequently in the light of future experience with the new boundaries. In other words, the achievement of a higher degree of international peace and equipoise may well depend to a far greater degree upon the accumulated efforts of students of human behavior, than upon political make-shifts, no matter how sincere, even though these make-shifts may be crowned with Nobel Peace Prizes. We emphasize this factor of human behavior in our studies, either because it is often totally overlooked, or because its implications are frequently ignored.¹

And so, in light of our above discussion, it seems that we do not know enough about the laws of nature to decide how boundaries should be permanently fixed. In other words, we cannot arbitrarily set down where specific inter-

1. In this connection the reader should be reminded that the author's insistence upon the importance of studying the fundamental forces governing human behavior is not peculiar to the author. In this connection we quote from the address made by Professor W. C. Mitchell, the internationally-known economist of Columbia University, as he retired (December 27, 1939) from the presidency of the American Association for the Advancement of Science: ". . . to increase knowledge of human behavior is the most urgent item in the unfinished business of science." "If we had a keener insight into individual psychology, we might not be able to alter drives, but we might be able to direct them into beneficent channels." "If we can come to a clearer understanding of how we behave, perhaps . . . we can learn how to condition men so that their energies will go less into

national boundaries should be permanently fixed without first establishing what the laws may be that govern these international boundaries. Since we do not know enough yet of these laws to warrant a statement about how one can determine just where permanent territorial boundaries should be fixed, we can only retire from our question after this digression and seek information. Though our digression may not have answered our question about the permanent fixation of boundaries, it is not necessarily valueless for that reason. On the contrary it has left open the possibility that there may be no such a thing as a permanently fixed international boundary in the terms of natural forces, and hence it may have paved the way for the ultimate utterance of an extremely unorthodox statement: no boundary is permanently fixed, and nothing is constant except the laws of nature.

But even this unorthodox statement is meaningless for us at present. Hence let us again inspect some cases, alternating the theoretical with the actual, in order to illustrate how boundaries will indeed change, and how wars over boundaries will in fact arise, and how the United States today is itself perhaps not entirely free from a problem of boundaries.

As we turn now to a consideration of cases, let us making one another miserable." "In addition to the responsibilities they share with all other citizens, scientific men have the special duty of trying to increase the kind of knowledge required to deal intelligently with human problems." "All the scientists of the country put together do not know enough to solve many of the problems that a democracy faces." "The gravest dangers to democracy come from within, not from without. They are ignorance and propaganda that turns ignorance to its uses. The best way of dispelling ignorance is by diffusing knowledge. The most effective defense against meretricious propaganda is critical inquiry." The reader is reminded that Professor Mitchell speaks as an economist and not as a psychologist. Many similar statements could be produced by other men in social science.

remember that we know nothing about the territorial boundaries of social-economic systems, but only of their communities, and of their processing of materials, and of their transportation of goods over routes of trade, be the striation national or international.

8. MEDIAEVAL VENICE AND WORLD-STRIATION; A HYPOTHETICAL CASE

Up to this point we have treated comparatively contemporaneous material in which we may suppose our own personal and social problems lie rooted. Let us, in the interest of dispassionate objectivity, take, as an instance of world-striation, the hypothetical case of fifteenth century Venice at whose docks and canals many highways and seaways once converged. We cannot assume that the shortest routes between the Byzantine East and Western Europe naturally converged precisely at Venice and nowhere else; on the other hand Venice was very conveniently located, or, as we may say, very strategically situated.

But geographic position though an important factor is not necessarily the only factor in determining a convergence of world-striation. Because of the physical terrain of Venice, the Venetians at an early period were placed in intimate contact with the sea from which we know they procured fish, salt and the like for consumption and for trade; then, too, because of the nature of the terrain, Venice was obliged to trade for many of her necessities of life. Hence we may suppose that expert sea-faring became a part of the blood of her childhood, and that she was in a position to take advantage of her strategic situation. With her docks, men of war and merchant fleet she routed much of the trade between East and West through her own markets, simply because the presumable combi-

nation of favorable distances, of facilities of transportation, of marketing, and of sea-protection made Venice an economical trading-center.

Furthermore she had a certain cumulative propaganda advantage that often comes with success. Venice might say to Byzantium, for example, "See how valuable we have become to you commercially; what would you do without us?" She might say to the North, "See how valuable we have become to you too; what would you do without us?" Of course it was probably only natural that Venice should have become prosperous, culturally diverse, and the home of rare arts and intellectual pursuits, if only because of her strategic position in world-striation. She might say to East and West, "See how valuable we are to your intellectual and artistic development; where would you be without us? Our vital interests are your vital interests; our enemies are your enemies, and you must help us forever to protect our common vital interests."

Yet the progress of civilization often renders useless if not predatory that which most aided it. In due course, as we know, other more economical routes of trade were discovered and also other cheaper means of transportation to the end that a combination of these discoveries yielded a new and different striation of potentially far greater economic value than that which Venice possessed. According to the laws of economics, Venice was destined to be replaced by another or other countries more strategically situated. What could Venice do to preserve herself from ruin? This is a general hypothetical problem; let us inspect it.

Venice could destroy her future competitors, one by one, while they were still weak and she strong. But while she was destroying one enemy, she would become weakened in

the process, whereas her other potential victims would have become in the meantime comparatively stronger and less dependent upon her. Though these other potential victims might combine against her, Venice might also mobilize others to help her against them. She could say to East and West, see how valuable we are to you economically and culturally, and how all our vital interests are identical; send your forces to join ours in order to subjugate these aggressors and treaty-breakers, who want to dominate the world, and so on. Thus exhorted, the East and West might come to Venice's help, annihilate her enemies and at considerable cost in blood and treasure re-establish Venice in her leading position.

What then? First of all Venice's allies would have little more to show for their pains than a possible feeling of moral righteousness and superiority at having saved world culture from a presumed destruction. For a time, still, Venetian gondoliers in red jackets might hunt to the swans after the nimble carp of Venetian country canals, and the cultured and refined of East and West might still sit awe-stricken at noble tables in Venice, ascribing perhaps the somewhat inferior food and perhaps the absence of formerly familiar objects of gold and silver to the curious world-wide depression which had only temporarily beset them all.

But Venice could continue to assert her position of world-domination only if she could permanently annihilate those who held the more strategic locations. If she had previously traded with these now annihilated people, their annihilation would be costly to her by the amount of her trade with them. Venice might continue her domineering role by garrisoning these countries to allow them to trade with her but not to use any new and more economical striation. Nevertheless this garrisoning would be

economical for Venice only if the amount she made in profit from this garrisoning were at least sufficient to offset the costs of the garrisoning. Otherwise she might expend the entire accumulation of her capital from her great days and still lose her role of dominance, as other competitive nations arose to challenge her a second time.

Of course she might again seek to mobilize East and West to help her a second time, hoping that they will have forgotten the practical results of their previous assistance. Even if they help, they will be playing a doubly losing game, for they are combating what would be to their own economic benefit, and they are supporting what has become in the last analysis an economic parasite. The East and West might help Venice actively, or give Venice "moral support" or simply ignore Venice, or actually help Venice's enemies, depending largely upon the shrewdness and national loyalty of their political leadership, the intelligence of the populace, and so on. But in the long run the odds would seem to be against Venice.

Let us take another case.

9. THE PRESENT-DAY BRITISH EMPIRE AND WORLD-STRIATION (A THEORETICAL DISCUSSION)

There is an island off the northern coast of France, called Great Britain, at whose docks many seaways from East, West, North and South converge. We cannot assume that the shortest energy-distances between the four points of the compass on this earth naturally and inevitably converge at Great Britain. Indeed the curious convergence of so much sea-traffic at this island is what most attracts our attention. Though its docks are extensive and its sea-protection great, nevertheless we may not necessarily assume therefore that in the long run these advantages will be sufficient to offset the economic losses entailed in

routing such a large share of world transportation to Great Britain as if Great Britain were a true focal point. Let us inspect more closely the case of Great Britain. Our inspection will be cursory as we present but widely held opinions (that may be incorrect) in a discussion which is to be considered only as speculative.

Great Britain may in fact be strategically situated, say, in respect to Ireland, northern France, the North Sea and the Baltic Sea, with adjacent terrain, on the one hand, when lined up in a great circle with the eastern seacoast of almost all of North America on the other, as the reader may verify with a globe of the earth and a piece of string. Nevertheless France, Portugal and Spain are themselves not without a certain natural advantage in their location in respect to the Western Hemisphere. Though England is favorably situated, she is not uniquely so.

But be all that as it may, the simple facts are that not only because of the nature of Britain's situation, but also, if we may trust the statements of historians, because of the origins and traditions of her Teutonic conquerors, she did early become indeed expert in sea-faring and trade, for which her situation was favorable, particularly in Irish, French, Rhenish, and North Sea waters. Furthermore she was protected from disturbing land attacks to a degree practically unknown on the continent. She had the opportunity, on the whole, to put her internal house in comparative order with a minimum of molestation from alien influences. She apparently developed a national homogeneity of populace sooner and to a higher degree than the others. Furthermore, though we cannot assume that her sailors were necessarily vastly superior to those, say, of the Netherlands, for example, any more than we can say that her world location was vastly more strategic than that of all other parts of Europe, nevertheless by defeat-

ing in succession the Spaniards, the Dutch, the French, the Danes and the Germans she managed by force to assert her domination over European sea-borne transportation from early days to the present. Then, too, by taking possession of genuinely strategic points of the earth's surface, such as Gibraltar, Malta, the Caribbean Islands, the Falkland Islands, Singapore and the like, she was capable of dominating world transportation, if only perhaps because of the threatening nuisance value of these strategic points in time of blockade. Her geographical givens, then, were extremely favorable. But that is not the whole story.

In the eighteenth century, thanks to the brilliance of English men of science, Britain led the way in the exploitation of steam and of the numerous other labor and energy-saving devices, generally described as the "Industrial Revolution." Because of her brilliant leadership in this technical advance, she became a great world producer of finished goods, a world market of finished goods and a world carrier of goods in general. In a certain very real and practical economic sense, Britain became the center of world trade for the simple reason that much of world trade was polarized in terms of delivering raw materials to her in payment of her finished goods. Furthermore she conquered and administered wide areas of distant lands, such as India and Canada. And with her experience in trade and her vast accumulations of capital she developed industries in lands beyond her control, bringing to them the benefits of the Industrial Revolution.

Hence, all told, whatever her position may or may not have been in respect to an original hypothetical world striation, she made herself the dominant factor in world striation, herself as the center, by shrewd diplomacy, by shrewd military action, by shrewd annexation, by shrewd

technical advances, and by shrewd banking and monetary manipulation, if we may believe the historians. She might well have said to the world: "See how valuable we are to you commercially; what would you do without us?" England become prosperous, culturally diverse, and the center of much intellectual, political and scientific thinking, if only because she had become the rich center of a world-striation, thanks largely to her own efforts. With propriety she might have said to the world, at least at one time, "Our vital interests are your vital interests; our enemies are your enemies, and you must help us protect our vital interests, for we are in fact fighting your battles."

But as the Industrial Revolution spread more or less throughout the earth, other peoples (e.g., the Americans, French, Germans, Italians, and Japanese) made very brilliant technical advances of their own, and either with or without British capital built up their own manufacture. Furthermore, if only in the interest of a more economical though conceivably selfish exploitation, the labor-saving devices of the Industrial Revolution were introduced into Britain's own vast domains, such as India (cp. Chapter Three). And with this general industrialization on a world-scale, England ceased to be the exclusive purveyor of finished goods that she once had been. And as she ceased to be a great purveyor of world-goods, world striation shifted. Nations became industrially more self-sufficient, not necessarily because of any distorted ideology, but because it is presumably economical to manufacture as much as possible as near as possible to the sources of consumption. Furthermore there was no longer a great need for a comprehensive world market in a given spot. Thanks to the telegraph and radio, world prices could become a matter of almost instantaneous world-wide information; thanks to the achievements in marine trans-

port, cargoes from India destined for the United States, for example, could proceed by shortest sea-distance to the United States over a course that did not necessitate a stop at England. England, in short, seems to be another case where one may say that the advance of civilization has rendered valueless if not actually predatory the very things that have most contributed to its advance.

But then there is such a thing as a cultural lag (Cp. Chapter Three) in which those who have previously been favorably situated may even organize and oppose any attempted change to their disadvantage. Our first illustration (Chapter Three) of cultural lag was the case of the old canals in the United States versus the new railroads; our hypothetical case of Venice was another example; indeed we might add that all innovations, whether materialistic or philosophical, are often greeted by a greater or lesser number of persons as if they were a menace. In her presumed reaction to commercial innovations, England was probably no exception. Brought up in the traditions of world-domination, "rule the waves," and more recently, in the perhaps quasi-sentimentality of a "white man's burden," her population as a whole may not have sensed the import of the fact that economic striation had shifted (the record shows that this statement is not applicable to many of Britain's statesmen). In any event it would seem that according to the impersonal laws of economics, England was destined to be replaced by another or other countries more strategically situated. Yet what could England theoretically do if she desired to preserve for herself her presumably profitable role of commercial-military domination?

England could destroy her future competitors while they were still weak and she strong. She might make war on them, one after another. But note well, while she was

fighting one, she herself would be becoming comparatively weaker, and others comparatively stronger as they pursued the economies of their own industrialization in a world trade temporarily free from England's competition. Indeed England's presumed preoccupation with her war and her neglect of trade would almost force her previous customers in time to become self-sufficient as far as possible, and to seek extra-English connections in order to avoid the dislocation of their economic systems during English wars with the implicit threat of duress from a British blockade and the like. Though England might destroy her enemy of the moment, she might well have become weakened in the process while her potential enemies next in order might have become comparatively stronger and less dependent upon her. Of course England might mobilize other nations to help her. She might say to the "world," for example, "See how valuable we are to you economically and culturally, and how all our vital interests are identical; we are really fighting your battle for you; send your forces to join ours in order to subjugate these aggressors and treaty-breakers who want to dominate the world and so on." Thus exhorted, the people of the "world," might come to England's help, annihilate her enemies and at a considerable cost in blood and treasure re-establish England in her leading position.

What then? First of all England's allies would have little more to show for their pains than a possible feeling of moral righteousness and superiority at having saved world culture from a presumed destruction. For a while, still, English huntsmen in red jackets would hunt to the hounds after the nimble fox on English country estates, and the cultured and refined of the world might still sit awe-stricken at noble tables in England, ascribing the perhaps somewhat inferior food and the absence of formerly

familiar objects of gold and silver to the curious world-wide depression which had only temporarily beset them all.

But England could continue to assert her position of world domination only if she could permanently subordinate those who might challenge it by refusing to acquiesce in England's leadership. If England previously traded with these people, then to annihilate them or otherwise seriously to cripple them would be costly to her by the amount of her former trade with them. England might continue a dominating role by garrisoning these countries or by using other forms of economic compulsion, such as money-manipulation, loans, monopolies of raw materials, and the like in order to prevent their using a more economical striation. But any such coercive course would be economical for England only if the amount she made in profit from this dominating role were sufficient to offset the costs of economic coercion. Otherwise she might expend the entire accumulation of her capital and investments from her great days and still lose her role of dominance, as other competitive nations arose.

Of course she might again seek to mobilize East and West to help her, hoping that they will have forgotten the practical results of their previous assistance. Even if they help, they might be playing a doubly losing game, for they might be expending their blood and treasure in combating what might in time be to their own economic benefit, and might be supporting what had conceivably become in the last analysis an economic parasite. The East and West might help England actively, or give England "moral support," or simply ignore England, or actually help England's enemies, depending largely upon the shrewdness and national loyalty of their political leadership, the intelligence of the populace, and so on. But in the long run the odds would seem to be against England's con-

tinued world-domination (as well as that of any other nation, presumably,—not excepting the United States).

And thus in our second case of a convergence of a large portion of world-striation at a single focal point, we note the possibility that on the one hand a great organizing force of years gone by has successfully impinged upon world-striation to the end of shortening many then existent energy-distances. Though the original organizing impingement might be considered to have been beneficial to the world at the time, nevertheless, in the course of the years, the world may have been repelling or neutralizing the effect of the impingement as something whose usefulness had diminished.

It is not our present purpose, however, to attempt even the rudiments of a social-economic history of any of these systems and, still less, a prophesy of their future course. But it is very much our purpose to study and test our assumed general principles by inspecting,—if only quite cursorily,—some of the historical manifestations of these assumed principles in operation. To this end let us reverse the proposition of national-international striation, and view it, as it were, from the angle of international-national striation,—that is, from the viewpoint of the earth's terrain on which human society must find its place.

10. THE "BALANCE OF POWER" AND WORLD-BALANCE

In previous portions of our study we have watched individual national systems grow and struggle for existence. Now we shall ask whether it would be possible for human society to be organized into one single world-wide homogeneous social-economic system without its breaking into subsidiary national social-economic systems. We have been prepared for this question by our study of the hypothetical cases of Venice and of the British Empire as well

as by our digression on the theoretical aspects of the general problem of boundary fixing. And we might be tempted to answer in the negative this question of the possibility of a single homogeneous world-wide social-economic system, for we have already produced enough data to suggest a negative answer. But instead of any answer on the basis of previous findings, let us derive one from our generalized harmonic series by forcibly "applying" the series to the entire surface of the earth.

Yet before proceeding further let us point out the two general forms in which a social-economic system can exist. First of all there is the form, like that of Norway or of Argentina, in which there is practically no piece of national terrain not contiguous to some other piece of national terrain; that is, the national boundary is practically unbroken by any alien territory or by international waters; we shall call this form the *organic-contiguous solution* of problems of national terrain. Then there is the form, like that of the empires of Britain, France, Belgium, Holland and the like, in which there is at least one or more pieces of national terrain which is separated from the rest of the national terrain either by alien territory, or by international waters, or by both; we shall call this the *imperialistic-discontinuous solution* of problems of national terrain. Each of these two forms of solution has its own social-economic advantages and disadvantages. Yet the *imperialistic-discontinuous* seems to have the greater problem of existence because its own striation, notably on the high seas, may be practically identical with that of world-striation. And because of this greater instability of the *imperialistic-discontinuous solution*, there would seem to be a tendency in the long run for the *organic-contiguous solution* to prevail ever more, to the end that in time, barring accidents, there might even arise a world-wide

quasi-confederation of individual systems each organized under the *organic-contiguous solution* of terrain with a minimal amount of international friction and with no further vestiges of *imperialistic-discontinuous solutions*.

The author need not be reminded incidentally that the tenor of his theoretical deductions may be unwelcome to some, for we are showing that the dream of a single great international super-state may be impossible of realization in the assumed practical balance of the world's natural forces. If we view "nationalism" as a disease, then we can only foresee that the poor earth may well remain broken out with this disease as long as man inhabits it. In other words, and to repeat, a "national" social-economic system, like its counterpart among the world of bees or termites, can apparently emerge and develop within nature's balance of forces as a part of the general evolution of animal sociology. But it apparently cannot evolve into one enormous world-superstate, if only because of the great economy inherent in a comparatively small, wieldy, homogeneous organization.

Though in all other matters man has learned to be very circumspect about disturbing nature's hypothetical balance, lest nature restore her balance with a brutal singleness of purpose that puts man in his place, nevertheless, in respect to human organization, man seems to assume that nature tacitly makes one great exception and allows him both to propose and to dispose without need of any subsequent accounting. If man be indeed nature's favored exception, then the foreign office of a single nation may indeed be able arbitrarily to "balance the world's power" without fear of a later reckoning. But if nature happens to make no exception for man, and if one self-appointed foreign-office in arbitrarily "balancing world-power" automatically sets opposing forces in operation to counteract

the "balance," then, who knows, a day of reckoning may await that foreign office. In any event, let us now build an imaginary world-wide superstate and see what happens to it. First (a) we shall take world conditions as they are today with all their racial, cultural, linguistic and religious heterogeneity, and we shall let an imaginary city, say, Gulliver, try to keep all in "balanced" position with no means sacred to this end. That done, we may note that the world may conceivably be in somewhat of a turmoil. To decrease this turmoil, we shall make the problem easier for Gulliver by removing all racial, cultural, linguistic and religious heterogeneity. That is, (b), we shall kill off all but the most perfect Lilliputian protestants of excellent school and university background so that the earth's surface may become populated exclusively with their own homogeneous and accomplished progeny; and we shall see how their progeny in time will break apart quite naturally again into national units with the familiar cry, as it were, of "give me liberty or give me death."

a) The problem of a single homogeneous world-wide social-economic system of heterogeneous cultures.

Let us now in our imagination force all human beings throughout the earth to live exclusively according to the exigencies of one homogeneous social-economic system, regardless of the present nature of their cultural goods. By the word *force*, we mean that we shall use military, economic, and political force upon persons in order to bring them into line with this one system whether they like it or not. Since some individuals or groups of individuals might resent this interference with the social-economy of their individual or corporate lives, it will be necessary to keep them powerless, or at least to keep world-power "balanced" so that no subsidiary parts or

combinations thereof can ever disturb our one social-economic system. Hence our problem of a single world-wide social-economic system has as a corollary a world-wide "balance of power."

Our understanding of this problem will be facilitated if we begin by referring it as far as possible to actual conditions. In this connection let us recall the data of Figure Eleven above (cf. Section 2, preceding) in which we noticed that the distribution of world-population in communities of not less than 100,000 persons in 1920 did in fact approximate reasonably closely the homogeneous conditions of our generalized harmonic series, with London as the chief center. These data of Figure Eleven would provide a good point of departure. Without asking whether all communities of every size in the world in 1920, if plotted on this chart, would yield a completely straight line, let us simply ask what steps would be necessary to force all communities to fall into a straight line, not with London, but with Gulliver remaining as the chief community of the world.

Of course we know that if the world-whole is homogeneous, in respect to the size and number of its communities, the individual national parts, such as they might be drawn by peace-treaties, will not be homogeneous. Furthermore, since the homogeneity of size and number of communities seems perhaps to be intimately connected with the total economy of a social-economic system, for possible reasons suggested in Chapter Three, we may conclude that if the whole earth could be conceivably organized into a "most economical single system," then the individual national parts, such as the amputation of peace-treaties might leave them, would not be most economically organized. Clearly therefore a potential conflict may be inherent at the outset in our problem between interna-

tional and national interests. Nevertheless we shall quell this potential conflict in our imagination by the use of brute force. In short, we shall keep Gulliver the chief community of the world regardless of every other consideration, no matter how great the deceit, propaganda, double-dealing, duplicity, brigandism or plain thievery that we must use to accomplish this end.

But if Gulliver must remain the largest community of the generalized harmonic series, then every individual community will have to govern its size according to every other community, with Gulliver at the top. Thus, for example, the size of New York could not be governed primarily by the exigencies of the internal and foreign trade of the United States, lest perchance it become too large for its place in the series and emerge as world-community number One. Though this excessive growth of New York might be natural from the viewpoint of the United States, and hence be economically sound for the United States, it would nevertheless be economically dangerous for Gulliver. For, as we suggested in Chapter Three, it is in general economical to move as much production as possible as near as possible to the largest communities so that there will be a minimum waste of energy in moving the goods of production to the consumer. Hence as New York grew larger than Gulliver, it might tend to draw international trade, international banking and the like away from Gulliver; in short, the chief focal point of world-striation might pass from Gulliver to New York to the end that New York might even grow at the expense of Gulliver and to the no small economic loss of Gulliver. Though the same would apply in the case of any other city, like London, Paris, Berlin, Rome, Moscow or Tokio, we shall continue with the case of New York as a typical example of a threatening disturbance to world "balance-

of-power," and simply ask hypothetically how we should bring New York back into line into a subordinate position.

There are two general approaches to the problem of reducing New York to a subordinate position: (i) the intra-national, (ii) the extra-national. Though these two approaches are intimately connected, let us take up each in turn and then synthesize them (iii).

(i) Intra-national subjugation of New York.

Since the size of New York is governed by the exigencies of the internal and international trade of the United States, one way of curbing the size of New York is to disturb the internal and international trade of the United States, by manipulating the forces and other givens within the United States proper. This disturbance could be effected by arousing antagonism between dissident racial, national, religious, social and economic elements on the one hand, and by encouraging Gulliverphilia on the other. Indeed a thorough-going Gulliverphilia would be so helpful in fomenting friction between the others that we might commence with a few brief instructions to the fomenters of Gulliverphilia, not only because propaganda is apparently an important international political force today but also because we shall find it an important cultural force in Chapter Six.

Gulliverphilia might be started with American citizens of Gulliver extraction by founding Gulliverphile societies throughout the United States. We should encourage these by providing them with Gulliverian lecturers, books, journals, moving pictures and the like in order to polarize their feelings favorably towards Gulliver. Furthermore we should invite the leaders of these societies to Gulliver and flatter them with entertainment in princely houses, and with presentation of their wives and daughters at the

Cabinet meeting. Thus we lend social prestige to them, and to the groups of which they are members. Americans who might feel socially a little insecure and inferior in spite of possible wealth and economic power would tend to gravitate into these societies in order likewise to grow in social prestige. Thus the social leadership of the United States might tend to become subservient to that of Gulliver. This subservience to Gulliver would not be without some financial profit to Gulliver insofar as the Gulliverphiles adopted Gulliverian luxury goods as symbols of their social class-membership (see discussion of social-symbolism in Chapter Six). But far more important than these slight financial profits would be the leverage Gulliver could exert by means of the Gulliverphiles upon other Americans. Since the Gulliverphiles might be more organized than the others in respect to social matters, they could socially kill or otherwise ostracize one or more of the others by treating them as bounders, or as "very nice but really not of our kind." This ostracizing treatment would have a twofold effect. First of all, it would divide American society by placing a premium upon the adoption of Gulliverian ways of action, thought and word, with the hope, say, of inducing Gulliverphilia among American parvenus in power. And second it would prevent the development of an American society with American interests, thereby thwarting competition.

In addition to this social organization we should also be obliged to organize the present and future intellectual leaders of the United States to make sure that they too are pro-Gulliver. For instance we could offer Gulliverian scholarships to America's better students, provided that they also have the necessary social and physical characteristics of social-political leadership. We should also

invite American educators to Gulliver and flatter them, knowing full well that they would carry our message further and give a quasi-academic sanction to the activities of our Gulliverphile societies. The educators we select should preferably be handsome, blonde or brunette, young men, or else old men of the fatherly type,—in short, whatever makes for a successful confidence-man. And so on, and so on, and so on.

And after the educators had been won over to Gulliverphilia, there would remain the clergy, and finally the intellectual-newspaper class,—all according to the familiar modern technique of propaganda.

In this fashion the entire social-intellectual fabric of the United States might be made subtly subservient to Gulliverian social-intellectual pressure which would extend its tentacles into our halls of Congress, Supreme Court, into our Cabinet, even into the White House itself, and modify our domestic and foreign policy to the advantage of Gulliver and to the disadvantage of the United States and sister nations in matters of commerce and diplomacy, should conflict arise.

And as the Gulliverians would do in the United States, so too they would do in other countries. Thus there would be Gulliverian schools and Institutes in Buenos Aires, Montevideo, Rio de Janeiro, San Paolo, and the like, all busily engaged in advancing the cause of Gulliver.

So much then for the intra-national subjugation of New York by impinging upon the United States from within. But this is not the only step in keeping New York (and all other communities) in line, although it is perhaps a prerequisite step. The next step would be the extra-national subjugation which is really but another phase of the intra-national.

(ii) *The extra-national subjugation of New York; "divide and rule."*

Once the United States, for example, is internally polarized in a pro-Gulliver direction with Gulliverphiles entrenched in strategic social, educational, religious, business, intellectual and political situations, then the people of the United States can be more easily led. Gulliver will dominate American foreign policy and American commercial policy down to the last trade treaty; it can foment racial strife, religious strife, anti-alienism, anti-nationalism or whatever it likes. Thus the Gulliverians can lead us into war as their ally in order to keep Gulliver on top of the world, or they can get us into war with a third power in order to weaken both of us, and keep us both down. Simply by means of manipulating their admirers in America, Gulliver might find countless opportunities for harming the United States in order to keep the whole country in line with Gulliver as the chief city of the world. And to raise a voice of protest against Gulliverphilia would be construed as a sign of ignorance, of subversive activity, if not of social backwardness. Of course the Gulliverians would have to work unobtrusively and conceal their propagandizing as a matter of deep state secrecy. The carefully constructed "Trojan Horse" must appear outwardly only as a sincere offering to the gods.

The question now remains as to the hazards our imaginary Gulliverphiles might encounter. What should Gulliverphiles be told to beware? In this connection they would do well to remember several very adverse effects to be avoided, if their propaganda is to be successful. For, after all, propaganda-penetration is of the order of financial penetration, and financial penetration is of the order of military penetration, as far as disturbances to a social-

economy are concerned, and can be resented as such. In the case of military penetration we can see how alien belligerent armed forces could coerce America into an economically deleterious course of action and be cordially hated for it. A control of the banks and other financial political agencies can obviously accomplish the same. Similarly a control by propaganda of the agencies controlling the financial and political agencies can circuitously coerce us into an economically deleterious course of action just as well as can the military or economic. Propaganda, then, can perhaps be likened to a gun, which can indeed hit its target; but, also like a gun, it can miscarry and kill an innocent bystander; then too, like a gun, it can explode in the user's hand.

Then there is another matter about general exotophile activities (i.e. activities that show a predominant preference for foreign habits and interests) that we should not overlook: the reaction. Exotophile agitation can be as much an impingement upon a social-economic system as any other; and, like any other, it is a beneficial impingement if it represents a saving in energy, and deleterious if it does not. The likelihood that exotophile-influences will ultimately be accepted or flatly rejected depends, in fact, upon the extent to which they may be beneficial or deleterious. The case of foreign troops is again analogous; if allies, they may polarize the country in their favor, though perhaps only temporarily; if enemies, they may polarize the country against them for years to come. Similarly with exotophilia. Hence exotophiles would do well to conceal where their hearts lie, nor fail to point out their native citizenship, and how they may be descended from the first settlers, and have only the country's best interests at heart, and so on. Yet even then they must beware a reaction which can appear overnight, once they are

recognized for what they are. For with them, as with any other deleterious force impinging upon a social-economic system, the system affected can become organized to repel or neutralize their influence. Hence overnight they may become pariahs (see subsequent chapters) who may be hunted down in the most viciously vengeful fashion. All the former symbols of membership in the exotophile elite may in this event become symbols of the pariah. We all know in general, for example, that on one day the callous hands of the manual laborer can suffice to mark him as a pariah; yet a month later, with a revolution intervening, there may again be a show-of-hands with all those led off to execution whose hands are not callous. And it might be similar with our Gulliverians whose cultivated Gulliverian ways of acting and thinking might mark them suddenly as enemies. Moreover the fellow travellers of the Gulliverians might suffer with them. *For all propaganda of any sort in a social-economic system would seem to be potentially an impingement upon that system; it can organize that system to neutralize the effect of the propaganda if not to expel the propagandists as alien and deleterious forces.*

Nevertheless once we have succeeded one way or another in organizing strategic Gulliverphile groups within other nations, we are in a fair position,—to repeat,—to manipulate these other nations to our own advantages. For example, we can sabotage pan-American political-commercial agreements by sowing discord among the nations. We can incite jealousies to the point of war and then sell them munitions. We can join the weaker side against the stronger in active military enterprises. Since there is no restriction of any kind upon what we may do, we can make the most pious promises about our war-aims and repudiate every promise we made, once we have

won the war, for we shall then have become too strong to be called to account by the rest of the world.

But with all of this deceit, double-dealing, duplicity, brigandism and even plain thievery would we necessarily be successful in establishing and maintaining a single world-wide homogeneous social-economic system? Let us see.

(iii) *“Balance of power” and world-unbalance.*

The point is perhaps not whether we could ever really succeed in establishing and maintaining a single world-wide homogeneous social-economic system with Gulliver (or any actual great city) at the head which would remain dominant right down the centuries from 1920, through 1940, 1960, 1980, 2000, 2500, 3000 ad finitum saeculorum. For our success in establishing and maintaining a single system would depend upon our ability to crush all opposition to our domineering rule. The point is rather that there would conceivably arise so much national and international friction at our attempt at a regimentation on a grandiose world-wide scale that we might suffer more from the friction than we might gain from our one homogeneous system. In other words, the price of our “balance of power” might be that of a world-unbalance within and between all nations so that really no nation would be as economically organized as it might be if left alone; thus the forces making for one world-wide system would oppose in conflict the forces making for individual national systems.

b) *The problem of a single world-wide homogeneous social-economic system of homogeneous culture.*

But the reader may doubt that there is any natural opposition between international and national forces. He may feel that if we could only put an end to “nationalistic

tendencies," then an international homogeneous super-state would emerge of its own accord and persist forever. Let us now examine this feeling which is by no means uncommon today. In our imagination we shall kill off everyone in the world except, say, the 100% Protestant Lilliputians of excellent school and university traditions living with their wives and children in Lilliput. This superior residue would be very homogeneous in its thoughts, actions and standards of "moral and aesthetic values." They would be the only persons left on the earth and we should ask them to keep propagating until their progeny had filled the earth's inhabitable surface. Would the world then be any better off in regard to international-national conflict than it is today?

As the earth's inhabitable surface now becomes populated with our chosen Lilliputians of excellent traditions we must watch for the emergence of subsidiary national social-economic systems which might later lead to international conflicts. Let us see now whether such subsidiary systems would arise. We shall commence with a consideration of the territory of North America; if an independent national social-economic system emerges here, we can suspect that others may emerge elsewhere.

The Lilliputians in the United States territory would of course view Lilliput as their spiritual home, but would they for that reason view it as their commercial home, century in and century out? That is, would they ship their raw materials and semi-finished goods to Lilliput and import Lilliputian finished goods? We have already suggested our own answer to this question by including semi-finished goods among their exports, for this semi-finishing would entail some local manufacture. Indeed the temptation might arise to finish some of the immediately needed goods in order to save unnecessary costs of transportation to and

from Lilliput. Yet to succumb at all to this temptation of a complete local finishing of any goods might be tantamount to opening the door to a full-fledged national social-economic organization in North America, with the threat of all the resultant phenomena discussed in Chapters One, Two and Three preceding. Of course Lilliput might try to skim off the surplus of American production for herself by striving to center world banking, world monetary control and the like in Lilliput. In that case American corporations would have central offices in Lilliput where the board of directors would hold their meetings. And as with North America, so too with all other parts of the world, such as South America, Asia, Europe, Australia, and Africa where incipient subsidiary social-economic systems might economically emerge. Unless this whole situation were deftly handled, the earth's human inhabitants might find themselves in a condition suggestive of turmoil. And by deft handling we refer not only to deft monetary handling, but also to deft "psychological" and cultural handling.

As for deft "psychological" handling we could of course send their Lilliputian majesties (or their president, or dux) on world-tours in order to keep alive "Lilliputian Spirit"; they would be encouraged to be gracious to all and to eat hot-dogs at the country estates of local political leaders, and so on. A deft "psychological" handling, comparatively speaking, would be quite easy; that is, we could conceivably keep a "Lilliputian Spirit" alive, with a Lilliputian national anthem, and so on.

Yet a deft cultural handling might be more difficult. For though the original founding Lilliputian fathers might have commenced with completely identical cultural goods and mental attitudes, this complete identity need not necessarily continue indefinitely. Thus the nature of the

climate and terrain of some distant land might prohibit the home-production of, say, boiled cabbage, mutton, sauerkraut, smorgisbord, truffles, snails and the like, which could be had only at the considerable expense of auxiliary importation. Yet as soon as the inhabitants of this distant land venture to experiment with native products, they may break from Lilliputian tradition, since these native products would be exotic innovations in Lilliput. Any invention anywhere of new modes of living, whether in the form of better plumbing, or of better dental hygiene, or of better means of transportation, would either have to be adopted by the rest of the world, in spite of tendencies of cultural lag, or else be forbidden, lest world-wide cultural habits become heterogeneous. The same applies to new ideas of conduct or of solving political, industrial, economic, or even philosophical problems; the alternative of breaking the world into heterogeneous parts would either be a world-wide instantaneous adoption of the new, or a world-wide extirpation of the new. Though history seems to suggest world-wide extirpation as the first reaction, nevertheless the new and more economical ideas, even when political, industrial, economic or philosophical, may well in time prevail. At any event, many believe that the world does ultimately beat a path to the door of the man who invents a better mouse-trap, even though (the author feels compelled to add from the history of science) his cottage may have been burned and he hanged in the meantime for his innovation.

But let us inspect this matter of local cultural goods even further. Persons would respond to the advantages of their particular local terrains: some would indulge in mining, others in agriculture and so on. Those indulging in agriculture would differ further in the types of agriculture,—live stock, cereals, forest-culture, whether tropical,

semi-tropical, or temperate and northern. And as their occupations became particularized in response to the nature of their environment, their interests, thoughts and attitudes would become localized and differ widely from the original standards of the Protestant Lilliputian forefathers. The persons remaining in Lilliput proper, being on the whole comparatively homogeneous, and living, let us suppose, within a comparatively small territory, might boast of the possession of a model congress where differences could be ironed out with comparative ease because the differences would be comparatively minor. Yet a world-wide representative congress might become a center of discord from the diversity of contradictory sectional, or local interests, with delegates engaged in intriguing and lobbying against one another. The American Congress seems to many to be becoming just such a body of discord with North versus South, East versus West, rural versus urban, employer versus employee, employed versus unemployed, the "haves" versus the "have-nots" and so on, because of the diversity of the United States.

In other words, cultural and "psychological" differences would seem to be inherent in the diverse nature of the earth's surface,—in the fact that raw materials are not homogeneously distributed, and that variations in climate, flora and fauna are often extreme. We may speak facetiously of bathtubs and boiled cabbage and sauerkraut as illustrations of sectional proclivities, or we may speak of the unequal distribution of natural petroleum, of the fertile fields of the Mississippi, Manchuria, and the Ukraine, or of the "bracing" climate of New England versus the "enervating" climate of New Orleans—it all reduces to the same final fact: people throughout the world are, or become, different in their psychological attitudes and habits of behavior if only because of the differences in

their existence-problems. People cannot all be cut to the same pattern in the long run, and it may be that the sooner we appreciate this fact, the sooner we can hope to avoid the unnecessary, wasteful conflict arising from our attempt to standardize the world in actions, thoughts and even "religion." Different climates, different flowers; different terrains, different horticultural methods. The people who first discovered gunpowder could theoretically dominate the rest of the world for a while either by enslavement or by annihilation of the rest of the world; but in time the secret of gunpowder will have become common knowledge, either because the slaves learn from their masters, or because the descendants will have been instructed by their conquering fathers. And then the world's population would perhaps tend to break up again, as nature restored equilibrium among many diverse entities instead of within one homogeneous group; as successive generations, in a constant absorption with their immediate, urgent, local problems, tend on the whole to forget their remote traditions of common origin. Each of our hypothetical entities might become a nucleus of a group, and behave according to the dictates of its own individual social-economy. The groups might conceivably combine in attacking problems common to all, such as problems of physical disease, white-slavery, and the like; but their self-interests, notwithstanding, would probably still remain predominant. They might combine to study common interests of international trade and communication; but their chief polarity would remain their self-interests.

We repeat our belief that self-interest would come first. Are we iconoclastic with this belief? On the one hand, we are but repeating the one chief thing that the whole world of biology tells us unambiguously; yet this seems really to be the one chief thing to which idealistic world-builders

most assiduously close their eyes, ears, and minds. On the other hand, in saying that self-interest comes first, we are repeating the one thing whose full realization may be necessary for minimizing international world-friction over the centuries, and for effecting a greater degree of worldwide international understanding; yet it seems to be the one thing first ruled out of consideration by—shall we say—the paranoid-world-builder who apparently refuses to believe that the law of the jungle also applies to man as man's final bio-social reality. The person who has proclivities for ideal world-building should be asked, at what moment in history mankind became exempt from bio-social law, and whether by divine interfusion of a new set of natural laws (for which, please, proof) or by a suspension or alteration of pre-existent natural laws (for which, please, proof).

Of course, some may feel that in spite of a diversity of localized culture in psychological-material matters, language might certainly be kept homogeneous so that people throughout the world would at least understand one another's speech in discussing controversial problems. For example, the descendants of our hypothetical Lilliputians, in spite of growing cultural differences and psychological attitudes, would be facilitated in successfully compromising conflicting differences by the fact that they possessed a common Lilliputian language. This thought of a single world-language of everyday discourse is very seductive, but unhappily not possible of permanent realization. For speech, too, has its laws. And as people differ ever more in their attitudes and activities, their vocabulary-content differs as new technical and local slang terms become incorporated into the language and displace the now obsolescent older ones; as the vocabulary content shifts, phonetic form alters; dialects emerge and develop into

ever more distinctly different languages. The passage of time alone is all that would be necessary to reduce the homogeneous Lilliputian language to a confusion of different dialects and tongues.

Would then nothing remain stable upon our earth, even though populated with imaginary Lilliputians? Let us pause and ponder this general question. Of course the language of mathematics would still remain, for this is the language of logical relationships which remain above and beyond the cultural changes which occur within the limits of its terms; thus the diameter and circumference of a circle will remain incommensurable, regardless of how mankind thinks or behaves. Similarly the great body of natural law will remain above and beyond the cultural changes occurring within the limits of that law; arrows, bullets, and tennis balls will behave according to gravitational forces, regardless of the vote of national assemblies. If we arbitrarily call this body of natural law, God, God will remain as the final arbiter, no matter what His vicars on earth may say or do, and He will doubtless be worthy of greatest respect, no matter what forms of government may arise. Except for the immutability of Nature's laws, we find nothing static and find no cogent reason for supposing that anything can be static. Therefore we should perhaps adjust ourselves to a changing world by accepting at the outset the fact that the world does and will change. Nothing, then, is fixed, as far as we know, except natural law which but states the conditions under which things change, things such as boundaries, interest rates, sales and profits, wages, taxes, thoughts and feelings, climate, geologic-meteorological phenomena, constitutions, laws, empires, sunspots and all else. Wisdom might seem to begin with the realization of the dynamics of process, and horror to increase the more we seek to impose static restrictions

upon dynamic process. The forceful fixation of a static condition upon any social-economic system or systems may very well, like any other impingement, but organize that system or those systems to remove the restriction or, at least, to neutralize its effect. Perhaps it is hard for us to accept the fact that the international, national, local and individual conditions of our childhood will change; and our resistance to the change is doubtless quite as understandable as any other resistance resulting in cultural lag. But let us remember that the new conditions, emerging naturally and inevitably from the old, will probably be accepted by our children as the natural and inevitable conditions of their environment, only to be hugged and fought for, in turn, as still newer conditions naturally and inevitably emerge to be couisined by our grandchildren. Human existence may become the happier, once we accept the inevitability of change with its attendant insecurity. Indeed it is not unthinkable that he who keeps his attention ever riveted upon the youth-end of the socio-biological progression may most easily make his day-to-day readjustments as he backs unobtrusively and without apprehension into the condition of old age and death.

But we are pondering this general question of the broader aspects of cultural-economic change not in order to explore their scope at this time, but rather to show that our ideas are not necessarily in conflict with accepted thought. Our statement of the general problem only serves to point out at present that nations and empires too, as special cases, may well tend to merge, or break apart. We are but remembering Mendel's laws of balance, how the earth's surface does in time become covered with a cobweb of independent interrelated organization, no matter what the beginnings may be and what the disturbances; this

cobweb may be viewed as a complexity of individual nuclei, with each nucleus representing a "social-economic system" which in turn merges into the neighboring system. From the viewpoint of the individual system, the *home-nucleus* seems important; from the viewpoint of the earth, it is the *multiple-nuclei*. And each of these nuclei would seem in the long run and on the whole to become an *organic-contiguous* solution of problems of terrain, even though the discovery of a new tool or of a rich source of raw materials may allow one system to send out "tentacles" temporarily and to become a passing *imperialist-discontinuous* solution. Yet the "tentacles" that sap the earth's richest veins of raw materials are also the "tentacles" that impinge upon surrounding terrain, both organizing it in order to eradicate the "tentacles" and diffusing the knowledge of how these "tentacles" can be most easily and economically eradicated.

And it is this general aspect of nature's balance of power that interests us, not the sporadic abortive attempts of historical foreign offices to "balance power." The great imperialistic groupings from earliest days through Rome, Genghis Khan, right down to the British Empire apparently risk the same ultimate fate either by eventually calling forth embittered Alarics, Hitlers and Mussolinis beyond their borders or by organizing disgruntled separatist groups within, or both. The value of the discontinuous group-organization in disseminating a knowledge of more economical ways of life is beyond question; the Jewish nation, which is essentially a discontinuous organization of terrain with fluid boundaries, is a classic example of the value of discontinuous organization in disseminating a knowledge of cultural goods. We shall return to a consideration of Jewish organization in a later chapter.

- c) *The possible meaning of equilibrium in international relations. Summary of the "Balance of Power." War and Peace.*

Of course we must not forget that our above disquisition on Gulliver and the Lilliputians was only theoretical and should be applied with caution to any actual historical case. Let us now pause and see what the essential elements of the disquisition were.

Behind our disquisition was the assumption that we made pages back that man strives to minimize the expenditure of energy (i.e. to operate with "maximum efficiency") in the attainment of his objectives of whatever sort they may be. The reader would do well to weigh the implications of the assumption of this minimum which we are applying to all social-economic activity (we shall discuss these implications further in the following chapter).

If this minimum is sound, then, to expend no energy at all in the attainment of an objective would be ideal economy. Since the author cannot conceive of attaining anything without the expenditure of some energy, he therefore concludes that we shall never attain an ideal economy. Nevertheless some courses of action may save more energy than others in the attainment of a given goal. Hence, if our assumption of a minimal expenditure of energy be sound, these more economical courses of action will be preferred if recognized as such. Let us continue with our assumption and see what some of these more economical courses might be when applied to problems of international-national striation. We shall begin with a consideration of "peace" and "war."

We might suspect that *on the whole* what we call "peaceful pursuits" would cost less energy in the attainment of a given objective than "belligerent pursuits," par-

ticularly if we remember the amount of a nation's total energy that may go into a successful "belligerent pursuit" of an objective today. In short, "peace" (even if in a "degenerate" sense of letting the other fellow do the work) is a legitimate objective quite worth organizing and *fighting for*. Hence, by itself, "to make war for the sake of insuring peace" is a respectable economic proposition, provided, of course, that the amount of energy of all sorts expended in waging the war would be appreciably less than that in obtaining the same objective by peaceful pursuits (including an assessment of the risks of failure in the two courses of action). In other words, warfare has its place in human social-economy as a means for the attainment of an objective. Thus, man is not exempt from the apparently general biological urge to accomplish an end even by killing members of the same species.

Similarly man is not exempt from the apparently valid biological urge to accomplish an end by co-operating with members of the same species ("in union there is strength," etc.). In short, as far as we can see, to "kiss" one's fellow and to "kill" one's fellow are apparently both quite respectable biological approaches to the problems of life. We are told that wolves may hunt together in a pack for the attainment of prey, only to turn and fight among each other for the now conquered prey. Though this may not be true for wolves, it is certainly true for human beings, if we can trust the record of human history at all.

But now let us ask when one should "kiss" and when one should "kill," or, better still, whom it is economical to love and whom to hate. In reply, the author would like to suggest as a hypothesis that we tend to love those who can or do help us towards our objectives, and to hate those who can or do hinder us in the attainment of our objectives—insofar as we are aware thereof; moreover, we tend

to ignore all others. Hence from our hates and loves of every kind, we may reveal our true objectives, no matter how complex, or how subtly and cunningly concealed these objectives may be even from ourselves. Hence from our alliances, ententes, declarations of war, and other acts and utterances can perhaps be read the real objectives of our loves and hates.

In this connection we must remember that we have not yet broached the question of human objectives, or desires, or demands (cp. Chapter Five). Nevertheless we may suspect that by and large, a considerable number of the populations in the predominant, present-day world-cultures desire about the same things, though probably some may want more of one thing, and others of another (cp. Chapter Six). Insofar as the peoples of the earth are approximately similar in their demands, they may seek to supply their demands by forming either competitive groups or confederate groups, depending upon the particular exigencies of the common desires (demands) and upon the particular nature and location of the common possible supplies of these demands. Therefore let us briefly consider a few aspects of desire (or demand) and supply.

Our desires (or demands), for all we know to the contrary, are the impelling forces of our make-up. No matter what the particular demands may be, any demand apparently seeks to be supplied,—or, as we shall say, seeks a condition of equilibrium by finding a supply. Some demands may be more urgent than others (i.e. have a greater compelling force); nevertheless all demands would seem to represent prospective orientations of actual forces. We note, for example, the amounts of material that are moved for the purpose of supplying demands,—and we

remember that the movement of material involves the expenditure of energy.

Of course, the more easily the objective (or supply) of the demand is obtained, the less the energy that needs be expended in the attainment of the objective; and conversely, the more difficult the attainment of the supply may be, the greater will be the expenditure of energy necessary to attain it (by definition).

Hence in the case of national and international demands of supposedly equal kinds and urgency, the amount of energy that must be expended for the sake of restoring equilibrium by balancing demands with commensurate supplies would seem to depend considerably upon the nature and location of the supply-end of the equation in reference to the demands.

If there are plenty of supplies to go around (roughly speaking) for all demands, then the problem of an international balancing of supply with demand is not impossible of solution.¹

Furthermore if there are plenty of supplies to go around for the peoples of all nations (and "if all else is equal"), then international (and intranational) hates are not inherent in the problem of balancing our demands with our supplies. Of course, we must remember that any serious use, in empiric inquiry, of the five words, "if all else is equal," betokens the nadir of scientific carelessness,

1. But in this connection (under the assumption of a minimizing of the expenditure of energy), the sources of demand would tend to approach the sources of supply in any assumed balance of forces (to be discussed more fully in the last chapter). Indeed this assumed "balance of forces" between all demands and their respective supplies would be the fundamental law of laws (as the author hopes to demonstrate empirically in future publication); in fact, by an appeal to such a final equilibrium, we may even hope ultimately to deliver the theoretical proof of our generalized harmonic series.

since we know well enough that "all else" does not obligingly remain equal in the world of actuality. Hence even if we should find that there were copious supplies for all our demands, there would still remain the problem (according to our assumption) of minimizing energy in equilibrating supply with demand throughout the entire human social species (i.e. the reduction to a minimal sum of the products of masses moved by energy-distances moved). And in this process of minimizing energy, "all else" may not remain equal.

Let us now, for the sake of argument, suppose that there are enough supplies for all human demands. Furthermore let us suppose that some nation or group of nations (the "haves") controls an effectual monopoly of a significant number of the various kinds of supplies. What then? In that case, those that lack (i.e. the "have nots") will be obliged either to alter their demands in order to equilibrate them with supplies within their reach (and this introduces the question of Ersatz), or else to destroy the monopoly enjoyed by the "haves,"—whichever is the easier. In case the destruction of the monopoly would seem to be the easier course, the "haves" will be classed among the obstacles which stand in the way of the attainment of objectives by the "have nots" and hence will presumably be "hated" by the "have nots." The conflict between the two may be one of warfare, or of economic coercion, or of propaganda, or of any combination thereof; the point is that it will be a conflict (and by conflict we mean the resistance of any kind, and hence waste of energy, which opposes the effort to move masses of materials through or over other materials).

Let us now suppose that the "have nots" win. What then? In that case, supply and demand may well be brought into greater equilibrium with a lessening of con-

flict (or friction),—provided that human society survives the conflict, and that the victors themselves do not establish monopolies. And as the amount of conflict subsides over the years under our assumed conditions, so, too, presumably will subside the amount of “hate.” In short, as conflict subsides, “hate” will tend to subside and give way to neutral feelings. Of course, should the former belligerents start co-operating in the attainment of objectives, then “love” would presumably appear. Indeed the suddenness with which “implacable hate” can change into “eternal love,” and vice versa, in the domestic, commercial, national and international order is too familiar to merit discussion.

In just what manner the human habitation of the earth’s surface would be most economically organized under the condition of what we may call “freely available” supplies is an open question, whose answering would depend to a considerable extent upon the validity of our equation of the generalized harmonic series. In the long run it might well be a “loose confederation of states” with fluid, if not completely non-existent boundaries, and with an interchange of goods with a minimal amount of conflict,—as demand seeks supply and supply demand. If it is, in fact, true that there are today enough supplies to go around for all nations, as many believe, and if our analysis be essentially sound, then in time we may indeed experience the “loose federation of states” as many hope. This condition of “loose federation” would doubtless constitute a “new era” for many of us. And if it be a truly more economical arrangement (and if our assumption of minimal expenditure of energy be valid) then the “new era” might emerge very rapidly indeed, as the old order of monopolies simply “caved in” internally and externally before the more economical striation.

However the term, "new era," is somewhat large in scope. For the present we are interested only in showing what we think may be the logical implications of some of our previous findings, and of our assumption of the minimal sum if all products of mass \times energy-distance. In using the term "cave in" in the above paragraph, we have perhaps suggested a useful analogy for the prospects of all carefully devised treaties and other human contracts which, when not dynamically sound, may be likened to the prospects of the dykes and dams of sand left by children upon the beach before the flowing and ebbing tides of forces.

If our above analysis be correct, however, then the goal of wars would seem, in the long run, to be a greater and more stable peace, and not the reverse,—by and large, over the centuries. In short "faith, hope and *love*" (for so we translate the Greek word, *eros*), would seem off-hand to be the long-term goal of humanity, and not the reverse.

So much, then, for the present, in the matter of the balance of power and of the question of war and peace.

11. THE SOCIAL-ECONOMIC SYSTEM OF MULTIPLE-NUCLEI; THE HYPOTHETICAL CASE OF RUSSIA.

We are assuming on the basis of our observations and of our assumption that a "national grouping" of human beings is natural; that is, that a "nation" has a justification in the scheme of nature's balance. Brought up on formal maps, geographies and national histories, we easily appreciate the existence and rationale of national entities, as we struggle to understand the problems of tariffs, boundaries and international trade. Perhaps because of the very formality of our education, we forget that social-economic systems are alive, that they breed and increase or recede before rising and falling birth-rates, with presumably a

constant increasing, shifting and relaxation of tension as nature seeks in her inscrutable way to preserve our assumed balance over her terrain. And these assumed stresses and strains can presumably be as severe within a nation as between nations; nor is man unique as a social animal in respect to these tensions. Indeed let us use as an analogy the organization of bees, even at the risk of excessive repetition. Though a colony of bees is often referred to as a *bio-social organism*, it is not entirely unlike what we are terming a "nation" or a "state."

If the reader on some warm day in June were to watch the urgent traffic of bees in and out of a large apiary, he would perhaps see a suitable analogue of many of our human problems. The field-bees of the different colonies roar forth pell mell into the meadows and orchards, each in a "bee-line" for his raw materials of nectar and pollen. Indeed we may say that the surrounding territory of meadows and orchards is being organized, among other things, in respect to the activities of these bees. As we walk through the territory with its busy bee-activity, we cannot identify the individual social-economic systems to which each of the melee of bees belongs, even though each bee seeks to return to his own hive and is, in fact, killed as an alien-intruder (exotophile?), if he alights by mistake at a neighboring citadel. With the passing of summer-flowers and the shortage of supplies, strong hives often turn to plunder weak hives. Yet come spring, these strong hives themselves break apart, as individual groups swarm forth to found new, independent, and competitive social-economic systems, with no charitable memories subsequently existing between mother and daughter states. From the viewpoint of each state there remains paramount the problem of the well-being of the total state; yet, from the viewpoint of the territory, it is at most but a prob-

lem of the number of nuclei that the territory's resources can support, with a supreme indifference to the internecine struggles of hive-politics, and with an utter willingness to secrete nectar for all and any who will come for it, even though the race of bees may pass from the earth.

And so too it may be with our human organization of earth's terrain. The only essential social difference between bees and man may be that bees, in the course of millions of years, have evolved a patterned mechanism both for living as a reasonably harmonious social whole and for reproducing themselves, not only as individuals but as social systems. Social man, on the other hand, is a comparative newcomer on the earth and has not yet evolved these patterned mechanisms. Our own specialized internal struggles and international strifes are perhaps, after all, but human responses to the same age-old universal and fundamental economic drives of all living existence, as we newcomers try to evolve our own mechanisms of defense, of support, and of reproduction of the individual and of the social-group as such. We cannot abrogate these fundamental drives of nature, but we can study and understand them in the hopes of directing them and even of aiding (or at least not of impeding) any inevitable course of evolution.

With these considerations in the background, let us now try to rid our thinking of its entrenched preconceptions of map-boundaries and formal national histories. To this end let us select one single vast national terrain, like that of Soviet Russia (about whose politics the author is no authority), and see how over the years this terrain will develop "multiple-nuclei," even though the same flag might wave over these nuclei. The study of this hypothetical problem will be of more immediate interest if we

remember that the United States may be facing a similar problem of the organization of a vast terrain.

Now Russia, at the time of writing, has a territory of about one-seventh of the earth's land surface, or nearly three times that of the United States. And like the United States, Russia is rich in raw materials. Our imaginary problem at present is to bring all these raw materials into exploitation, and we shall see that no matter how we solve our problem of exploitation, multiple-nuclei (i.e. separate systems), will probably eventually appear to the end that Russia will become at best but a confederation of inter-related systems instead of one single system, like that of the United States or Germany (as of May, 1939). In a practical sense we are but recapitulating from a different angle the argument of the preceding section; but by placing our problem within a single great political territory, we obviate concern for the existence of formal political boundaries.

Let us commence, first, (a) by founding in our imagination independent nuclei at different, distant points in Russian terrain and then, (b) by sending forth colonists into unexploited terrain.

a) The founding of multiple nuclei.

Let us arbitrarily establish individual social-economic systems at various different points in Russia, say, one each in the Ukraine, in the Urals, on the Pacific Ocean and so on. These individual systems would be *intended* to thrive independently, with the surplus products of the one being traded for the surplus products of the others while each nucleus seeks to preserve its identity. Theoretically these independent systems would be *expected* to grow until they had merged into one great complex of multiple-nuclei, with one comprehensive Russian striation. Yet *in practice*

would that be the case? Such a complex of multiple-nuclei was probably envisaged by the founders of the United States. But with the elapse of time, and under the pursuit of economies inherent in the situation, the populations of the different nuclei apparently gravitated into one single, uninuclear system, with farms, mines, and routes of trade opened or abandoned according to the exigencies of a single system, instead of those of any multiple-nuclear system. In short, it was much the way we might imagine that schools of fish seek out the best feeding grounds in a lake's terrain.

Russia might well undergo the same preliminary integrating metamorphosis into a single state. Because of natural differences in climate-terrain, only coercion could prevent the abandonment of outlying and less productive districts. But would this coercion be possible? The more productive districts would be crying for the labor that the less productive districts would be only too happy to yield; and no one would be left to do the coercing. Hence the initial founding of independent nuclei will not by itself insure the continued existence of the independent nuclei.

But since our problem calls for the total exploitation of all Russian territorial resources, let us see how now we may get people back on the abandoned land.

b) The colonial solution of terrain.

Under the colonial solution of terrain we must imagine the preliminary stage in which the whole population had at last gravitated into one highly organized system, like that of the United States, with abandoned farms and mines on the one hand and with a growing population on the other. Though this one established system offered the greatest economic opportunities, it would be faced by serious problems of unemployment because of the surplus

persons arising from the growing population. Inasmuch as unemployment may be considered undesirable for both economic and psychological reasons, the unemployed would be put to work.

Thus the unemployed might be sent back forcibly as colonists to the lands and mines where, at public expense, and under government threat, they would work to earn as much of their keep as possible. While these colonists were being rooted on the land at public expense, there would naturally be an increase in taxation to offset the charges of the colonization. Yet eventually the entire terrain would be brought under production by these means, and theoretically the organization of the terrain might well be one of multiple nuclei, with the chief centers of production and distribution located in terms of the most economical total striation of all Russia. Thus Russia might consist of a number of intricately interwoven systems, represented, say, by $A_1Sn_1 + A_2Sn_2 + \dots + A_mSn_m$. And each of these systems might represent a generalized harmonic series of its own, if one could only unscramble the parts of the total.

In view of the complexity of this equation, could we tell that this system was one of multiple-nuclei if we had no other social-economic information? There would be only one monetary standard, with one Federal Reserve System clearing checks at par, one foreign policy, one criminal code and the like. Nevertheless the presence of multiple-nuclei might well be revealed by marked differences in cultural goods. We know that the architecture, diet, clothes of persons may be greatly colored by the nature of climate-terrain under which one lives; similarly with other cultural goods (cp. Chapter Six). In the presumably loose social-economic organization of the "horse and buggy" days of the United States, local cultural modifica-

tions were quite noticeable and, indeed, to many, not displeasing, as they thought they saw human life blending into the natural environmental background of Nature. But as the United States merged ever more into one great uninuclear system, our living became more standardized, with a standard architectural composite of "Old Colonial-Georgian-Rhenish-Ann Hathaway-Cape Cod" bungalows with or without Greek pilasters arising on the new urban developments from coast to coast. The materials and fashions of our clothes became ever more standardized, often not even within the limitations of the climactic range of temperatures. Our diet tended to be standardized by the canning factory, and our tools and living appointments by the illustrated catalogues of mail order houses, while our local habits, etiquettes, and mental attitudes towards life tended to be regimented by Hollywood which apparently succeeded in the 1920's in bringing many of the population to the homogeneous intellectual level of the moving-picture theatre. As long as there is one uninuclear system, there would seem to be a noticeable tendency towards standardization (but see Chapter Six).

Yet once the entire vast terrain (Russian or American) becomes exploited to full capacity with hundreds upon hundreds of millions of persons in multinuclear systems, all struggling for existence, then a more localized culture might well emerge again, with local interests predominant, and mass-standardization receding because of the economies of local production for local consumption.

Furthermore, after the terrain has become saturated with multiple nuclei, either by the merging of many systems of independent foundation, or by progressively sending forth colonists from one system, then, in the absence of further labor-saving and material-saving devices, the death-rate would counter-balance the birth-rate, either by

governmental plan or by natural process—as is the case in autumn with our analogous bees.

Many things, of course, might happen to these different nuclei, who might soon even commence fighting between themselves for survival. For we repeat and shall continue to repeat that man has not yet evolved a mechanism for inter-nuclear or intra-nuclear behavior and hence we can make no predictions. Ultimately our individual human nuclei might break apart and evolve into great states; or, in the course of prolonged civil war and local anarchy, they may be reduced to the size of little hamlets, each one jealously guarding its rights against its neighbor, as in days gone by. In this connection perhaps the chief thing for us to remember is that the evolution of mankind will presumably continue long after petroleum has been exhausted and our coal has been reduced to ashes. And during this endless evolution, if man survives, social-economic systems will emerge, expand, break, and disintegrate as each generation tries to apply the maxim that “in numbers there is strength and in union there is strength,” in its attempt to balance one set of forces against another according to what we assume are natural laws.

Once again, then, in our discussion of human forces, we fail to find any permanent territorial arrangement that will remain constant, fixed and invariable throughout the ages.

The reader will remember that this discussion of the problem of Russian terrain was entirely theoretical and might have been referred to any other enormous piece of territory. In the belief that there may be some interest in actual Russian conditions we present in Figure Twenty data for the principle communities of the U. S. S. R. with their estimated population on January 1, 1933 (within the

limits of the respective community-boundaries) as presented in *The Statesman's Yearbook* (London: Macmillan, 1939, p. 1285).

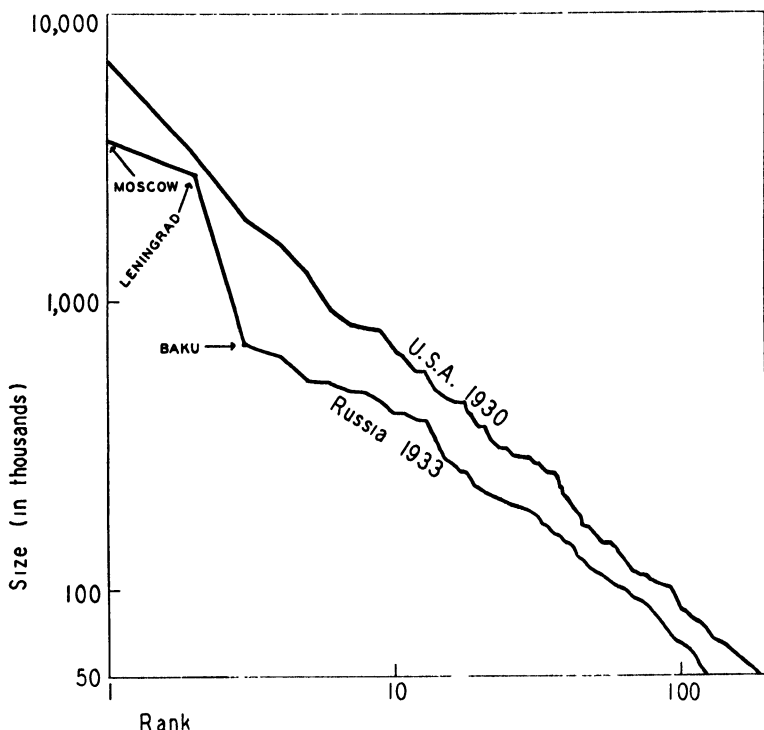


FIGURE XX. U. S. S. R. 1933. Estimated Population of Communities (with comparative data from U. S. A. 1930).

We note the excessive size of the two largest communities (Moscow, 3,663,300, and Leningrad, 2,776,400, with the third largest, Baku, containing but 709,000). For the reader's convenience we present for comparative purposes the curve for the U. S. A. in 1930 as taken from Figure One for cities of 50,000 or more inhabitants.

12. THE UNITED STATES (INTERNATIONAL AND INTRANATIONAL FORCES)

As we return now to a final brief consideration of the United States with which we first started, pages back, we see that our country too may well be a part of a presumably world-wide natural metabolism. On the one hand our system is an entity, describable in 1930 by our formula for the harmonic series. On the other hand we are living in a world of presumably sensitive balance, with other countries populated by persons who like ourselves are struggling for security and happiness and the means to live their way of life. And each of these nations, including our own, believes its way of life to be superior. Each nation, on the basis of its hopes and fears, probably divides the earth arbitrarily into the forces of "good" and of "evil." Once hostile conflict starts, we see how similar these persons are in the similarity of their reactions to similar problems of survival. Likewise in peace, if we only cared to look, like things might be found to behave alike under like conditions.

Yet nature's assumed balance apparently prevails also within the internal structure of a social-economic system. Our discussion of multiple-nuclei in Russia suggests one of many possible problems confronting us in America. For, if our analysis be correct, America represents today a supersaturated population in a subsaturated terrain. The growing tendency of state-boundaries to become economic boundaries as the result of state sales-taxes and the like may be a partial indication of the actual emergence of multiple-nuclei along the old historical-traditional lines of interstate cleavage. Incidentally a fixation of boundaries does not seem necessary for a multiple-nuclei solution; rather the reverse.

But there is perhaps another interesting development awaiting us as a nation. Our largest community, New York, may well begin to shrink in comparative size, if the days of large foreign exports are really over for a while. If United States trade becomes relatively ever more an internal trade and ever less an external one, then the tendency will increase to have the larger and largest communities located more towards the center of the terrain and less at the periphery. This shift in the urban center of gravity, which would probably entail some large increases and some large decreases in the sizes of our cities over the years, would probably be accompanied by economic duress for the losers, and this duress—really but a case of restriction with cultural lag—could not but affect the entire country. The census statistics for 1940 should tell us of the extent to which this restriction may have progressed (cp. discussion, including foot-note, of Table One, Chapter One). Of course, as long as our chief markets are located in New York, a possible loser, we should probably be given a much more pessimistic picture of the condition of national affairs than would be really warranted by the facts. Furthermore New York might reveal a greater amount of political-social unrest than would be the case elsewhere. (At the time of proof-reading, only the preliminary data of the 1940 census were completely available to the author. These data suggest the validity of our preceding surmise about multiple-nuclei in the United States. The author plans to publish a comparative analysis of the completed 1940 community-data as soon as these are available.)

It is quite likely, in the author's opinion, that in small matters as well as in large, the international and the intranational are too intimately connected to justify an excessive segregation of foreign and domestic policies. In fact

there may be a real political danger in segregating the two, because of the temptation offered to seek international solutions for those domestic problems whose solutions are and remain essentially domestic, and the reverse. But here again we must remind the reader that we have not proved the existence of a system of automatic checks and balances, on the assumption of which much of our argument has been based. If there is no such system,—that is, if those who prefer the dogmatic-speculative approach be correct,—then the future of the United States (if we may even assume that it has a future) will be a matter of dogmatic speculation.

Of course it does not follow by any means from our assumption of a system of automatic checks and balances that the United States will survive. After all, if we are living in a world of forces which are no respecters of persons, our survival as a nation will depend upon our ability to cope with these forces. It is true that we are exceptionally favored in the possession of natural resources. Furthermore we have a large population that (as far as sheer number is concerned) could theoretically be organized for the attainment of a national objective. But, to be completely frank, if there has been a clear-cut unambiguously national objective during the 1930's, the author has not been able to find it. This does not mean that there has not been a great deal of organization in the United States of national-international forces in the 1930's. Rather does it mean that there has been conflict of interest and a general turmoil of desires.

But may we infer from this past apparent lack of orientation in our national life that there have been no forces present which have been operating according to orderly law? The author feels that in the matter of social law our

popular views resemble those of persons living in the Middle Ages whenever they were confronted by earthquakes, hurricanes, pests and other natural phenomena of violent manifestation. The turmoils and conflicts of forces were viewed then as aberrations of law, as punishments, as scourges of the devil and so on; only with the lapse of time did man learn that, even in the midst of the hurricane, all remains orderly and behaves in the direction of seeking a more stable equilibrium. Similarly with great epidemics; they are but nature in operation according to law, and by understanding the law of the epidemic, we hope in time to control the epidemic. So too, the author feels that years hence we shall have at long last found that this same orderliness applies to the social "pests" and "hurricanes" with which we are all too often visited.

But it is not our purpose to editorialize on this matter of social law. Rather do we but state again the task that lies before us: the disclosure of the law. In the opening four chapters, we have presented observations that only too clearly show that laws do in fact exist, and that within these laws there is apparently a place for a social-economic system which we call a nation.

But let us now look within these national entities and try to observe at least something of their internal structure apart from the sizes of their communities which have served us well as a measuring rod thus far. After all, the sizes of incomes may offer something to measure, and similarly the varying amounts of individual and corporate wealth (assets). In the following chapter we shall inspect these distributions in detail and then, in our closing chapter, we shall attempt to reconcile our previous, rather cold, objective findings about society with our instinctive feelings about society with all its wealth and warmth of cultural goods. In this last chapter we shall

ponder briefly what a society might look like if all things in all ways happened to be seeking equilibrium with a minimal expenditure of energy; and there, in our final chapter, we may find that a society thus organized might conceivably be not entirely unlike the one in which we live, with all the perplexing international and internal problems that confront us.

Furthermore we may see that a nation is not unlike the bio-social organism of a hive of bees; and that the integration and disintegration of a nation involves many factors; and that national unity may be able to arise from a national disunity in spite of all the meretriciousness, histrionics, subterfuge, double-dealing, intellectual hypocrisy, and general political schizophrenia of the more highly placed political, intellectual, and academic leaders, who may in time be removed—if we are correct in assuming that human social-economic systems minimize energy.

CHAPTER FIVE

On the Distribution of Consumable Goods

In the first four chapters of our discussion, our main emphasis has been upon the production of consumable goods, with comparatively little attention paid to the way these goods might be distributed to the members of the population. In the present chapter we shall shift our emphasis to problems of the distribution of consumable goods to the population.

Our chapter will be divided into three parts: In Part One we shall discuss theoretically the possible existence of a law of monetary income-distribution, and then present empiric evidence of a law. In Part Two we shall discuss the proposition of *the maximum "good" for the "given number,"* and attempt to show the relationship between the "given number" of any nation and the entire population of that nation. In Part Three we shall discuss the question of possible equilibrium between the factors of social security, and of life, liberty and the "pursuit of happiness."

PART ONE

The Empiric Law of Income-Distribution

Up to this point our concern has been primarily with the production of consumable goods and only secondarily with their distribution and consumption. Let us in the course of the present and following parts turn to the general question of distribution and consumption. In a certain sense we are operating at a great advantage because we are by now thoroughly familiar with our generalized harmonic series which, as we shall see, applies quite precisely also to the distribution of consumable

goods. But in another sense we are at a disadvantage because of the elusive nature of the monetary symbols of consumable goods with which we must now work. Thus in the preceding chapters there was little doubt as to what a human being is; and with our mind's eye we could watch him move about in society. But there is grave doubt as to what, say, a dollar is, and it is by no means easy to watch one move about. Nevertheless let us begin. We shall pass from the theoretical to the empiric.

1. THE ROLE OF ORGANIZATION IN THE DISTRIBUTION OF INCOMES

Let us assume explicitly for the present chapter that, on the whole, all human beings desire to get as large a share as possible of the goods of production. The question arises as to how a person can get as large a share as possible, or, if one prefers, a larger share than he has. And the answer would seem to be that since "in union there is strength" and "in numbers there is strength," therefore the organization of number would be an excellent device for obtaining a larger share of goods. Since we have become familiar with this general proposition of the organization of number in respect to production, we need at present but to note that a number of persons, when organized, may be stronger than those same persons when acting alone in procuring consumable goods. In short, the share of goods falling to the organized might well be larger than would be the sum of the shares falling to the same individuals if unorganized.

Yet at this point we must be circumspect, because the opportunity for organization will be theoretically open to all, to the end that all may become organized and therefore strong. In short, there may be a competition of organizations. Hence a corollary of becoming organized

in one's own group would seem to be the prevention of organization of other competitive groups. This assumed tendency to prevent others from becoming organized, we shall arbitrarily call the force of disorganization. Indeed all intra-national organization may well have these two tendencies: first, that of increasing the efficiency of one's own organization and, second, that of decreasing the efficiency of one's competitors in the struggle of comparative strengths for the attainment of larger shares of the national goods of production. In other words, we may imagine that the goods of production are flowing simultaneously through local organizations—large or small—each one of which is bent upon procuring as large a share as possible of these goods for itself. To repeat, then, not only is production a matter of organization, but so too is consumption (distribution), with the terms *production* and *consumption* being by no means discrete.

Yet once we view the question of distribution of shares of consumable goods (i.e. of incomes) as a matter of organization, and once we view any local organization as but a part of the vast national social-economic system through which goods are flowing from their original natural state to the final refuse heaps, then it becomes clear that a country, like the United States, may be considered as being engaged at all times simultaneously not only in pumping goods through production into the national reservoir, but also in pumping these goods into the possession of the individual members of the system for their use. Of course there is actually no reservoir of goods; in fact, the more directly the goods can be pumped to the consumer, the greater the economy will be. And obviously there is no strict demarcation between raw materials in the process of production and those of consumption; our so-called "consumable goods" constitute after all the raw materials

which are necessary for us human beings if we are to live. Human "consumable goods" are the raw materials of human activity. And by the same token, a national social-economy may be viewed as a complete social organism, like a bee-hive in which all activity is inter-related to the end that we produce to live and live to produce (on the whole); that is, we pump the reservoir full of goods in order to pipe them off into consumption, in order to have the strength to pump the reservoir full again.

Now this analogy of the reservoir of consumable goods with conduits to the ultimate consumer may be useful in suggesting an empiric approach to the problem of income-distribution, if we assume explicitly that we are all engaged as individuals and as members of larger or smaller subsidiary collective organizations in getting as big a stream of goods into our own possession as possible. Indeed let us see theoretically what the quantitative effect will be of this struggle of individuals, whether organized or unorganized, to get a larger share of the stream of national income.

2. THEORETICAL APPROACH. THE OPPOSING FORCES.

If we begin with a hypothetical condition in which every individual receives the same share of consumable goods, we can write down this distribution as,

$$A Sn = \frac{A}{1^0} + \frac{A}{2^0} + \frac{A}{3^0} + \dots + \frac{A}{n^0}$$

without repeating the detailed analysis of Chapter Three in which we developed this formula from the obvious statement that the whole is equal to the sum of the parts. In the present instance $A Sn$ equals the sum of all consumable goods of a given national population at some moment, or interval, of measurement, and n equals the number of persons in that population.

Now as soon as cliques of like-minded enterprising individuals begin to "organize" by whatever means in order to tap off a greater amount of these goods for themselves, then, if they are successful, the quantitative effect would be an unevenness of distribution. Thus, for example, if we ranked incomes in the decreasing order of size, just as we previously ranked communities, and if we assumed that cliques were organized to procure larger shares of the monetary incomes, then we might suspect that the curve would descend from left to right, *though by no means necessarily in a straight line as far as we now know.*

Of course, nothing succeeds like success, and if one can organize, so too can another. In fact, master minds may appear to organize the smaller organizations into one large organization. And as with this one large organization, so too with others. Yet no matter how extensive or of what kind the different organizations may be, the effect of these organizations, if successful, may well be to increase the disparity of incomes. And this disparity of incomes would appear graphically on chart paper as a curve descending from left to right; the greater the disparity of incomes is, the more precipitously the curve will descend from left to right.

But if we have this assumed force of, let us say, "avarice" making for a heaping up of large incomes of the organized groups, have we also an opposing force that tends to level these incomes again? Obviously, with a constant supply of consumable goods, then the greater the share that one group receives, the lesser the share that the others will receive. Hence the others may feel quite properly that they are being exploited by the organized group, and this feeling of being exploited may act as an opposing force to the exploiting organizations. Let us call

these exploited persons the *exploitees*, and pit them against the *exploiters*.

What recourse have the *exploitees* against the *exploiters*? This is a problem which many persons face who are being exploited. In general the *exploitee* can unite in an organization with fellow *exploitees* in order to out-organize the organized *exploiters*. Or the *exploitee* or *exploitees* by obstructionistic tactics can so adversely affect production or distribution that the *exploiters* will yield to them. Carried sufficiently far, the organization of *exploitees* can itself become one of *exploiters*, with the former *exploiters*, now deposed, struggling to recapture their leading positions.

It seems in general quite possible, then,—to repeat,—that there are two opposing forces in the struggle for the possession of the goods of production: one force makes for organization, and the other makes for disorganization (with neither term used in a pejorative sense).

But these opposing forces may appear also in another connection. If we assume that the strength of organization lies both in the number of its members and in the union of its members, then any organized exploiting group is confronted by a problem. As it increases the size of its membership of fellow-*exploiters*, it reduces the number of persons that remain to be exploited. Furthermore the effect of this increase in size may be a diminution of the share of income for each *exploiter* within the group, as long as the rate of national production remains constant. Thus, if carried to an extreme, the group of *exploiters* might expand in number until it included every member of the population. In this extreme case, its growth would defeat the original purpose of the organization, because everyone would be a member of it, and the shares of con-

sumable goods would be the same to all members (unless an inner clique arose).

In this connection we must not forget that there is a legitimate reason for an outsider to join a successful group of exploiters, because membership in this group entails a greater income. In other words, there is clearly a force attracting members into any successfully organized group because of the emoluments of group-membership. Yet there is clearly also an opposing force that will tend to exclude members in order to avoid the dilution of individual emoluments that results from an increased size of the group. We know that, in practice, groups may grow very large in size and that inner cliques may arise within the organized group in order to exploit unsuspecting fellow-members; and we shall later inspect this problem of inner cliques. Yet for the present we are interested only in two considerations: first, that the force towards organization and its opposing force towards disorganization may pervade the entire population; and, second, that there may well be such a condition as the "right number" for the given organization (or, perhaps, the "right amount of organization" for the given number). And it is this second consideration, namely, the consideration of "the right number" for the given organization (or the reverse) which will engage us now.

3. "THE RIGHT NUMBER" FOR THE GIVEN ORGANIZATION

How are we to know, say, just what the "right number" of members of a given organization may be? We do not yet know of organization, except by its possible effect. Of course we may suspect that the "wrong number" will fare worse in the competition of the total social-economy than a "more nearly right number." Whatever the "right number" may be—and the problem is clearly complex—

we may suppose that the actual survivors of a general competition for incomes will have the closest approximation of the "right number."

When we say the "right number" of members of an organization, we use the term without restriction. That is, we mean the right number not only of a vast organization, but also of the inner cliques within the inner cliques within the inner cliques of that organization. If any organized group is procuring "too much," there will presumably be a tendency for others either to crowd into the group (and hence to increase its number), or to break it up (and hence to destroy the organization). If the organization is procuring "too little," there will be a tendency for its members to desert it for more promising groups, and so on.

But if there are these two opposing forces in operation at all times, to increase and decrease the size of group-membership, then we may suspect that the distribution of incomes within a national social-economy may not be an entirely random affair. Thus, if we inspected the actual shares of income passing to the various organizations large and small and to the individuals inside and outside of these various organizations in a given nation, then we should expect to find some evidence of an equilibrium between the organizational component on the one hand and the disorganizational component on the other. In other words, we might expect to find a balance between the *social* on the one hand and the *individual* on the other, if our above analysis be correct. Every actual income accruing to a group or to an individual would be the resultant of the opposing forces of organization on the one hand and of disorganization on the other. If all incomes, thus described, were ranked in the decreasing order of size, we should expect to find, first, some sort of orderli-

ness of distribution within any given national social-economy, and, second, a similarity of orderliness between the income-distributions of different national social-economies. Let us see what we find by appealing to actual sets of data. All income data are plotted according to the cumulative method of ranking (cp. Chapter One, Table Two for explanation).

4. EMPIRIC DATA.

In Figure Twenty-one are presented the official income-data for corporations and individuals in France for the fiscal years from 1927-1928 through 1933-1934 respectively. We note that on the whole these lines are straight

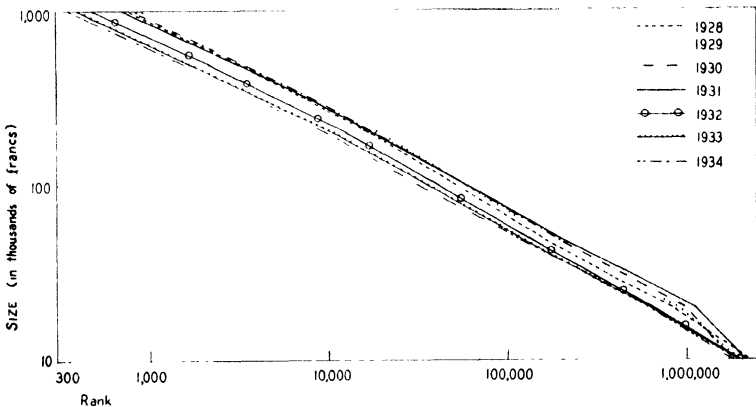


FIGURE XXI. FRANCE: INCOMES FOR FISCAL YEARS, 1927/28—1933/34.

except for the bottom where, for the years 1927-1928 through 1930-31 there is a noticeable downward bend for incomes of less than 20,000 francs—a bend that disappeared in subsequent years. (We shall discuss this type of bend in Part Two following.)

In Figures Twenty-two, Twenty-three, and Twenty-four we present the official figures for Denmark, the

Netherlands, and Latvia respectively for the years indicated. These data can be found not only in the official publications of these countries, but also perhaps more conveniently in the *Statistisches Jahrbuch für das Deutsche Reich* (for the years 1932 and 1937) from which the present compilations were taken. (A cross-check of the data in this book with official data for the United States, Great Britain and France showed a complete reliability of the German data.)

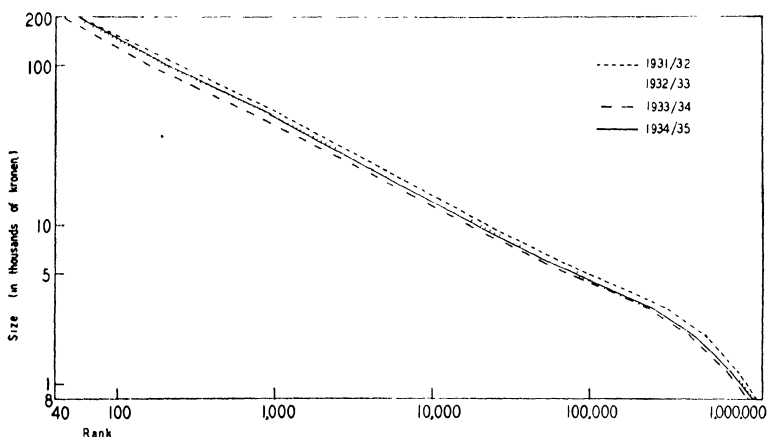


FIGURE XXII. DENMARK: INCOMES FOR FISCAL YEARS, 1931/32—1934/35 (INDKOMSTSKAT).

In the cases of Denmark and the Netherlands we find unmistakable examples of a straight-line distribution, except for systematic downward bends at the bottom which are striking. We shall ignore for the present the differences in the slopes of the lines in the Netherlands' data (see discussion of slopes in Part Three below).

The Latvian data reveal on the whole a slight concavity downwards with a marked concavity upwards at the top for two of the four years. This upward concavity at the

top we shall ignore, because it probably results from the approximate nature of our cumulative method of rank-

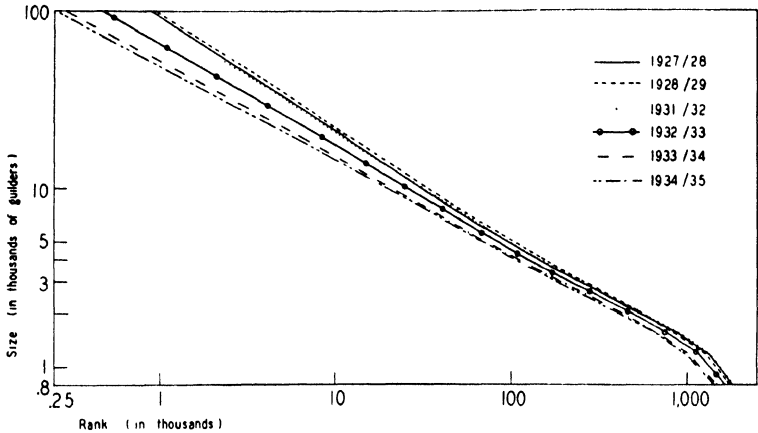


FIGURE XXIII. NETHERLANDS: INCOMES FOR SIX FISCAL YEARS (INKOMSTENBELASTUNG).

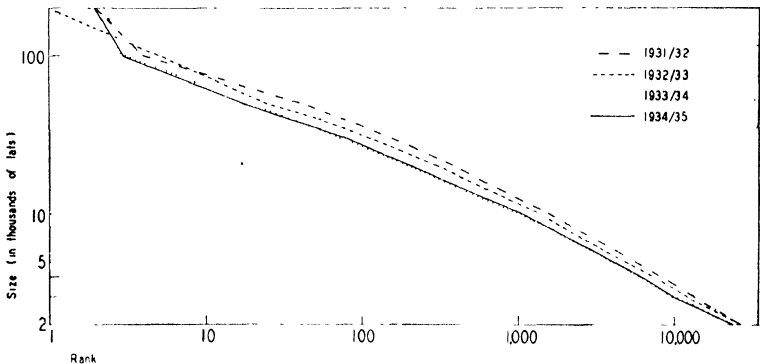


FIGURE XXIV. LATVIA: INCOMES FOR FISCAL YEARS, 1931/32—1934/35 (JENAKUMU NODOKLIS).

the two incomes of 200,000 or more lats is in fact exactly ing; thus we have no right to assume that the second of 200,000 lats.

Proceeding further we present in Figure Twenty-five the official income data for the surtax of the United Kingdom for the years indicated. In Figures Twenty-six and Twenty-seven respectively we present data for Finland and for Hungary for the years indicated; the data for these two countries were taken from the *Statistisches Jahrbuch* (op. cit.). With the exception of the data for poor, internally distraught Hungary, where there is an unmistakable concavity downwards, we find essentially a straight line distribution.

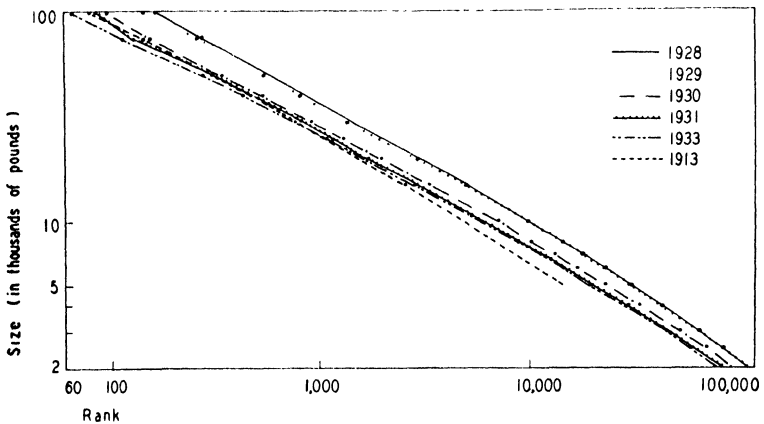


FIGURE XXV. UNITED KINGDOM: INCOMES FOR SIX YEARS
(FOR SUR-TAX).

In fact all our curves, with negligible exception, reveal (1) an orderliness of distribution within the national social-economies of the countries in question, and (2) a similarity of the orderliness as we pass from nation to nation. Furthermore, for the main bulk of most of these distributions, a simple straight line seems to be that which is being approximated. Algebraically all of these curves might be expressed as approximations to the general formula,

$x \cdot y^q = \text{constant}$, or, as we shall presently say, to the general formula,

$$A S_n = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{n^p}$$

where we are again on familiar stamping grounds.

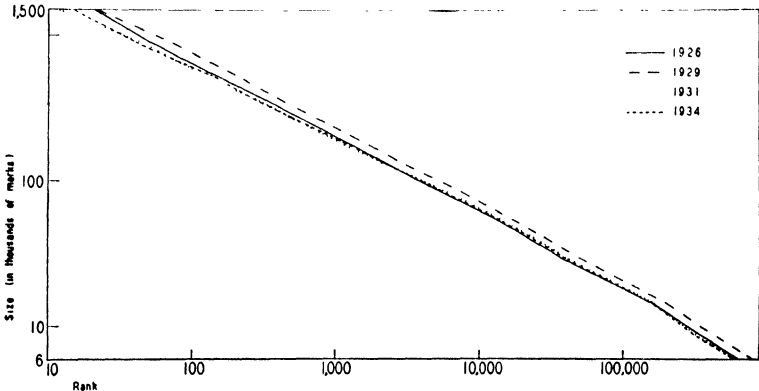


FIGURE XXVI. FINLAND: INCOMES FOR FOUR YEARS (INKOMSTKATT).

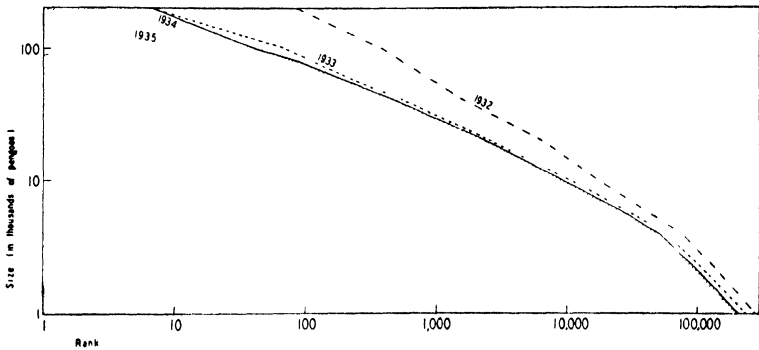


FIGURE XXVII. HUNGARY: INCOMES FOR YEARS, 1932-1935 (JOVELELEMADO).

Now in the terms of general dynamics, and in view of the above straight lines, we may say that the opposing forces of social-economic organization in respect to mone-

tary incomes apparently seek equilibrium in a condition that may be described by our generalized harmonic series. In other words, our hypothetical forces of *social organization* and those of *individual disorganization*, apparently balance one another in a rectilinear distribution. In terms of our generalized series, an increase in the size of p (between the inclusive limits of 0 and 1) might mean an increase in the total organization of the whole, on the one hand, and a concomitant decrease in individual independent activity, on the other.

However, the chief matter of concern, at this moment, is not a possible mathematical description but rather the fact that a law does indeed exist in the distribution of consumable goods (i.e. of incomes) in so far as these may be equated with monetary sums. Theoretical considerations have led us to suspect the existence of some sort of a law of balance; and empiric findings from an abundance of data confirm the existence of a law, and shed some possible light upon its precise nature. In this connection we shall not ask what a dollar is, or a franc or a pound; instead, we shall simply assume, until evidence is advanced to the contrary, that whatever these monetary units may be, they are distributed to the organized and unorganized members of the national social-economies under review in an orderly fashion. Furthermore we shall not at this point ask about the reliability of the data nor mention the question of fraudulent returns, or of deductions, or of admitted differences in statistical procedure of enumerations; however urgent such questions are in calculating actual descriptive formulae for given nations at given moments of measurement, nevertheless for us the apparently fundamental straightness of the line is alone of importance, and in view of this fundamental straightness we simply surmise that matters of fraud or of deduc-

tions or of differences of statistical enumeration—whatever they may actually have been—are not of sufficient moment to disguise beyond recognition the apparently fundamental straight-line distribution. In other words, a concern about statistical minutiae shall not divert our present attention from first principles.

Nevertheless bends of any sort, and notably systematic bends, can be of very great concern to us. Let us approach this problem of bends.

5. HOMOGENEITY AND HETEROGENEITY; THE CASE OF GERMANY.

Up to this point in the present chapter we have presented several sets of data for the income-distribution of various typical countries and have found unmistakable approximations to the same linear equation which holds for community sizes and numbers. In fact the entire mathematical argument of the first three chapters about the formula will be assumed automatically here. Hence, we may immediately write:

$$A Sn = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{n^p}$$

where $A Sn$ represents theoretically the sum total of a nation's consumable goods as represented by net incomes in monetary terms, and where n represents the number of organized groups (including groups consisting of single individuals) who receive net incomes. We may also say that if the whole organization is homogeneous, the subsidiary parts will not be. Furthermore, all we have said in Chapter One about *surfeit* and *deficiency* will apply here; as with communities, so too with incomes,—a convexity upwards means a surfeit, and a convexity downwards a deficiency.

With these considerations in mind let us present in Figure Twenty-eight the income data for Germany for the years 1926, 1928, 1932 and 1934 and 1936. These curves are striking for several reasons. First of all, the curves for 1926 and 1928 are both on the whole straight and parallel down to a pronounced downward bend at 2,000 marks (about \$500). Second, the curves for 1932 and 1934 are both reasonably straight as far down as 8,000 marks (about \$2,000) where the line bends out to the right until the point of downward slope is reached at 2,000 marks. If we ignore in all cases the bends below 2,000 marks, we may say that the curves for 1932 and 1934 show marked incidences of heterogeneity, or of *surfeit*, for recipients of incomes of less than 8,000 marks (ca. \$2,000). In other words the lower middle class (with

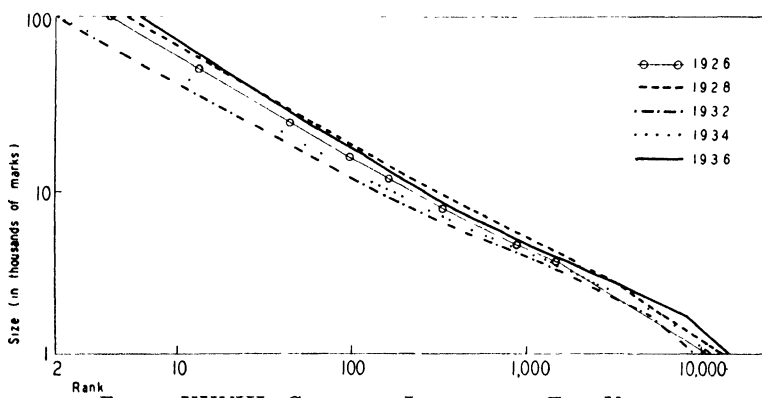


FIGURE XXVIII. GERMANY: INCOMES FOR FIVE YEARS.

incomes from \$2,000 to \$500) by the years 1932 and 1934 had lost their rectilinear position with the recipients of incomes in the higher brackets.

The fundamental aspect of the German curves is perhaps the appearance of this abrupt bend during the emergence of the world-wide depression between 1928 and

1932. In other words, the bend may reflect a break in the total economy which attended economic depression.

There is nothing to be gained, of course, from arguing whether the slope above or below this bend is the "chief slope." From the viewpoint of persons in the lower brackets, who were receiving incomes from \$500 to \$2,000, the members of the upper brackets were receiving incomes at a disproportionately higher rate than they. From the viewpoint of those with incomes larger than \$2,000, there was a disproportionately larger number of persons receiving incomes from \$2,000 to \$500 than seemed warranted. We do not mean to imply that these various persons looked at the bends of these curves and as a consequence thereof reached these conclusions. Rather do these curves suggest that these feelings might be warranted. In other words, Germany's total organization was apparently split into the two groups of the upper brackets on the one hand and the lower brackets on the other.

Of these two groups we may say that one was smaller in number though richer in incomes whereas the other was larger in number. If we assume that in numbers there is strength, then it would follow that the lower and larger of the two groups would be capable of a greater strength if organized. The author suggests that it may have been precisely this second group—the lower middle-class with incomes between \$2,000 and \$500—that became organized in the German revolution. The members of this lower group would contain the local shopkeepers, artisans, and poorer professional classes.

Of course there is a large group not represented on these charts,—the unemployed that were said to have reached about six millions in 1932. They constituted probably the "communistic-proletarian threat" against which the upper classes are said to have sought protection. But since 1933

the attempt was reportedly made to bring the total whole,—industry, distribution, and agriculture,—together into one total state, organized as a whole even into the intimate and minute details. It is not our purpose, however, to attempt a description of National Socialistic Germany.

Actually the German data for 1932 and 1934 may be said to represent a homogeneous organization, plus a residue. That is, we might write

$$A Sn + (\text{Residue}) = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{n^p} + (\text{Residue})$$

Furthermore, there was probably at least one other residue: the unemployed.

The curve for 1936 is interesting to observe. The author does not possess the necessary factual information to comment upon it.

6. HOMOGENEITY AND HETEROGENEITY; THE CASE OF THE UNITED STATES.

In Figure Twenty-nine we present data for the United States from 1927 through 1936 inclusive. The data are taken from the official *Statistics of Income* (published by the Bureau of Internal Revenue, Washington, D. C.) for the years in question, and represent a combination of corporate and individual net incomes arranged in decreasing size according to the cumulative method of ranking. We shall first discuss the curves on the figure and then the data.

Beginning with the upper part of the ten curves, we note that five fall slightly more to the right and five slightly more to the left. The five at the right are for the years 1927, 1928, 1929, 1930 and 1936,—that is, one each for the three years before the depression of 1930, one for 1930

itself, and one for the year 1936 in the post-1930 period. The set of five curves at the left are all for the post-1930 period; that is, for 1931 through 1935.

Let us remember, before proceeding, that with a reasonably constant population of persons, and with a reasonably constant slope of the line of distribution of mone-

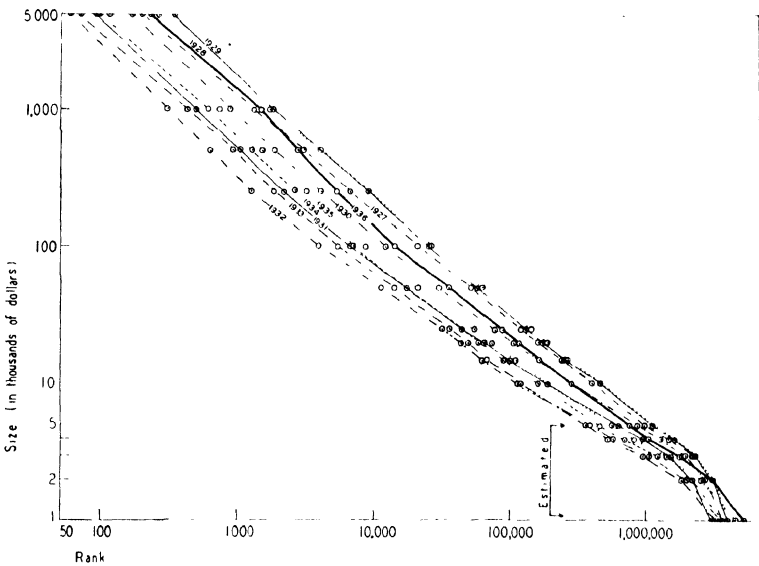


FIGURE XXIX. U. S. A.: INCOMES, 1927-1936
(COMBINED CORPORATION AND INDIVIDUAL).

tary incomes, then it follows from the way we are charting our data that the farther to the right the line lies, the greater the number of "organized entities" in each monetary income bracket.¹ In short, as the line moves parallel to itself to the right, more and more "organized entities"

1. We may speak of a movement to the right only on the basis of our data as charted on, say, Figure Twenty-nine. On the basis of a curve for the complete set of data we should say that the line is moving upward and parallel to itself (or else downward and parallel to itself).

(corporations, partnerships and individuals) are included in each monetary income bracket. For example, in Figure Twenty-nine the main trend of the line might be considered ever more towards the right in the years of expansion from 1927 through 1929. It receded ever more to the left through 1930, 1931 and 1932, and then back again to the right through 1936 (the last year for which final data are available to the author at the time of writing). From the viewpoint of the "organized entities" themselves, on the whole, there was a general upward trend in monetary incomes from 1927 through 1929, then a downward trend through 1932, and again an upward trend through 1936. This statement is but general and "on the whole," because the slopes changed in the course of the years. (Remember we are talking about monetary income at this point, and not about "real" income, or the purchasing power of the dollar.)

If we now consider the slopes and straightness of these lines, we find that the lines for 1927, 1928, and 1929 were on the whole quite straight (notably for 1927 and 1928 where the straightness is striking). Furthermore there was a marked increase in slope between 1927 and 1929 when the slope closely approximated that of a harmonic series, with $p = 1$.

As for the curves after 1929, all have bends of the type found in the German data of Figure Twenty-eight. There is perhaps even a faint suggestion of a bend in the data for 1929.

These bends in all curves after 1930 are significant because of the composition of the upper and lower parts of the curve. From an inspection of the actual data, in which incomes for corporations are segregated from those for individuals, we know that the upper portion of all curves represents primarily the net incomes of corpora-

tions whereas the lower portions of the curves represents primarily those of individuals. The general sense of these curves for 1930 and after is, comparatively speaking: fewer corporations were receiving disproportionately more, while more individuals were receiving disproportionately less. In other words, the total economy of the United States began to split into two main groups,—the one with fewer but richer members, the other with more and poorer members,—comparatively speaking. The low point was reached in 1932,—and of course we remember what happened then.

Since 1932 the slopes began to rise, but it is a matter of debate whether the bends became less pronounced. There is no doubt, however, that all data since 1929 have bends, and that the data for 1936, which is the last, has a serious bend at incomes for one million dollars, and a marked downward convexity for all smaller incomes to those given for three thousand dollars. In other words, there has been since 1930 and there continued to exist through 1936 a perceptible heterogeneity of income distribution. The reader may review what we said about the preceding German data, for much of the argument may apply here. The small corporations and the individuals in the lower income brackets were said on the whole to have supported the New Deal; those in the upper brackets, to have fought it. In addition, there were many unemployed individuals (the author cannot establish how many) who are not represented here, and also many corporations with deficit incomes who are not represented, but whose numbers and deficits can be found in the *Statistics of Income*.

In this connection there are several points to be made, and frank discussion may not be out of place. The year 1932 was a memorable year as our national social-economy seemed about to collapse. Many felt that the signs of an

impending "revolution" were not absent. Indeed the emergence of bends of this sort in an income-distribution may well be symptomatic of a pre-revolutionary condition (see Part Two, following), and the failure of these bends to disappear may be ominous for our national social-economy. In simple terms, the emergence of these bends after 1929 may well have meant that *a* new deal in our social-economic organization was very much in order (whether *the* actual New Deal was or was not the proper new deal remaining a matter in respect to which the author takes no stand in the present study). In other words, the emergence of a new deal in the United States, as in Germany, in the opening months of 1933 may well have been an inevitable result of the mal-distribution of social-economic forces within each of these countries. There may or may not be doubt about the expediency of the methods taken, nevertheless the bends in our lines suggest that a change might well have been in order.

7. THE RELIABILITY OF THE DATA.

But now let us interrupt our discussion of the United States with a few critical remarks about the reliability of our data. To begin, the reader must not think that the author is the first to operate with this type of data or is the only person thus occupied. There are even certain stereotyped criticisms levelled at this type of analysis which the author now tries to meet in advance.

One possible criticism is that the data for the United States are incomplete because they do not include the very low incomes nor anything better than estimates for all incomes under five thousand dollars. To this we respond that, though this is true, the upper portion of the line (i.e. the portion above five thousand dollars) is more than sufficient in extent to warrant study.

There is the possible criticism that many important corporations are simply not represented in some years because they had no net incomes; for example, a great steel company of vast importance for the national social-economy may have been producing without earning a net. To this we reply that these corporations in question, though not represented by their own net incomes, were nevertheless represented by the salaries—high or low—of their executives, and that these salaries were presumably only possible because of the corporation-organization; for all we know to the contrary, many of these deficit corporations may well become bankrupt with their assets split to pieces if they cannot stand up under competition.

Next the criticism may be rightly made that the statistical procedure of tabulation of incomes as well as the definition of net income changed between 1927 and 1936. In reply we admit that our curves are no sounder than their supporting data. Nevertheless there are several considerations that we must bear in mind. First, as long as the same tax-definitions and statistical procedure are adopted consistently within each set of data by and for itself, then it is not impossible that any consistently applied difference in procedure between different sets of data may modify the position or slope of the line by a constant amount without altering its essential nature. Second, many differences in procedure may be trivial in their effect upon so large a distribution; that is, the line would not be seriously altered by the differences in procedure. Third, we must submit that the charts in this chapter reveal many instances, not only of straight lines, but of brazenly straight lines about whose straightness there can be not the slightest question. This is notably true, for example, for the earliest curves of the incomes for the United States. These instances cannot be ascribed to

random chance. Furthermore, we cannot argue that the straight lines have appeared because of a faulty statistical procedure. Similarly it would be dangerous to argue that the bends in some of our lines would disappear under a "more correct" statistical procedure.

It may be argued that we cannot visualize these forces nor comprehend this population-in-organization, in which we are reducing individuals and organized groups to a common unit of "organized entity" which can be applied either to a great corporation or to a single person. True. But we also cannot visualize, say, electricity; nevertheless we can understand electricity by its effect, and by the same token we can hope to understand social-economic organization by its effect. The very fact that we are finding straight lines gives an unmistakable pragmatic sanction to our inquiry, for these straight lines are not the effect of chance. Furthermore, our theoretical discussion at the beginning of this chapter, as well as the material in the preceding chapters, have given an *a fortiori* hint of the theoretical likelihood of some law, even though the author advances these straight-lines only as empiric findings.

One may remark that our data refer to dollars and not to "real values"; one may even ask, "What is a dollar anyway?" To this we reply that whatever a dollar may be, it is very "real" in its ability to purchase something, and that the distribution of dollars apparently seeks to follow an orderly law of equilibrium. By studying the behavior of dollars we may learn of the nature of dollars. Similarly, and in general, by defining entities in order to study properties, we may learn thereby how to define entities more precisely.

And to all other possible criticisms we answer in blanket form: we have frankly told precisely what we have done and have labelled honestly what we have found, and feel

under no obligation to excuse ourselves for not doing what others may have seen fit to do, or the reverse. In short, we are offering our investigation for what it is worth. If we continue to argue on the basis of a fundamental logarithmic equation, it is because we see that that is the case, and we see it because we are watching the fundamental forest and not the minutiae of trees.

But let us continue. Many things are not clear about this logarithmic equation. For instance, how is income-distribution related to production from which, up to now, we have arbitrarily segregated it?

8. NATIONAL PRODUCTION-DISTRIBUTION: ABSOLUTE AND RELATIVE SHARES.

Before continuing further let us briefly remark that all that we have said in our first four chapters about the naturalness of a "national entity," on the basis of community-distribution, may apply also here on the basis of income-distribution, and for the same reasons. The community-distribution was a possible barometer of the national production of consumable goods for which the natural basis was one single integrated social-economic system which we might call a "nation," in contra-distinction to some "international grouping" of many nuclei or to some "intranational" subsidiary group. Yet even in our studies of production (notably in Chapter Three), we were obliged to consider the problems of the distribution and consumption of the goods of production in order to try to understand the law of community-size. For we argued at the time that it is economical to bring the locations of production and of consumption as nearly together as possible.

And as we turn our attention now to what we term "distribution" (including consumption) we must remember

that distribution is so intimately related to production that it is but a literary fiction to keep production and distribution apart,—a literary fiction which we use only for the purposes of exposition and which we shall hope to abandon as unnecessary before the end of our study when we shall have integrated somewhat more the forces of production and of distribution. Let us, in fact, now commence this integration.

Thus far in this chapter we have represented distributional organization as a struggle for the goods of production apparently according to the general formula of

$$A Sn = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{n^p}$$

in which $A Sn$ means the sum of all goods and in which the exponent, p , takes on values (discontinuously) from 0 to 1. We have argued essentially that the problem of income-distribution was a problem of allocating balanced shares in which the forces of organization and of disorganization were in opposition. Thus to organize oneself into a group of greater strength, and to disorganize one's competitor, are means of increasing one's own share of the total income. But this applies only to one's share of total income, and not to the absolute amount of the share. That is, it says whether the share will be one-thousandth or one-millionth of the total national income, and not how much in absolute dollars and cents that one-thousandth or one-millionth share will be. The proportional share, we assume, will depend primarily upon the forces of organization and disorganization; the absolute amount of any given share will depend upon the absolute amount of the total income to be divided (i.e. the size of $A Sn$).

In order to clarify the difference between a proportional share and an absolute amount let us suppose that

A Sn refers to a thousand pies. If a given person receives one-tenth of these pies, he receives an absolute amount of one hundred pies. If he wishes to increase the absolute amount of his pies to two hundred pies, he has two alternatives (or a combination thereof). As a first alternative, he can try to increase his share to two tenths of the one thousand pies; in other words he can theoretically increase his absolute amount of pies by increasing his proportional share of the total; but in this event, his additional hundred pies will be taken from those previously allocated to another or others. Second he can try to increase the total number of pies (*A Sn*) from one thousand to two thousand; and, if successful, he will receive two hundred pies as his share of one tenth of the new total. (By the same token he can combine the two alternatives by increasing his share on the one hand to, say, $13\frac{1}{3}\%$, and the total of *A Sn*, on the other hand, to 1500 pies).

Similarly, there are two alternatives for increasing one's absolute amount of national income: (1) one can try to increase one's proportional share of a constant whole, or (2) one can try to increase the total national income without altering one's proportional share. And, of course, one can combine the two.

To increase one's proportional share of the whole will automatically deprive another or others of some or all of their previously allotted shares. We might call this the non-productive approach to social-economic distribution. For it does not increase the nation's total production; on the contrary, by introducing intranational friction in the displacement of others, it may actually decrease national production.

But to increase one's absolute share by increasing the total national income while abiding by one's proportional

share is to increase, by a constant fraction, the share of everyone else, along with that of one's self. This increase of the national total might be called the productive approach to social-economic distribution, because, in the last analysis, it is based upon an increased national production.

The question might arise as to which of these two approaches (or what combination of the two) should be adopted in a given situation. To this the author replies that, in the light of our assumption of a minimizing of the expenditure of energy, that course which is recognized as the most economical should be (or will be) adopted.

And since the most economical course for one individual or group of individuals is not necessarily the most economical for another or others, we therefore note a potential source of conflict between the advocates of these two different ways of increasing one's absolute amount of income,—between the non-productive and the productive,—provided of course that we are correct in assuming that practically all persons want to increase their incomes.

In any actual conflict between the non-productive and the productive, we can only foresee that the stronger side will win (and again we remember that in union there is strength and in number there is strength). Hence it is quite conceivable, in the light of our above discussion, that a national system of production-distribution may become divided in conflict, as one side organizes against the other.

Let us briefly inspect some of the types of organization that may be open to our imaginary adversaries. For, after all, we cannot deny that both the total amount of national production, as well as the proportions of its distribution, may be of great concern to the inhabitants of any nation.

9. SOME TYPES OF ORGANIZATION FOR PRODUCTIVE OR NON-PRODUCTIVE ENTERPRISES.

As we turn now briefly to a few of the various types of organization that may be formed to increase one's share of income—one way or another—we may say in advance that, from the sheer appearance of any one of these organizations, we can not tell whether it is productive or non-productive,—that is, whether it will increase its own absolute amount of income by increasing the total income or by simply taking from others. For, as far as we can see, the same type of organization may be used for either course, as will be apparent as we proceed.

One obvious type of organization is the military, where the members of the group procure weapons, have a central organizing command, disarm the opposition and by brute force simply take for themselves a large share of the goods of production. It is a form of slavery. History is replete with examples of it from earliest to present times. It has not been infrequent south of the Rio Grande nor unknown north of it. It may appear in the form of a military dictatorship, or of armed vigilantism, or of gangsterism, or in many other forms. Carried sufficiently far it can over-bleed production and kill it off. It can beget an armed opposition that will throw a nation into a long destructive period of civil war, or of revolution and of counter-revolution. On the other hand, moderately and cautiously managed, a military organization can be highly effective in increasing national production, in stamping out the waste of unnecessary inter-group and intra-group friction, and of integrating and forcing production. Because of its inherent capacity for increased efficiency, congressmen have decided to impose an organized military dictatorship upon us automatically whenever they vote us into war. Of

course, it is often easier to hand over arms than to get them back; furthermore even the best intended dictatorship can bungle matters, and finally the accession to power can go to the heads of those in power. Nevertheless, whether positive or negative, membership in a military organization is one possible way of increasing one's share of the goods of production.

Another type of group organization is the economic, in which the members openly or tacitly agree upon a course of action. By pooling their assets and by collusive bidding or by collusive buying, boycotting, underselling, or otherwise "rigging the market," they can kill off their competitors individually or collectively. For the want of a better term let us call this type of economic organization a *social-economic trust*. A social-economic trust may seek monopolies or franchises on essential sites, or essential processes, or on essential materials, or on essential types or routes of transportation, or of communication, or on essential types of labor. Like the military organization, it can increase national production by cutting down the wastes of unnecessary competition and the risks of price-cutting which can undo all parties concerned. Furthermore, by pooling its assets and its common interests, it can afford to undertake risks of innovation in processes and in goods of great value to the total social-economy. In other words, a social-economic trust has a productive side that cannot be ignored. On the other hand, and by the same token, it can exploit extortionately, impede progress by killing off innovations in processes or in goods and seriously cripple an economy.

A social-economic trust can arise from the independent efforts of shrewd leaders. Or it can result as a self-preservative reaction to some other trust. Thus, from fear of organized labor or of an organized and hostile party in

government, a commercial-industrial trust may arise. Or, as a reaction to a commercial-industrial trust, labor may organize itself into a social-economic trust. Or as a reaction to either of these, a political party that is hostile either to commercial-industrial trusts or to labor trusts, or to any other type of trust may take over the power of government. As with a military organization, so too with a social-economic organization, the effects may be "good" or "bad" depending upon how one defines "good" or "bad," and upon what the organized groups do. With all ethical considerations aside, a military organization or a social-economic trust is of positive or negative value for the nation, depending exclusively upon whether the result of its existence is the movement of a greater or of a lesser amount of materials through the total social-economy per unit of energy.

Though history offers endless examples of social-economic trusts, the advance of civilization in recent years has perhaps enlarged the means whereby a trust can become organized or maintain its organization. Of these new devices the chief is propaganda which is useful not only in eulogizing the home-organization but also in disparaging competitors. Of course we know that no person, no organization and no product is perfect; it has its positive sides and its negative. By emphasizing the positive sides of anything and by ignoring the negative, one can make a "saint" out of anything; conversely, by emphasizing the negatives sides of anything and by ignoring the positive, one can make a "devil" out of anything,—the terms "saint" and "devil" to be understood in the light of what the public at large feels a "saint" or "devil" to be. In other words, taking popular preconceptions and biases as the final standards of truth and ethics, the propagandist wrestles with the facts of history and with the data of

science to force them into line with popular notions of truth and morals on the one hand and with a eulogizing of oneself and a disparaging of one's competitor on the other. This wrestling with the facts of history and of scientific data is frequent, even in certain types of academic circles; we shall call it the *warping of historical-scientific data*. Many examples of warping of *historical-scientific data* can be found in the United States in the 1920's. During that period, for example, we were apparently more afraid of "Reds" than anything else; and one vastly powerful social-economic trust, by means of propaganda, entrenched itself in power by warping historical-scientific data to legitimize itself and to disarm all adverse criticism by pinning the label "Red" on the critic. In the 1930's the labels of damnation seemed to have been "Nazi," "Fascist," "Economic Royalist," and so on. The 1940's have yet to bring forth their labels; but "Fifth Column" and "Trojan Horse" seem under way.

In addition to the military organizations and the social-economic trusts there are also the *religio-Brahministic organizations* that can increase their share of the consumable goods by persuading the people that they have a monopoly on godliness, or on "morals," or on blue-blood, or on intellectual processes, and so on. The potential viciousness of *religio-Brahministic organizations* lies in the fact that religion, ethics, and intellectual activity are all apparently very important for a social-economic system as a whole or as a part. The need for intellectual inquiry into the forces of nature in order to find man's place therein is beyond question. The urgent need of a faith in a divine guiding *Whatness* (i.e. God) is immediate to many persons at all times and perhaps to all persons at some time. The need of principles of decent human social conduct is with us constantly. But let us be careful. On

the one hand we may be inclined to say with Matthew: "Where two or three are gathered together in my name, there am I in the midst of them." On the other hand we must admit that when two or three are gathered together in any name, the nucleus of a potential social-economic trust is present. On the one hand history is replete with examples of the great constructive positive value of religious and academic activity; on the other hand it is replete with examples of crassly selfish or short-sighted social-economic activity of religio-Brahministic groups.

These three types of organized groups—the ones of military-physical force, the ones of social-economic trusts with economic collusion, and the ones of religio-Brahministic appearances—can be either "good things" if dynamically sound, or "bad things" if dynamically unsound.

Of course these three types of organization are not discrete; in fact a combination of all three is only too easily conceivable. Furthermore they do not exhaust all possibilities of organization, though they do most certainly represent very important possibilities. For after all, in the last analysis, they represent the organization of brute physical force, or the organization of the controlling factors of production and of distribution, or the organization of the controlling factors of public enlightenment and information,—a triad of quite important sets of factors in any social-economic system today.

By and for themselves these organizations are not necessarily "predatory,"—they may or may not be, depending both upon what they effect and upon one's criterion of "the predatory." They may increase national production, or they may stabilize national production, or they may reduce national production; they may increase their proportional shares of the total income, or they may stabilize their shares, or (if the facts of history mean anything)

they may succeed only in laying their heads upon the public chopping block and have no share at all.

In this connection we might remark that in the long run, an organization,—or any other functional entity within a social-economic system,—is of positive or negative value depending upon its function and not upon its label, or its avowed intentions. The case is perhaps roughly analogous to that of a person who is either sick or well, regardless of what the doctor may say, and who will either respond or not respond to medication depending upon the illness and the kind of medication given and not upon what the doctor honestly or dishonestly may say or think. The same applies to social-economic entities; they are of positive or negative value, as the case may be, and no amount of warping of historical-scientific data, either honestly or dishonestly, by humble persons or by exalted, can significantly alter the fundamental dynamics of the situation. Many believe that today in the United States, because of the excessive length to which historical-scientific data have been and are being warped for the interests of one social-economic trust or another, the people have become confused both in intranational and in international matters. According to these persons, the freedom of press and of organization in our form of government has apparently been so extensively abused by powerfully entrenched factions of all kinds that our nation has become psychologically disorganized, with little faith left in the press or in the radio or in those “leaders” whose past performance did not perhaps reveal at all times a high degree of good judgment or of honest integrity, as the case may be. Furthermore, as a reaction to a constant and, at times, almost a militant warping of historical-scientific facts, all statements may come under suspicion.

However our immediate interests are in the general

dynamics and not in the individual illustrations. Propaganda is just one more device for establishing and maintaining an organization, or for destroying a competitive organization, for increasing the total national income or for merely increasing one's proportional share thereof.

But before leaving our present cursory inspection of these three types of organization, we may remark that theoretically the possibility of forming one or more of these organizations is open to all persons, even though "possession may be nine tenths of the law." Furthermore the impingements of one of these organizations may call into being another and opposing organization as a reaction. Moreover in the competition of organizations of this type, much will depend upon the number of members in the competitive organizations, and upon the degree to which they are organized (cp. Part Three following, and Chapter Six). Here again we may suspect that comparative strengths in the attainment of an objective may depend somehow upon the comparative degree of organization of comparative numbers.

And yet what may this last sentence above mean in terms of the distribution of monetary incomes which seem to follow our generalized harmonic series?

10. SUMMARY OF PART ONE

The little fleas that do us tease
 Have other fleas to bite 'em
 And these in turn have other fleas
 And so—ad infinitum.

The above familiar quatrain, or any of the other flea-quatrain, from that of Swift through the one of Augustus de Morgan, may conceivably serve as a homely analogy to any assumed system of automatic checks and balances of forces in respect to incomes in a social-economic system.

Of course we have not proved by any means that there is any such system of automatic checks and balances. Indeed we have but shown from a considerable number of sets of data on national incomes that an income-distribution, instead of being a random matter, can show a high degree of orderliness in respect to the terms of our generalized harmonic series. In view of the nature and amount of our data, the assumption of some sort of system of checks and balances would not be rash, provided we remembered that it is an assumption. Hence as we now make such an assumption, let us again remind the reader that the findings of this entire published study, if any, are empiric.

But if there be some sort of system of automatic checks and balances that will account for the orderliness of our income-distributions, what may we suspect that the nature of the system might be? In answer to this we might again inspect our formula for the generalized harmonic series.

The features of our generalized harmonic series which come to mind are not only the size of $A Sn$ (i.e. the total amount of income to be distributed) but also the size of n (i.e. the number of organized entities, including those entities that consist of a single person). There is, moreover, a question of the size of the exponent, p , which we are arbitrarily assuming may take on values between 0 and 1 inclusive. Since we have already briefly treated of the size of $A Sn$ in our cursory discussion of the possible relationship between the assumed forces of production and those of distribution (or consumption), there remain the tasks of considering the possible import of n (in Part Two) and of the size of p (in Part Three).

Nevertheless before turning to Part Two, let us briefly return to a question broached some pages back: "the right number" for the given organization—and explore very

superficially into the possible connection between this hypothetical "right number" on the one hand and that of the hypothetical "order of flea-dom" in our flea-quatrain above.

As far as the hypothetical "order of flea-dom" is concerned, it would seem—very superficially—to be a question of the organization of a number of organizations of a number of organizations and so on to a poetical ad infinitum. In short, it would seem off-hand to be a question of number on the one hand, and of organization on the other—in which number refers to organization and organization to number—whatever these terms may mean.

Similarly, perhaps in the phenomenon of social-economic production-distribution, there may be a question of an organization of a number of organized persons and so on—whatever these terms might mean. Furthermore, for the attainment of an objective by means of the organization of men and materials, there may be such a thing as a "most nearly economical number of persons" (i.e. the "right number") in terms both of the objectives, and of the kinds of persons and of the other givens of the situation. In reference to this hypothetical "most nearly economical number of persons" there might be such concepts, then, as "too many persons" or "too few."

In other words we might, for example, conceive of the total social-economy of the United States—with all its farms, factories, stores and other evidences of social-economic productive-distributional activity—as an elaborate balance between individual and group-activity with all individuals and groups having, on the whole, the common, though often competitive, objectives of preserving or increasing their respective shares of national income. We might imagine that an organized group would seek to increase its share of the total income by, say, employing

more persons (hence a larger number). Similarly we might see how the members of the group might want to increase their individual shares by discharging some of the members (hence a smaller number). We might see how an individual might wish to increase his own share, either by joining a group, or by leaving a group, or by organizing his own group, or by working alone.

Success or failure, as measured by a rate of increase or of decrease of the shares of incomes of the persons and groups involved, might depend upon the attainment of the "right number," either of persons within the group, or of groups within the group. In short, whatever "organization" may mean (and we may hope to learn of it by studying its effects), the concept of "number" or of the "right number" would seem to be important. Indeed the presence of heterogeneity, in the sense of the presence of bends in the otherwise linear curve, might seem to indicate a possible mal-distribution of number in a great social-economic complex of assumed forces that are bent upon seeking equilibrium.

And yet,—what is the "right number," if there be any such thing? Let us approach the answer to this question circuitously.

PART TWO

The Problem of the "Right Number": Pariah and Elite.

As we turn now to inspect the general question of the possible meaning, if any, of the concept of the "right number," we may suspect at the very outset that the concept would make sense only in reference to the organization of the actual givens in a definite situation for the attainment of a specific objective. In other words, the "right number" is presumably relative. Hence it would seem that we might best learn of the possible general

meaning of our hypothetical "right number" by studying a specific and actual example of number. Let us begin by inspecting a set of data for the United States in 1935-36, and, from this inspection, as from a point of departure, broach the more general question of "right" and "wrong" numbers. Here we shall become familiar with the terms, *pariah* and *elite*, which in turn will suggest a possible meaning of the familiar phrase *ancien regime*.

1. CONSUMER UNITS AND AGGREGATE INCOMES IN THE UNITED STATES, 1935-36. THE MEANING OF A PRE-REVOLUTIONARY CONDITION.

In the *Monthly Labor Review* for October, 1938 (published by the Bureau of Labor Statistics, United States Department of Labor: Serial number R. 829) there are presented on page 3 some interesting sets of data. One of these represents the aggregate incomes for families plus single individuals (i.e. consumer units) at various income levels for the year 1935-36. We shall not ask how the term "consumer unit" was defined nor inquire into the reliability of the data. The author, for his part, assumes without hesitation that the data are substantially correct as presented. Suffice it to say that the data refer to the entire amounts of income that accrued during a given fiscal year to "consumer units," that is, both to entire "families" as such, and to "single individuals" who were not members of "families."

It is evident that the classification of incomes according to consumer units is quite different from that used for the income data of the United States as presented in Figure twenty-nine, where corporations, partnerships, and individuals were the recipients of incomes. Hence the data of Figure Twenty-nine and those for consumer units are, strictly speaking, not comparable. Neverthe-

less the data for consumer units, which we present in Figure Thirty, shed welcome light upon the amount of actual income that was allocated to the venerable bio-social entities called "families" and "single persons,"—those entities which existed long before there were such things as corporations, and which are not peculiar to the human species, and which perhaps more than anything else represent the "bricks and mortar" of any nation.

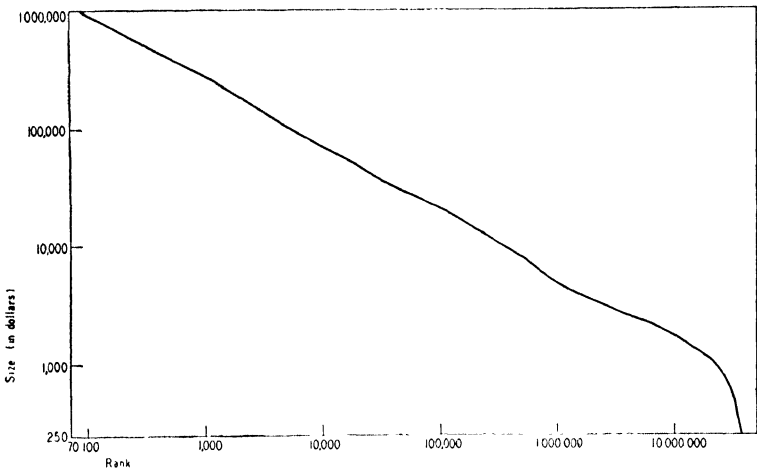


FIGURE XXX. U. S. A. 1935/36: INCOMES OF CONSUMER UNITS
(FAMILIES AND SINGLE INDIVIDUALS COMBINED)

As we inspect the curve for the data of Figure Thirty (the cumulative method of ranking), we note that the line is on the whole remarkably straight until about rank 10 million when it bends down abruptly and reveals a pronounced condition of deficiency. This downward bend represents in general the consumer units that received less than about \$1750 per year. And we shall devote our attention to this lowest bend, to the exclusion of the slight convexities upwards or downwards above it.

Now this bend that begins at about rank 10 million, and represents incomes of less than about \$1750, is graphically a very small part of our curve. But that comparative smallness results from the fact that we are plotting the logarithms of the numbers and not the actual numbers themselves. As far as the actual numbers themselves are concerned, the original data show that about three times as many consumer units received incomes of less than \$1750 than those that received more. More precisely stated, 9,475,024 consumer units received at least \$1750, while 27,859,742 received between \$1750 and \$250. Furthermore there were 2,123,534 consumer units that received less than \$250 and hence do not appear in our figure. In short, there were in all a total of about 30 millions (actually 29,983,276) having aggregate incomes of less than \$1750 in comparison with the approximately $9\frac{1}{2}$ millions who received more.

The fact that the income level of \$1750 is an approximate pivotal point, with about three times as many units below it as above it, need not by itself concern us. For, after all, we may expect from our formula that as we decrease the size of the income level, we shall increase the number of units that receive incomes within the range of that level—provided that our formula for the generalized series be applicable. That is, we may expect that fewer units will receive incomes between 4 and 5 thousand dollars than will those between 3 and 4 thousands, and so on.

The point of genuine concern is that the units receiving less than about \$1750 are not receiving shares of income at the same ratio as those of the upper income brackets. If the units in this bend were to receive incomes in the same ratio as those above the bend, then, for example, the unit at the bottom of the curve (with rank 37,334,766), should receive about \$1000 instead of \$250. Of course we

cannot argue that the units beyond rank 10 million should or should not receive proportionate shares. Nevertheless we can consider the academic problem of what might happen if they wanted proportional shares; and, in fact, let us consider that problem.

If we ignore the comparatively slight bends for incomes above \$1750 and assume that the line representing these larger incomes is essentially straight, then we can bring these larger incomes into an equation and treat the incomes below \$1750 as an unorganized residue, thus:

$$\begin{aligned}
 & A \text{ Sn} + (\text{incomes to ca. 30 millions}) \\
 & = \frac{A}{1^p} + \frac{A}{2^p} + \frac{A}{3^p} + \dots + \frac{A}{\text{ca. } 9,500,000^p} \\
 & + (\text{incomes to ca. 30 millions})
 \end{aligned}$$

This equation but says that there are 30 millions of consumer units who are not organized in terms of the approximate $9\frac{1}{2}$ millions. And that is all that the equation says.

However, the moment that the recipients of these incomes of the unorganized residue decided to increase the absolute amount of their incomes, then the problem would become quite interesting. For if strength be the organization of number, then the unorganized will outnumber the organized by about three to one.

Let us now arbitrarily define as a *pre-revolutionary condition* in a national social economy, the condition (a) in which there is a residue of persons or of consumer units which is receiving incomes at a smaller ratio than the rest of the population, in the terms of our generalized harmonic series, and (b) in which this residue outnumbers the rest of the population.

Obviously the degree of the *pre-revolutionary condition* might well depend both upon the degree of disparity of incomes and upon the comparative numbers of those in the

residue and those in the rest of the population. For example, there may be a very pronounced pre-revolutionary condition, or a negligible one.

Furthermore the pre-revolutionary condition will become, by definition, a *revolutionary condition* the moment that the residue organizes to increase its income—either the absolute amount thereof or the proportional amount thereof. The members of the residue can try to accomplish this increase productively by increasing the total amount of national production, or they can try to accomplish it non-productively, by increasing their proportional shares at the expense of others,—whichever is the easier (according to our assumptions). And to this end the members of the residue may organize themselves either into a group of military-physical force, or into a social-economic trust, or into a religio-Brahministic trust, or into any other kind of organization, depending, we assume, upon whatever may be recognized as the easier in terms of the actual material and human givens and of the specific objective within the definite situation.

Of course it is quite thinkable that a national social-economy is constantly in a condition of minor revolution in which the “outs” are trying, one way or another, to displace the “ins.” In short, revolution may be a matter of degree, as well as being either productive or non-productive, or a combination of the two. It would be interesting, in this connection, to study some of the great recent revolutions in the hope of roughly classifying them in terms of dynamics. And to that end we recall that several of our previously presented curves of income-distribution for European nations contained similar pre-revolutionary bends of deficiency or of surfeit.

But instead of pursuing further this matter of actual bends, let us inquire rather into the possible relationship

in general between that portion of a population which is organized according to our generalized harmonic series and that portion (the residue) which is not. For perhaps this relationship may have something to do with the general problem of the "right number" and the "wrong number" on a national scale.

2. THE ELITE AS A PUTATIVE "RIGHT NUMBER" WITH THE RESIDUE-PARIAHS AS CONSUMABLE GOODS.

It is widely believed that a possible means of learning of the functional value of anything is to operate with it. Mindful of this belief, let us operate with a given number of persons—which, for the sake of argument, we shall assume to be the "right number." The given number (or putative "right number") which we have in mind for our present purposes is a sizeable fraction of a population,—say, one-quarter, or one-third, or one-half,—and for the want of a better term we shall call this sizeable fraction of persons the *elite* of the population. And as for the balance of the population, we shall refer to it as the *pariah-class* (or proletariat). Hence our population consists of the *elite* and of the *pariahs*.

Furthermore we shall assume that the purpose of the production of the total population is to provide "goods" for the elite.

With these conditions in mind let us see what happens to the pariah-class.

a) The pariah-class (proletariat) as a consumable good, with the rise of classes.

It makes no difference how we define "good" (and we shall define "good" as consumable goods of all sorts); as long as a given population sets out to provide its goods for its elite, it will have the problem of the residue of

persons (the *pariah-class*) who are not included in this elite. The question arises as to what the elite should do with the pariah-class.

Obviously the pariah-class, in so far as it is a source of energy, can be treated by the elite as a consumable good. That is, the elite can distribute the useful pariahs among its members, and these pariahs will minister to the elite, in return for the right and means of survival.

Naturally the existence of this pariah-class may cause many troubles for the elite. In fact, let us see what some of these troubles will be. The first trouble will arise from the births and deaths within the elite and the pariah class. Since the elite remains the constant "right number," and since the elite receives the goods of production, there will be an enormous pressure from the pariah-class to become members of the elite. Hence the elite will have the problem of keeping the pariah-class from intruding into it. Furthermore the elite will have to watch the number of its own offspring. With a surplus of births over deaths in the elite, the elite will have to devise some means of pushing some of its own offspring into the pariah-class. In short, the problem of class-membership will be serious for the elite; we shall return to it again after we have scouted a few other problems.

A second problem of the elite will relate, say, to any increase in the production of "goods." Technically this increase (an increase in $A S_n$ above) might conceivably be used to enlarge the number of members in the elite to a new "right number." In other words, some pariahs might cease to be viewed as consumable goods for the elite and instead would suddenly become colleagues of the elite. That is, for example, the butler and chambermaid would suddenly sit at table with their former master and mistress. And in a round-about way this is quite possible.

But it is equally possible for the elite to maintain its number, with the bread but spread a little thicker for the elite (from an increased $A Sn$). In short, under an increased amount of consumable goods, the elite can either distribute larger amounts of goods to itself, or it can increase its membership,—or it can do both. That is the nice thing about being in the elite.

There is, however, one slight drawback about being in the elite as becomes apparent once we ask further about the treatment of the pariah-class by the elite. After all, the pariah-class must be kept in its place. One device for doing this is by military force, either by arming the elite or by employing mercenaries; the Bourbon aristocracy of France was perhaps an example of this use of military force even though it also made use of a second device. The second device was the use of a religio-Brahministic organization whereby the pariah-class was taught that the king and aristocrats stood a little nearer God than they, and that it was a danger to the pariah-soul as well as to the pariah-body to contradict members of the elite. Many believe that this second device was the one subtly employed by the British ruling class who had a state church and kept the prerogatives of church, education, government, and even economics to a considerable extent the prerogatives of the elite.

Furthermore a social-economic trust is a third device for coercing the pariah-class. An excellent example of this device was the coercion of the negro pariah-class in the United States before the Civil War; its members were used like chattels without any religio-Brahministic facade.

Moreover, and as a further device, it is quite possible to envisage a social-economic elite which, with the control of the channels of information and of the instruments of

influence and persuasion, can keep millions of persons their unwitting slaves; in this event some religio-Brahministic facade might be recommended.

Now these are some of the many problems which we may suspect will confront any elite which tries to keep society organized on the basis of production for itself. Another problem is that of supporting the pariah-class. It is of course economical for the elite to give the useful pariahs enough to survive on efficiently and no more (just like keeping a cow) and to slaughter or let die off those who are not useful. But this problem we mention only in passing.

However let us turn now and see what some of the other weaknesses may be of elite-organization, that is, of organizing a population's production-distribution on the basis of "all goods" for the elite.

b) The pariahs as tools of production with comparative value.

If the elite is to distribute the members of the pariah-class among itself just like any other consumable good in order to be served by them, then some members of the pariah class will be worth more than others. After all, a well-trained and well-educated slave is more efficient to have working around the house than an untrained or uneducated slave, because the former saves more time, labor and dishes, etc., for the master than does the latter. That is, the skillful, well-trained slave is more efficient in the sense that he conserves energy and the products of energy of all sorts for the master. The more efficient the slave is, the more he can relieve the master from many of his duties in the mine, field, store, or factory so that the

master can hunt to the hounds more often and with greater mental ease.

Hence it is to the master's advantage to educate and train the members of the pariah-class so that they can act for him with *maximum efficiency* (i.e. maximum conservation of energy in the handling of time and materials). But as soon as one adopts efficiency as the maximum of social-economic organization, then we may run into difficulties. Indeed we have perhaps here found the chief inherent weakness of any dominant class.

This inherent weakness of any dominant class is the fact that the real fundamental maximum of society, in the opinion of the author, is *maximum efficiency* (i.e. maximum conservation of energy), whatever that may ultimately mean in terms of our hypothetical "right number." And it is quite conceivable that the organization of society in terms of an elite may not be one of maximum efficiency. In that event, if an elite desires to preserve itself as long as possible and as wealthy as possible, it must seek to prevent the pariah-class from becoming "efficient" in any physical, mental, or social sense, lest they conceive of a more economical "right number." The reader may ask how this prevention of pariah-"efficiency" can in practice be done. But to this question the author can only answer: it is too late even to ask this question because the elite has already twice bungled, *from its point of view*, and the decision about the role of the pariah-class in the matter of the "right number" was apparently felled centuries ago. Let us inspect theoretically the main trend of history with the role of the pariah-class in mind. Our inspection will also serve to suggest in a superficial way the interplay of possible social-economic determinants, even though the inspection is offered only as a speculation.

- c) *The trend of history from Christianity through Gutenberg to the present (a theoretical discussion, in which society may be seeking the "right number")*.

An eminent French general is reported to have said that if Jesus of Nazareth had been born in a province under his military rule, he would have put an end to Him before He could speak. From the viewpoint of a political elite, or of a social-economic elite, or of a religio-Brahministic elite, or of any combination thereof, the French general is quite right. Furthermore the elite of Christ's time (i.e. the political, economic and religio-Brahministic elite) did finally put an end to Him. But, in the author's opinion, they did it too late. The fateful doctrines of "blessed are the poor," "love thy neighbor as thyself," "faith, hope, and love," "serve one another" and all the rest had already become common knowledge. Of course, in loving one's neighbor as oneself, there may be some doubt as to who one's neighbor is, and as to how one would like to be loved oneself—in fact the Christian principles call for a little cerebation—nevertheless, as far as the author can see, they happen to be dynamically sound both in a psychological and in a social sense, though centuries may pass before society acts according to these principles.

These Christian principles (with all that that phrase entails) gave a trend to history by planting the seeds of what, without specific definition, we shall call "good fellowship." And, to repeat, it was a great mistake of the elite ever to let those seeds get planted, for "good fellowship" can be equated quite easily with the more acid term, "social-economic organization."

The second outstanding blow to elite-organization came from Johann Gensfleisch zum Gutenberg when he, in the

last decade of the fourteenth century, invented movable type and thereby opened the doors at Mainz to an ultimate education of the members of the pariah-class. Once his invention of printing was made (ca. 1397) a considerable amount of ensuing history was determined. The sacred and profane word was brought out of monastic cells and the wisdom of the ages was made ever more a matter of common knowledge.

But that was not all. The invention of printing led not only to a greater diffusion of knowledge, but also to an increase in knowledge. Long before printing, the international alchemistic struggles to discover the way to make gold had begun to lead, in the words of a great scholar, to a far greater discovery than gold: the science of chemistry. After the invention of printing, the increase in popular education and the multiplication of scientific findings by print facilitated the development of the science of chemistry as well as that of its sister science, physics. And this development was important for the evolution not only of society, *but of a national society*.

For the development of chemistry and physics opened the door not merely to an understanding of the structure of materials and of the nature of energy; it opened the door also to a greater specialization of materials and to a greater conservation of energy in social-economic production-distribution. And, as we saw in Chapter Three, the end result of an increased specialization of materials and of energy-labor is not unlikely a national social-economic system,—in short, *nationalism*. In other words, in the alchemist's crude retorts as well as in Gutenberg's movable type lay nationalism. And in Gutenberg's first book, his marvelously printed Bible, lay the doctrines of what we in America like to call "democracy," for they recognize no social differences among men.

But let us now pause and reflect. During the Middle Ages there is said to have been an "international civilization." Throughout those ages, a dominant class was the order of society, whose members' views of the role of God, of themselves, and of the pariah were substantially the same. This dominant class was the *ancien regime* about which so much has been written and yet about which the last word has not been said. Its original foundation probably rested on the "entire goods" (i.e. the products of local agriculture, local handicrafts, and warfare plus the serfs) for the elite, with the result that Europe became a cobweb of little feudal systems in which the classes of free-born and serf became fixed. This fixation of classes, we may believe, in summary, was the *ancien regime*, and its soul was internationalism.

Once the hereditary membership of the dominant elite became fixed, then the principalities seem to have vied with one another in wealth, strength, ostentation and prestige. And at this point (if not from the very beginning) the goal of production may not have been simply "the goods of production for the elite," but rather "the maximum possible amount of goods of production for the elite" (hereinafter the principle of "the greatest good"). In short, the elite may be presumed to have wanted as much as possible of all "goods" of production (i.e. as big an *A Sn* as possible) according to the elite's own arbitrary and final definition of what were to be "goods." Of course, the possible meaning of any such maximum as that of "the greatest good" would depend considerably upon the meaning of "good"; and the meaning of "good" in this usage might have to be determined by studying the nature of the total phenomenon—a presumably arduous task. Nevertheless people do study the nature of total phenomena in the interest of enlightenment.

And during the entire long period of the *ancien regime*, the undercurrent was one of an ever greater popular enlightenment, as the ancient and Biblical writings became ever more widely known, and as science continued its advances. Before this undercurrent, the *ancien regime* was apparently destined to crumble, if we may assume, first, that a leisure class of this type is not an organization of maximum economy, and, second, that the operation of our assumed natural forces of maximum economy cannot be indefinitely postponed, no matter how valiantly any regime may fight them. In other words, with the education of the pariah-class, then the door was opened to the placing of persons in society according to the economical maxim of fitting natural capacities to the jobs and the jobs to natural capacities, regardless of any considerations of hereditary class-membership. Furthermore, in assuming a system of automatic checks and balances as the final arbiter of human organization, we assume that in time these changes in the direction of greater efficiency of organization will take place.

Perhaps the greatest blow to the *ancien regime* came in the French Revolution, when inadvertently nationalism may also have had its start as a condition of greater equilibrium of social economic forces. To be sure the French revolutionaries (like the more recent Russian revolutionaries) saw only "liberty, equality and fraternity,"—that is, the destruction of class-differences, indeed on a world-wide scale. Nationalism was probably far removed from their minds. Nevertheless, after they had overthrown the elite and turned to the organization of production-distribution with the objective of the greatest amount of goods for the entire population,—without distinction of classes,—then they may inadvertently have set forces in motion that may conceivably lead automatically

to nationalism, as we suspected in our qualitative discussion in Chapter Three. Hence it was perhaps not entirely by chance that the French Revolution was opposed bitterly, not only by the local elite, but also by the entire religio-Brahministic, political, social-economic elite on an international scale, for they saw quite properly that the revolution meant an "end of civilization" and "all that civilization stands for"—from their point of view.

In one sense the French Revolution may be viewed as successful, for it spread like a wave of reorganization over Europe, in spite of temporary counter-revolutions. Yet in another sense it may be viewed as incomplete, because of the effects of the Industrial Revolution and of the overseas exploitation of backward peoples who were essentially enslaved. Thanks to the Industrial Revolution and overseas exploitation, there occurred at home an enormous increase in the amount of consumable goods (an increase in $A Sn$), the first effect of which was presumably an increase in the number of the elite, while the second effect was perhaps to raise somewhat the standard of living of the pariah class. Yet in spite of its increase in number, the elite was still there; it merely became larger. According to widely held opinion, first the upper, then the middle, and finally perhaps the lower "bourgeoisie" was absorbed more or less into the elite, either because of revolutions or of labor agitation which carried the threat of revolution. Yet though the ancien regime may have been extended in scope and changed in label, nevertheless it may be presumed to have remained essentially in kind, for, first, class-division persisted and, second, the elite was still international, even though the political and cultural concept of a nation was perhaps not lacking. Indeed, because of the upsurge of production in the nineteenth century, a final decision between the contradiction of "the

greatest good for the most economical number (i.e. the nation)" and "the greatest good for the elite" may well have been postponed without being solved. Indeed, the author suspects that the cyclical business disturbances ("business cycles") of the past and present may conceivably be attributed in part to an alternation between an "elite" and the "entire nation" as the "right number" for which the goods of society are produced.

According to the beliefs of many, the ancien regime in Europe finally wrote its ultimate death warrant in 1914 when it went to war and became exposed to the need and value of organization according to maximum efficiency with the prosecution of warfare as the national objective. Though the victors with their plunder at Versailles evidently forgot the lesson of efficiency, not so the vanquished, if only because their survival depended upon seeking a maximum efficiency of production-distribution. Yet again, with the search for maximum efficiency in these vanquished nations, the ancien regime of class-distinction in these nations faced extinction, if we assume, as previously suggested, that a hereditary elite is not an organization of production-distribution according to the maximum efficiency of the entire population.

Hence when the European war broke out in September, 1939, it was perhaps more than a war between imperialistic-discontinuous solutions of terrain versus the organic-contiguous. It was perhaps also a war between ideologies. In other words it was perhaps a war between the ancien regime of internationalism and of classes, versus the new order of national "maximum efficiency"; it was a war between opposing maxima of the national organization of production-distribution,—between maximum efficiency of organization on the one hand versus some other maximum which one would scarcely call maximum efficiency on the

other. In short, it was not only a war, but also and perhaps primarily a great social revolution, in the direction of maximum efficiency of organization of human beings, regardless of class origins.

Hence it is conceivable that no matter who wins the military struggle in Europe, the "maximum of efficiency" (as the "greatest good") may prevail, even though in the eyes of some that "greatest good" will appear as the "basest evil." Victors and vanquished alike, in order to recuperate from their dreadful losses, may have to live and work with maximum efficiency, before which the remainder of the ancien regime as such will probably die, if this theoretical discussion is dynamically sound.

And so a great era of western civilization, which started perhaps with the end of the second Punic War in 194 B. C., is conceivably winding up in Europe even while the author writes. And as the old era falls, a "new era" is perhaps being born which may well last for centuries to come. What the "new era" will be like cannot now be foretold, any more than the period after the French Revolution could have been foretold during the height of the revolutionary crisis, because one sees at the time only the glaring though superficial crisis-phenomena and not the inconspicuous but profoundly fundamental drives toward our assumed equilibrium. Actually the nature of the crisis-phenomena during any social upheaval depends largely upon local givens through which the fundamental drives are working. In Russia the most conspicuous given was the village idiocy inherited from Czarist days, with no serious shortage of raw materials to worry about. In Germany the chief given was a serious shortage of raw materials with an extremely well educated population inherited from the imperial days. Hence the initial crisis-

phenomena differed between these countries, though the end result may well be the same.

Through all this, can it be that society is seeking the "right number" in terms of the conservation of energy?

3. THE MAXIMUM GOOD FOR THE GIVEN NUMBER; THE MEANING OF A NATION (THEORETICAL).

As we continue our inspection of the implications of the maximum good for the given number, we shall first ask "what is the given number," and how may it be related to our hypothetical "right number," for whom the maximum amount of goods is to be produced. For the sake of greater clarity, let us refer our discussion to the United States.

In the history of the United States we have for generations been patently devoted to increasing production in quest of the greatest amount of material goods for ourselves, as has perhaps been fitting for the fugitives from the ancien regime in Europe. But though we agree as to the meaning of material goods, have we ever been conscious of the problem of the "given number"? Indeed has our history not been one of "closed corporations," the members of each one of which have tacitly assumed that the members of their corporation were the given number for the sake of which the entire country was to be exploited? These "closed corporations" consisted not only of actually incorporated commercial corporations, but also all sorts of non-incorporated religious, racial, occupational, social and even academic corporations. They were all competing with one another, tacitly or openly, each one trying to increase itself. Thanks perhaps to the instincts of "equal opportunity" that are deeply rooted in the American people, excessive success has risked being curbed in due course by restrictive legislation (e.g. railroads, utilities, and many others). Furthermore the effects of this

“free competition” of organization according to the maximum amount of goods for the “closed corporation” may well have been reflected in the straight lines for income distributions before 1930, as each “corporation” tried to exploit all others. And doubtless it was an efficient system for rapidly exploiting the natural resources of our terrain,—with “the devil take the hindmost,”—until we reached the saturation point in 1929.

With 1929, the assumed system finally broke, apparently because of its inherent weaknesses. For then the question arose for final answering: what is the “given number” for which American production functions? To this question (if we may reminisce) each closed corporation—the incorporated and the non-incorporated, the occupational, the social, the racial, the religious, and, we must not forget, the academic (i.e. “the brain trust”) in fact, all of us—gave an answer, and the answer was “our closed corporation is the given number; follow us; the other fellow was to blame; where would this country have been without us? Back to the American way of our forefathers!”

And each of these groups, in the firm conviction of its rightness, reached for the country’s goods for itself,—the country’s assets, its security, its political power. In the meantime, if we may trust the record, the country disintegrated into factions and into a period of recrimination and of class-hatred. The “haves” organized against the “have-nots” for the given goods of America, as each side tried to increase its assets of all sorts to the maximum possible amount. In short, we seemed for a moment to have shifted our maximum from “the maximum goods of production for the given number” to that of “the maximum amount of assets for the given number,” with the

inevitable emergence of class-fissure and with production at the minimal level necessary for survival,—the familiar depression level—as we sought to understand for whom, or for what “number of persons” we were producing (that is, for how large an n in our generalized harmonic series). And, at the risk of seeming repetitious we must submit that this familiar depression level may well continue until we have made up our minds about what is the “right number” for which we are producing. Indeed, all we have said previously about the elite, the dominant class, and the ancien regime may confront us now,—if we decide in favor of only a fraction of the population. On the other hand, if the decision is to be made for the entire nation as the “right number,” then the question remains as to what a “classless” national society will look like.

In the opinion of the author the decision may already have been cast: *the “greatest good” for the nation*. For this decision apparently lies wrapped in natural law, since people are born even as they are born, and “nature loves economy.” Indeed the interplay of international and internal forces today is perhaps teaching us what we are to understand under the terms “the greatest good” and “the nation.” Tomorrow these forces may teach us how to live as a member of a great world family of nations, “with malice toward none, with charity for all.”

But if we may hope to learn of Nature’s ends by studying Nature’s means, let us reinspect the economic collapse of 1929 with the problem of the “greatest good” in mind. Since the period up to that time was reportedly one of materialistic goods, let us begin by working with the proposition of “the maximum amount of material goods for the nation” and note what we may learn about the nature of “goods” in the process.

a) *The maximum amount of material goods for the entire nation.*

Once a national social-economic system decides to produce the greatest amount of material goods for the entire nation, then the wheels of industry may be supposed to whirl as the social economy attempts to give every one of its members the greatest amount of goods,—automobiles, houses, clothes, food, electrical equipment, and so on,—with every member just as important as every other, as far as the goal of production is concerned. Slums are cleared, railroads electrified, bridle-paths laid out, horses bred, and so on. Each one is given a position in production and no shame and no discrimination in reward entails to the incumbent of any position. Everyone would receive one piano, two pianos, three pianos, one automobile, two automobiles, three automobiles, one combination electric-refrigerator-with-built-in-radio-with-New-York-Stock-Exchange-ticker-service, and indeed one hundred such combinations.

The total social-economy would roar according to whatever devices might produce the maximum amount of material goods. Day and night all would be slaving until a curious phenomenon would appear. Someone would sooner or later criticise: “But we have no leisure time to enjoy these material goods!”

This criticism would be sound, and it shows the inherent weakness of any argument for a maximum amount of material goods for the entire nation. For when one says “the maximum” it means the exclusive maximum. In this entire study we have selected, perhaps arbitrarily, the conservation of energy as a maximum,—that is, we say that man in his activity is minimizing the energy he expends. Yet whether we are right or wrong about our maximum

conservation of energy, it is clear that a maximum amount of material goods for the total number is no adequate alternative, for we should but bury ourselves under our goods.

Nevertheless, by using this inadequate alternative, we have come upon the concept of leisure time which we shall find important. Let us view the American depression of 1929 with the concept of leisure time in mind.

b) October, 1929; the discovery of the "raw material" of leisure time.

With the end of 1929, for reasons partly suggested in Chapter Two, the American total economy reached a point of great achievement, namely, a point when the national economy could produce its accustomed needs without using anywhere near all its available energies. Expressed differently, in 1929 the United States discovered a new "raw material": *leisure time*, which in a way is just as much a "raw material" as coal, oil, steel or anything else, because for many types of human activity, *leisure time* is an essential prerequisite. Of course one may be inclined to say that 1929 introduced a period of surplus production; that is true. Nevertheless in the solution of any problem much depends upon the angle of approach, and in this study we prefer to speak of the introduction of a surplus of *leisure time*.

However, as we have remarked in the course of our study, any change in kind or amount of goods or of processes within a social-economy will necessitate a restriction within that social-economy itself. This was true of the discovery of steam, oil, and the like, and it will also be true of the "discovery" of leisure time.

Yet what are some of the implications of an increase of leisure time as far as production is concerned? Obviously

as long as a social-economy produces goods in sufficient amount to meet the minimal needs necessary for the survival of its members, then a social-economy could conceivably continue indefinitely. The only draw-back to this happy state of affairs is the phrase "the minimal needs necessary for the survival of its members." We do not know what those hypothetical minimal needs are, nor do we know a happy way of indefinitely forcing great masses of the population to be contented with a supply equal merely to the barest needs of survival, as long as more goods are possible. However, let us return to the consideration of leisure time as a raw material, or if one prefers, as a consumable good.

As soon as we turn to the implications of an increase of leisure time from the viewpoint of distribution, then matters become clearer. Leisure time, like any other consumable good, is something worth organizing for; and the distribution of amounts of leisure time to the members of a population is as much subject to the laws of income-distribution as anything else. People like to eat, to sleep, to play,—and people like to "loaf." In short, everyone wants leisure time. To live by doing nothing is the height of economy. But how about the distribution of leisure time?

Naturally, a large-scale unemployment is in and for itself a certain distribution of leisure time. But is it the most economical distribution of the nation's entire stock of leisure time within the total reservoir of a nation's complete production of consumable goods? Let us see.

Our political solution of leisure time to date has resulted in a large unemployed youth and a large unemployed old-age group and a large partially-employed middle-age group. In other words, large portions of the population are receiving an unfair share of leisure time. Expressed differently, large portions of the population are receiving

their share of consumable goods from the total economy in the form of leisure time. Of course they probably do not object to leisure time as such, but they seem very definitely to object to receiving quite so large a share of it in their incomes in lieu of other types of consumable goods.

Hence the unemployed are organizing into pressure groups which, on the whole, are not asking for less leisure time but for more consumable goods of the other types as well. That is after all the meaning of our old-age pension plans and of our subsidies to youth and to the unemployed. And since their numbers not only are large but are also said to be becoming larger, their organizations cannot be simply overlooked. Furthermore they cannot easily be coerced into inactivity by armed force, because many members of our armed forces would come from these very groups that are so blessed with leisure.

But suppose we are obliged to give the older members of our national-economy a pension-plan. As long as we could produce their needs, then we could view the old as "national pets." Moreover, since in time we shall all become old and fall into this class of pensioners, we can afford to treat our "national pets" with great fondness and liberality. We can build winter hotels for them in the south, summer hotels for them in the north, stock fish ponds for them and provide a special set of movies to assure them constantly that the youth of the nation is immoral and unmannered with no respect for the opinions of their elders. After all, our parents and grandparents will be in this pensioned group right now, and we shall be in it later.

Similarly with our youth. Suppose we present them with the consumable goods they want or need, so that they will have something more than leisure time to "consume."

Thus we shall give them food and clothing and recreation, and train their minds and bodies to be healthy and to enjoy life. We shall clean up forests for their camps, and stock ponds, and lay out bridle paths and provide horses and oats for their horses and wood for their hostelries, and skis for their boots and boots for their skis. And similarly with tennis courts and the like. Furthermore, we shall give them several years at sea upon resplendent battleships filled with the most gorgeous machinery that the youthful extroverts can imagine; the ships will stop at every port, and will be named after states so that shore-acquaintances can not remember after a few weeks whether the boys said they were on the *Louisiana* or the *Tennessee*. We can behave very handsomely and liberally towards the youth because our own children and grandchildren will be in it.

But now the question arises as to who is going to provide and maintain all these things for young and old. The answer is obvious: we, the people of the United States, whether young or old. Grandmother will be knitting socks for America's youth on the porch of her winter hotel, and the youth will be whittling out canes and making balsam pillows for America's grandparents. Furthermore, because of the needs of labor for the maintenance and distribution of this enlarged production, there will not be quite so great a number of unemployed persons, once we begin the actual outlay, maintenance and distribution of consumable goods for these pensioned and protected classes. In fact the unemployed youth might well be absorbed into the ranks of those being trained for the enlarged production and distribution,—trained in mental alertness and in healthy physical, emotional and social behavior.

But why continue this imaginary picture? We are but saying that leisure time is like a raw material and that

thanks to the combined efforts of American labor of all sorts (manual, intellectual, social, political, scientific, business), and thanks to the bounty of natural resources in the American terrain, we have suddenly an abundance of this hard-won much-prized new "raw material": leisure time. Yet this new "raw material," like any new raw material,—such as steam, oil, or the like,—must be first carefully studied for its potential values and not simply played with and dissipated by humanitarians whose conduct may be more a tribute to the soundness of their hearts than to that of their heads. The proper economical exploitation of leisure time may entail a long process of evolution that should be neither impeded nor excessively urged lest reactions arise which, for the want of a better term, might conceivably be called revolutions. The emergence of leisure time will necessitate a restriction of values of all sorts and descriptions. During any period of restriction, and for reasons presented at the close of Chapter Three, there is bound to be both a conflict and a cultural lag while the total populace is slowly shifting its social-economic orientation.

In this connection let us quote from the report of President Hoover's Research Committee on Social Trends (1932).

"Not all parts of our organization are changing at the same speed, or at the same time. Some are rapidly moving forward and others are lagging. These unequal rates of change in economic life, in government, in education, in science and religion make zones of danger and points of tension. . . . Scientific discoveries and inventions instigate changes first in the economic organization and social habits which are most closely associated with them. . . . The next set of changes occurs in organizations one step further removed, namely, in institutions such as the family, the government, the schools and the churches. Somewhat later as a rule come changes in social philosophies and codes of behavior."

The assumed strong tendencies towards a conservatism of striation or of habits of behavior should not be overlooked; the logically shortest course may be the longest way around. For example, the existence of the United States Supreme Court may or may not be wise from a long-term view. Nevertheless a great many Americans feel that it is a wise and extremely necessary provision. To tamper with the membership of this court, even if to expedite unconstitutional changes which, we shall assume for argument, are absolutely sound, may incite so enormous a reaction that the wasted energies from the reaction may more than offset any savings from the intended changes.

Revolutionary conditions, like evolutionary conditions, apparently emerge in a social economy. They cannot be induced by "radicals" if they are not present, nor can they be wished away by well-meaning humanitarians if they are there. The forces of society, according to our argument, will seek equilibrium according to natural law. Too long frustrated, a social-economy in disequilibrium may finally either explode or else die of stagnation as a consequence of the natural behavior of the forces in question. Nothing, not even the United States, is immune from the consequences of these assumed forces, nor can our hypothetical equilibrium be necessarily established solely by violent emotional drives of fear or of hate, or of a desire to seek a solution internationally for a problem whose givens are intranational.

4. SUMMARY.

But now let us pause and reflect. Up to this point in the present chapter we have inquired about organization, about number, about "goods," and, above all, about maxima. In Part One we studied the conflicting forces of

organization and of disorganization in the general struggle for the "consumable goods of production"; here we arbitrarily assumed that on the whole everyone wanted more of these "goods," although we never defined these "goods." In Part Two we broached the question of a maximum, in which we saw the difficulties that may attend the selection not only of a maximum, but also of a "right number." The very nature of our dilemma was instructive, if only because it tacitly suggested an inference which we drew in the preceding chapter: Social Man, unlike the social bees, has not yet evolved a stereotyped mechanism for distributing the goods of his exploitation of nature. We have seen the possible difficulties inherent in defining goods exclusively as material goods. And we noted possible reasons why a class-cleavage might arise, unless the "given number" selected as recipients of production was dynamically sound; in this connection we suggested that that "given number" might be dynamically most nearly sound which was most nearly coextensive with the national population as defined in the first three chapters preceding.

Nevertheless we have yet to discover what we shall understand under the term "good" or "goods" that man is supposed to desire. In short, the time has at last come to ask: what is "good"? What do we want? What are our objectives? Until we know what we want, we but flounder. Actually the question of the objective should be the first question to pose, and not the last. For once the objective is determined in space, time, and in interrelatedness, then man can proceed to the attainment of that objective—with the minimum expenditure of energy (i.e. with the maximum conservation of energy) as the author assumes.

And perhaps after all that is what we mortals most want: to save energy. Being mortals we already have

life as a given; and, given life, we want to save energy. Of course life, as a process, has its inherent conditions of self-growth, self-support, self-defense, self-propagation, and we may at first be inclined to view these conditions as our "objectives." But upon reflection, they may seem to be rather the properties of all living process than the objectives for which we mortals strive. If this reflection be correct, then, the properties, or general conditions, of living process can scarcely be a matter of desire for the living. Perhaps what we desire is to save energy while living. From this viewpoint, social organization would then be but an economic device which is employed, like any other device, only when it has a positive value. It may sound mystical to propose that we desire to live with a minimal expenditure of energy. Indeed it is not a proposition which will seem robust to those who have been so preoccupied with human problems that they have not had time to look around them at the behavior of other species. Of course the proposition is not simple, because of the vagueness of the word "to live."

However if this proposition is too vague, let us work with more familiar propositions and see what happens. Today one wants "security" and "life, liberty and the pursuit of happiness." Let us look at these terms. We may only find (in the opinion of the author) that *life* is the given, that *personal* liberty stands in some inverse relationship with *security*, while the "pursuit of happiness" may well be but the pursuit of economy. In short, by different paths we may well come to many of the conclusions already reached, and, as we are led to these conclusions from a different point of departure, we may learn even more about the meaning of the slopes and bends of the curves of income-distribution which we have presented some pages back.

PART THREE

Personal Liberty versus Social Strength
(*Life, Liberty and the Pursuit of Happiness*)

It is a common belief that all Americans desire life, liberty and the right to pursue happiness. Also many of us desire security. Since these common, deeply rooted desires of the population cannot be ignored in any national organization, we do well to inspect what they may mean, not only in reference to one another but also in reference to a national income-distribution.

1. PERSONAL LIBERTY VERSUS SOCIAL SECURITY

Let us inspect the four desiderata,—life, liberty, security, the pursuit of happiness,—and ask which of these may come first in importance. The question is not easy.

Off-hand life itself seems to be first in importance, not only because a person must first be alive in order to be capable of the other desires, but also because a threat to a person's life is also a threat to his liberty, security and his pursuit of happiness.

But if life is first in importance, which is next? The answer might conceivably be the pursuit of happiness,—for at least all persons seem to pursue happiness with the same eagerness with which they seek to preserve their lives; many end their own lives when the attainment of happiness seems no longer possible; and not infrequently a person sacrifices either his personal liberty or his security in order to become happy. Nevertheless we do not know what happiness is in terms of forces. Hence let us turn to liberty and security.

By liberty we shall mean the capacity to act as we please, and by security we shall mean the strength to struggle successfully in a hostile environment. But are

not these terms,—liberty and security,—perhaps contradictory, to the end that as we have more of the one we have less of the other? Let us see.

If security is the strength to struggle successfully in a hostile environment, and if strength is the result of the organization of number (i.e. “in union there is strength,” and “in numbers there is strength”), then one can increase one’s own strength by becoming organized with another person or persons in order to pursue a common objective. But note well: when one person becomes organized with others in the pursuit of a common objective, he must integrate at least a part of his activity with that of the group. In other words, he must yield a part of his own liberty of action to the exigencies of the group-organization. This yielding of personal liberty is conspicuous in military organization, in industrial organization, in political party-organization, and is not lacking in all other organization even including the intimate details of friendship or of marital life. In brief, the price one pays for the increased strength and security of organization is the loss of a greater or lesser degree of personal liberty.

Of course, if a person organizes others to follow him, as their leader, then that person, as leader, might seem to have increased his strength without abandoning anything of his liberty; nevertheless the leader must, in fact, sacrifice something of his own liberty of action to meet the exigencies of keeping his organization intact. Moreover this same need of keeping the organization intact may require every organization to allocate some of its strength to preserve its own organization. For example, every state must have a police force to prevent members of the state from taking too much personal liberty.

And so it seems that security and personal liberty may be on the whole contradictory forces; and that everyone

must simply make up one's mind which of these two goals one more prefers.

However, in a national social-economy, the choice between membership in an organization on the one hand and complete personal liberty on the other is not left to every individual. The organized group, even though only a minority, can coerce the disorganized persons to submit to the organization and to become organized in terms of it. The coercion can be one of bodily threat of force, or of financial threat, or by control of much of the machinery of influence and of propaganda. The opportunist, seeing this threat from an organized group, may run to join it, and frivolously or wisely sacrifice his liberties for the greater security and strength of membership in the organization. Others, either because they are more dull-witted, or because they are stubborn in their desire for personal liberty, may postpone decision until they are finally forced into subordination on the pain of death, or of expropriation, or of concentration-camps, or of exile,—that is, if we assume that the organization is successful and not simply annihilated.

Now in view of these considerations we may perhaps say that the general amount of one's personal liberty may be a function of one's security which in turn is equivalent to the degree of one's regimentation in "organization." That is, if L stands for personal liberty, and S for strength-security-organization, then the amount of a person's L may stand in some inverse relationship to the amount of his S . Just what the relationship might be, the author does not know. But in view of the nature of the quantitative data in this chapter, he suggests that it might be: $L \times S^n = \text{Constant}$, in which we may imagine that L is plotted on the abscissa (x-axis) and S on the ordinate (y-axis). Of course this is only a speculation.

2. THE SLOPE OF THE CURVE OF INCOME-DISTRIBUTION IN RELATION TO PERSONAL FREEDOM.

The chief value of the above speculation, $L S^n = \text{Constant}$, is that it suggests a possible explanation of the differences of slopes of our generally straight lines of income-distribution. For instance, in the data for the United States as presented in Figure Twenty-nine, we notice an increase in slope from 1927 through the year 1929 when the size of our hypothetical q had become very close to 1. If our preceding speculation be true, then, in 1929, the extent of one's personal liberty was approximately counterbalanced by the extent of one's strength-security-organization.

Moreover, the increasing slopes of the lines from 1927 through 1929 would mean that more and more the United States as a whole, during that period, was exchanging personal liberty for social strength in the total American Nation, where each person and each organization found the possibility of a compensation for a risk of security or of personal liberty in the receipt of a commensurate quantity of the other. Thus, in 1929 (until October), if a person sacrificed on the one hand his personal liberty by entering into the regimentation of industrial-commercial production where every worker of every description must be at his assigned task at the assigned hour, just as in the army,—then that person had the possibility of receiving at least a commensurately increased security of high wages and employment. Similarly, on the other hand, the person who risked his security for a bold individual enterprise might also find commensurate rewards in a greater personal liberty. In either case the assumed opposing forces of organization versus disorganization were presumably still there, yet these opposing forces were subject at

that time to negligible restrictions, comparatively speaking, upon anyone's becoming either organized or disorganized.

Apparently some persons always have advantages in rising over others, because of an initial superiority either in capital and established organization, or in brains and the like. Yet the point is that no one at that time was arbitrarily disqualified from rising or from falling, and that everyone, with negligible exception, was bent upon "playing the game" so as to rise as high as possible, by finding, one way or another, some better (i.e. a *more efficient* or *less wasteful*) means of organizing production and distribution. The United States was polarized according to the peace-time principle of "everyone for himself,"—either by individual enterprise or by becoming a part of an organization—and "the devil take the hindmost." It was a time of great mobility of occupation; the man with brains, or capital, or both, was welcome. It was a time of maximum organization of organization, with "pools" and organizational devices of all sorts; the simplest moron could truthfully believe that his membership in the right organization would put him in the millionaire class. So great was the population's "faith" and "hope" in the future of American industrialization that the so-called "brotherly love" was forgotten. In fact, the record shows that not until 1932 was there any appreciable interest in "democracy" or "brotherly love," and the "Bill of Rights." Though this later period of depression was attended by bends in the curves for the national income-distribution, nevertheless the previous peak year of 1929 witnessed a period when apparently one could and did seek a maximum possible efficiency of organization for the sake of increasing the product of life, liberty, security and the pursuit of happiness; it was a period when our specu-

lative $L \times S^n = \text{Constant}$ may well have meant something.

3. SLOPES AND BENDS IN THE INCOME-DISTRIBUTION.

Now in view of the foregoing we may say by way of summary that the curve of income-distribution admits, first, of the possibility of differences in slope of the straight line, and, second, of the possibility of bends from the straight line. Let us briefly review each of these possibilities.

As far as the slope is concerned, a progressive increase in slope may mean *for the total population* a progressive decrease in one's personal liberty of action and a progressive increase in one's general organizational security-strength. The leaders of organizations, who are ostensibly free agents with commensurate responsibility are as much tied to their desks by worry and economic planning as the laborer who picks up and drops his tools according to the blow of a whistle. Though the laborer may be less independent in his work, nevertheless he may be more independent of the worry and grief of economic planning that is largely done for him. In sum, an increase in slope may very well mean a decrease in personal liberty for all concerned. Let us turn now to bends in the straight line.

Bends in the line of income-distribution may well indicate a lack of mobility of organization. In other words, bends in a straight-line may indicate the presence of arbitrary restrictions of some sort upon man's ability to exchange personal liberty for security-strength of organization, or vice versa. In the opinion of the author the bends in the curves of the United States for the years after 1929 indicate clearly the emergence of restrictions on organizational mobility, even though it would be very difficult to isolate all the restrictions that appeared. Since

1932 the slopes of the American income-distribution have increased, thereby revealing that on the whole personal liberty has been exchanged for social organization (social security?); nevertheless, the bends have persisted, and this persistence of the bends conceivably indicates the continued presence of restrictions upon our organizational mobility. The emergence of these bends may mean the emergence of subsidiary social-economic classes from the viewpoint of the total national social economy. On that point the author has no opinion to offer.

But now that we have cursorily inspected the proposition of security and liberty from the viewpoint of the total whole, let us turn to the individual within that whole, and ask what is a free man.

4. DEGREES OF PERSONAL FREEDOM AND THE QUESTION OF SUPPLY AND DEMAND.

It is obvious that if a person were completely "free" in the sense that his every act remained a completely voluntary procedure over which he had constantly to dispose, then the completely "free" man might be obliged to give such continuous care to supervising his breathing, heartbeats, digestive processes and the like that he would have little time left for anything else. Hence we might suspect that a mechanical stereotyping, or routinizing, of essential and highly repetitive processes in one aspect of a person's individual behavior, might result in an increase in one's freedom of individual action elsewhere.

Similarly in one's social behavior, a mechanical stereotyping or routinizing of essential processes in one aspect of a person's social behavior might result in an increase in one's freedom of social action elsewhere. For example, by completely routinizing the breadwinning hours of one's life, by means of a complete integration with an indus-

trial-commercial group, a person may find the possibility for a greater personal freedom in his non-breadwinning hours.

The chief point about personal freedom is that it may be found to entail some sort of organization in which personal freedom is curbed. In other words, there are hypothetical degrees of freedom which are balanced by hypothetical degrees of organization. It is this balance that is important,—a hypothetical balance that is essentially one between comparative degrees of individual “freedom” and of social organization. The descriptive verbal labels of this hypothetical balance are not important; yet, to repeat, the balance itself, if existent, may be extremely important. Though we cannot lay our fingers upon the actual condition called “organization,” nevertheless the measurable effect of this organization seems to show that its assumed forces follow a logarithmic equation of the generalized type we have been discussing. No matter what our own interpretations, deductions, and working hypotheses may or may not be worth, the empiric data themselves are clear-cut.

The chief difficulty in our apperceiving the laws of human organization with their “comparative degrees of freedom,” lies in the fact that our eyes are riveted to the immediate present of the daily news in which our immediate and most urgent problems lie. That is, we forget that man presumably reacted according to the same laws of social-economic organization in the year two million B. C. and will continue to do so in the year two million A. D., if he exists that long. It is hard for us to feel that our great civilizations were not once necessary and may not again be necessary to man.

What at all times seems necessary to a living man, as far as we can judge, is “happiness,” which he prizes with

life itself, and "pursues" relentlessly. We do not know what a given person's "happiness" is; indeed, it is probably a complex combination of many factors. But the author argues that whatever "happiness" may be, man "pursues it" with a minimum expenditure of energy. That is, in the opinion of the author, God loves the lazy man (as, indeed, He seems to have built His whole universe on the ever-present principle of least action). The reader may feel that this statement implies the familiar "loaf of bread," and "jug of wine" and the "greenwood tree" as the goal of human action. And this implication is correct; indeed the beginning of a knowledge of social forces may depend upon one's actually procuring a jug of wine, a loaf of bread and upon finding a greenwood tree to lie under. In fact, let us do this very thing in our imagination.

Of course, the production and replenishment of wine and bread presupposes productive activity by someone who did not simply lie under the greenwood tree; but we shall ignore that point for the moment. Even with a constant supply of bread and wine under the tree, the man will find the ground hard, the nights cool, the mosquitoes and gnats annoying! He will wish that Charlie were there to keep him company, that Mary would come and stay with him. And if Mary did come, there would be the possibility of children who would need perhaps more than bread and wine and would disturb the serenity of the greenwood tree. Hence, the man under the greenwood tree would *want* more and more *things* (material, animate, and psychological). These wants would be *demands* upon the environment, and the *things* demanded would be *consumable goods*. In order to *supply* at least some of these *demands*, the man would have to sacrifice some of his laziness in order to *work*. He would try to work economically; and here the advisability of the division of labor

and of the organization of fellow man would suggest itself in order to increase his "liberty," his "security," "the supply of his demands," "his happiness,"—whatever these terms may mean.

The laws of demand (i.e. of consumption of goods, or of income-distribution) are intimately connected with the laws of supply (i.e. the production of goods). In other words, it is a law of production-consumption or of supply-demand, within the material, biological, and psychological givens of the total situation. One person may use the word "freedom," another "liberty," or "security," or "the pursuit of happiness"; they all would seem to boil down to the same thing in the terms of the movement of materials of all sorts. The author simply says "economy of effort" in the handling of all things,—of energy, of time, of materials, of everything. The main thing is not the *what*, but the *how*; and again, within the *how*, the author believes to see the maximum conservation of energy of all sorts in the attainment of objectives of any sort.

We hear much talk of "happiness" today as if it were a discrete stable category of existence, in terms of which one is either happy or unhappy. The author doubts it. For him happiness is a degree of equilibrium of all the opposing material, biological, and psychological forces. According to his view, for example, a person may study and learn in order to become both wiser and more discriminating in his judgment so that he can more accurately appraise and solve the problems of conflicting forces within himself and between himself and his environment. If a person does not have, directly or indirectly, a given problem, then he is foolish to bother with it, and he generally does not. If a person has naturally a high degree of discrimination for his own problems, he is foolish to bother about book-learning; and many persons do not bother. And so on.

Thus we see that the words "life," "liberty," "security" and "the pursuit of happiness" refer to very complex phenomena. Yet however complex the phenomena, the laws of final forces behind them may well be both simple and orderly.

5. ASSETS, WEALTH AND RELATED MATTERS.

Since we have never defined consumable goods, except as those things whose consumption was desired, we are in a somewhat stronger position than we perhaps imagined, because whatever are found to be consumable goods may also tend to be found distributed according to the laws of "production-consumption" (i.e. the generalized series).

For example, the sheer possession of assets, whether in the form of cash, notes of indebtedness or of physical property has long been felt to be a consumable good which was worth striving for. And in Figure Thirty-one we present the assets of American corporations as defined and presented in the Statistics of Income (*op. cit.*) for the arbitrarily selected years of 1931, 1932, 1933, 1934 and 1936, arranged in the order of decreasing size according to the cumulative method of ranking. These figures (from the *Statistics of Income*) were taken from the item marked assets for all corporation returns with balance sheets. The assets consist of cash notes and accounts receivable (less reserve for bad debts), inventories, investments (tax-exempt and not tax-exempt), capital assets (less depreciation) and "other assets."

The curves for assets are notably straight from the top down through assets below one million dollars, where a slight concavity downwards (i.e. a deficiency) begins to appear. This downward concavity probably indicates the inadequacy of the statistical data which do not include the

assets of partnerships and individuals, some of which most assuredly have assets of well over 100,000 dollars.

What has been said in Part One above about a shift of the line parallel to itself in respect to income-classes

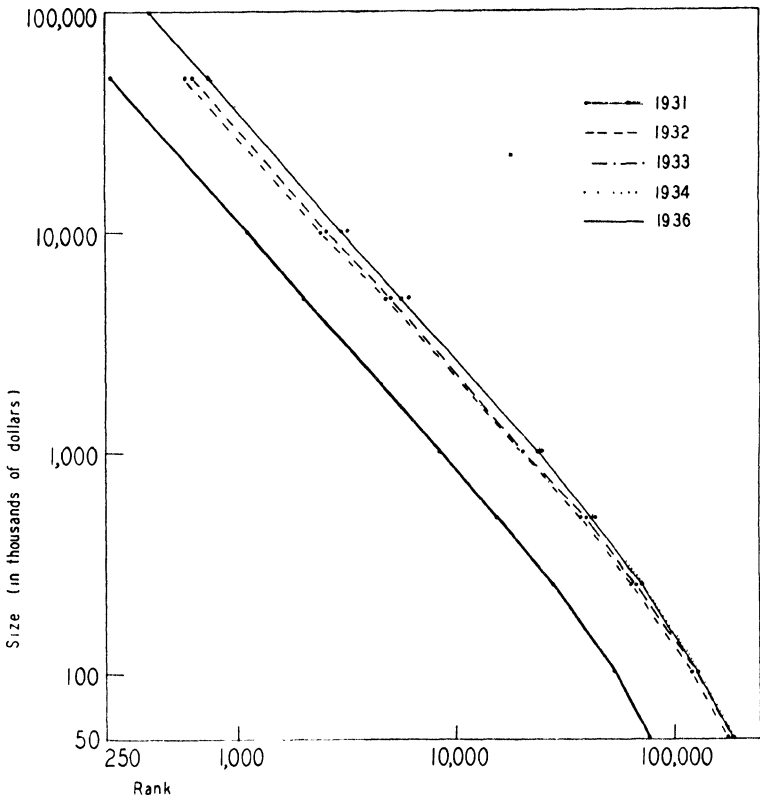


FIGURE XXXI. U. S. A. CORPORATION ASSETS FOR FIVE YEARS.

applies here in respect to asset-classes. However, the slopes of these lines are interesting, for, if reduced to terms of our generalized series, the exponents of the slopes are in all cases *greater than 1* and hence represent what is

technically known as a convergent series. This sudden appearance of convergence may be very significant for the future of the American national social-economy. It might well mean an excessive heaping up of assets among too few corporations; in other words, a too great pyramiding of assets in corporation-combinations. Yet according to what criteria may we say that the heaping is "excessive" or "too much"? Obviously we may say "excessive" or "too much," first only according to the criteria of our generalized series where an exponent larger than 1 means a convergent series, and, second, only according to the criteria of our demonstration in which we have been arguing arbitrarily that the exponent, 1, the upper limit of divergence, is also the final limit of equilibrated social organization. Unless one is willing to assume these two sets of criteria as valid for all social-economic phenomena, or unless other objective criteria can be found, then we may not call these assets "excessively" heaped or "too greatly" pyramided. Perhaps a complete set of data which would include also the assets of individuals, and so on, would alter the slope so that p would not be greater than 1.

At this point we may be surprised to find that the distributions of incomes and of assets both essentially approximate linear equations. The distribution of income, after all, refers to the shares of the flow of consumable goods to the consumer; whereas assets (also really a very complex matter) would seem to refer in the last analysis to the power to control the flow of production and distribution.

But the preceding statement of the possible reference of income and of assets to the total social-economy, though obviously superficial, is of possible value in suggesting that the two distributions may be mutually contradictory. For the power to control production-distribution without

restriction would seem to be the power to control income-distribution without restriction. The evolution of society may have to make a decision between the primarity of these two distributions. It is not inconceivable that we are now in the midst of making this decision in the United States today. If the linearity of the asset distribution is to have priority, then there will apparently remain the threat of a constant pariah-class of assetless persons whose employment will depend upon the decision of the asset-holders. If the income-distribution is to have priority to the end that everyone will share in production-distribution (with the accumulation of individual capital assets a secondary concern), then the greatest assets, that an individual or a group may have, will be the skills of all sorts that may be of value in production-distribution. And these skills will be of positive or of negative value just like any other tool, or process, or material, or source of energy. Though, to repeat, this discussion is but superficial, nevertheless it suggests a very inviting topic of study. For all we know to the contrary, the complex phenomenon of the so-called "business cycle" may reflect in part a shifting in polarity from a fundamental drive towards increased assets to a fundamental drive towards increased income, and so, back and forth. If the author be correct in assuming that efficiency, or the conservation of energy, is the final arbiter in the evolution of social-economic organization, then it will be interesting to ponder what the course of evolution in the United States will be in respect to the distribution of assets and of incomes.

But now that we have presented above our demonstration of the presumable forces that govern the distribution of incomes and the like, it is very fitting that we call the reader's attention to the priority of the investigations of others. First in time and in importance are doubtless the

brilliant studies of V. Pareto who (*Cours d'économique politique*, 1897, II, 304) propounded the law of income-distribution which we shall present as $Nx^a = A$ where N represents the number of persons who receive the income of x . The size of Pareto's exponent, a , in terms of the exponent of our generalized harmonic series, will be approximately equal to $P + 1$.¹

Pareto's epoch-making studies have led to many subsequent investigations. Interesting among these is the work of R. Gibrat (*Les inégalités économiques*, Paris, 1931) who used a different type of equation and presents a diversity of empiric material in support of his linear equations which are extremely interesting. The present author's own contribution to the study, if any, is to show that the distributions are fundamentally ones of the generalized series which we have been discussing; and he has based his demonstration upon a study of nature in the raw without any appeal to the findings of Pareto or Gibrat. In other words, the present author's demonstration and findings stand or fall on their own merits or demerits, without explicit claim to priority. In this connection we must add that the author considers the concept of an integral social-economic system (i.e. a "nation," or "state," etc.) as essential to any understanding of social-economic forces. For example, Dr. Mark Jefferson has propounded a Law of the Primate City (cf. *New York Times*, June 4, 1939, Section 4, p. 8E): "A country's leading city is always disproportionately large and exceptionally expressive of national capacity and feeling." Here we must first say that "disproportionately" may be the

1. According to the analysis of M. Joos in connection with a related problem (*Language*, XII, 196 f.); cf. also the analysis of M. H. Stone in answer to Joos (*Language*, XIII, 60 f.). See also Zipf, *The Psychological Record*, II (1938), 347 f.

most unfortunate adverb Dr. Jefferson could have selected, for our findings show that the largest city of a country may be quite in proportion with the others. But more important is the ambiguity of his term "country." Is England a country? Or should we call the British Empire a country? What is a "country" in dynamic terms? Though we have presented our views on this question, we hasten to repeat the belief that man has really not yet evolved a stable national social-economic system, and that we are today very probably in a period of rapid evolution.

6. THE "ECONOMIC MAN" AND THE "PSYCHOLOGICAL MAN"

In the course of the preceding pages we have presented an abundance of quantitative data which we have discussed both mathematically and qualitatively. Our actual data show quite clearly that natural law of some sort is present; and this fact alone should give pause to those who are inclined to believe that social phenomena are random (i.e. "there are no social laws"). Our qualitative discussion of the data was intended to suggest the significance of the data in ordinary human terms, as we argued for the conservation of energy by groups of human beings in the attainment of objectives.

Since groups of human beings consist of individuals, it is perhaps worth speculating for a moment about the position of the individual within the group. The economists, after all, have been telling us for years of their conception of the "economic man." This "economic man" was assumed to want as much of the goods of production as possible, and, on the basis of the assumed "economic man," the economists have tried to disclose the laws of material production. However, in addition to this concept of the "economic man," there has arisen—apparently

somewhere east of the Rhine River—a conception of the “psychological man.” Just what this “psychological man” may be, the author does not know, nor can he find out about it from perusing American newspapers and journals. Nevertheless he does learn from American newspapers and journals, that the “psychological man” can work hard over long hours for very few of the goods of his production—quite unlike the “economic man.” Is there a difference between the “economic man” and the “psychological man”?

Let us in our imagination take an arbitrary example of a man and watch him work. All day long he may struggle to get more of the goods of production for himself, and then, having procured a sizeable amount of goods, he may simply and cheerfully dump them into the lap of a woman, or into his country’s treasury, or he may disburse them anonymously among a dozen charitable or non-charitable causes. As long as he was struggling to get these goods of production, he may well have been the “economic man” carefully weighing *quid pro quo* in every exchange of goods or services that he made. But does he necessarily cease to be the “economic man” as soon as he gives to another the products of his endeavor? The answer to this question would seem to depend upon whether he was perhaps not still receiving some immaterial *quid pro quo* in such a manner that at no time did he cease to be an economical man. This *quid pro quo* may have been but a “feeling,” such as a “feeling” of greater security, or of lesser loneliness, or even of lesser “wickedness,” or it may have been a “feeling” of sexual excitation or of social importance. Indeed the man may attach such value to the possession of some such “feeling,” that all his previous restless and even ruthless struggles for material goods may have been of secondary importance; that is, they may

have been but a means towards the attainment of what amounted to little more than a different kind of a mental "feeling" or of a different degree of the same "feeling," or of a freedom from an unpleasant "feeling."

Shall we say that there is a dichotomy between the "economic man" and the "psychological man"? Or shall we say that the "economic man" struggles for consumable goods of all kinds, including "psychological goods"? In other words, as we view a man, shall we think of such possible terms as the "psychology of economics" or of the "economics of psychology"? These questions are easy to ask, but a satisfactory and conclusive answer (i.e. a scientifically sound answer) may not be easy to find. Nevertheless let us head our discussion into the general direction of where (in the author's opinion) the ultimate answer may lie. And as we head into that general direction, let us remember that we do have a few definite observations that may serve as points of reference.

For we have seen that man (whether an "economic man" or a "psychological man") does behave according to what we may call a law of community-size as well as what we may call a law of income-groups. As far as the law of community size is concerned, there seems to be a natural dynamic grouping which may be called a "nation"; in short, a man may be a *national* in his rural-urban activity—a national of some nation. Similarly a man may be a member of an economic group or class within a nation, if we may trust our explanation of our income-distributions. And in this connection we have the possibility of grouping according to the supposed classes of the *pariah* and the *elite* (i.e. those that give proportionately more than they receive and those that receive proportionately more than they give).

Clearly our "economic man" or "psychological man" (i.e. *man*) appears to be the resultant of at least several sets of forces in operation. How many more sets of forces may there be? Indeed, may we perhaps say that the total person is nothing but the resultant of psychological, biological and physical forces in operation upon matter? And yet, though we might all very willingly make such a statement *a fortiori*, nevertheless the statement would be meaningless unless supported by rigorously scientific data.

But let us turn our attention now from man in general to an American in particular. At the time of writing the author seems to note the presence of conflicts of a kind that seem to suggest that our previously discussed laws of forces may well be in energetic operation. Thus there is the conflict between those who favor a policy of an independent American nation first and foremost, and those who apparently believe that America is a part of the British Empire which we must save even at the expense of our own blood and treasure—the nationalists versus the interventionists. Which of these two propositions are the sounder in terms of the movement of masses of materials over distances with minimal energy? As far as our own data are concerned, the nationalists would seem to be the more justified. Should we then perhaps divide Americans into classes of persons according to the degree of their loyalty to the United States? Such division into loyalty-classes seems to be being made by both sides.

These are but a few of the problems that face us in our inquiry into social-economic forces. Furthermore an inquiry into the nature of these possible forces, in so far as they may be "psychological," would seem to be of something more than mere academic interest, particularly at a time when we are officially in a state of "emergency." The United States might be at a disastrous disadvantage if,

totally ignorant or unmindful of these supposed "psychological forces," it tried to oppose in warfare a nation that was not so ignorant or unmindful of them. Indeed, perhaps, if we understood more of these "psychological forces," there might be far, far fewer occasions for serious international struggle or of internal conflict. In other words, the first defense of national and internal integrity may lie in the laboratory of psychology, of economics, of sociology, of anthropology, in the hands of those who are not afraid to investigate dispassionately and objectively and, in thus investigating, who are not afraid of being found mistaken.

In that spirit of dispassionate objectivity let us continue.

CHAPTER SIX

Cultural Drives

In the present chapter we shall discuss some of the forces that seem to govern the nature of cultural goods. The contents of the entire chapter are to be viewed as a working hypothesis at best, except where the contrary is expressly stated, and hence should not be placed on the same empiric level as that accorded to the sets of actual data which were presented in the course of the preceding chapters. We include this discussion of cultural drives primarily to show that far more belongs to the form and behavior of a social-economic system than the distribution of persons in communities or of consumable goods to those persons in the form of monetary incomes or their equivalent.

Because of the diversity of cultural goods and the presumable complexity of the forces governing their manifestation, it is perhaps inevitable that our ensuing treatment will not entirely escape a certain occasional suggestion of discursiveness inherent in the topic. Cultural goods, after all, are the *particular kinds* of goods (or tools) which are *peculiar* to the members of a given social-economic system. We know that Japs, Americans, Mexicans and Arabs, for example, all produce and wear clothes; we are now interested essentially in the particular kinds of clothes that they wear, or, more broadly stated, in the psychological and social drives that make for a peculiarity of clothes in any social-economic group. The contents of the chapter might be labelled "the psychology of economics" or "the psychology of culture" if those terms had meaning.

In order to help orient the reader in advance, the essential steps that we shall take are the following. First (1)

we shall inspect the outward characteristics of what we have termed social organization; then (2) we shall note some of the effects of social organization upon cultural goods; then (3) we shall inspect some of the social-economic drives that make for a greater homogeneity of cultural goods; this done, we shall (4) discuss the concepts of "natural" culture and of "national" culture; thence we pass (5) to a consideration of "psychological nations" and of the problem of nationalistic minorities; this consideration will lead us to inspect (6) the meaning of excessive nationalism in culture together with the forces that make for an international levelling of culture. Thence through a statement of the author's personal working hypothesis (7), we briefly summarize (8) our study of national unity.

1. THE CHARACTERISTICS OF SOCIAL ORGANIZATION.

Up to this point we have spoken much about social organization, without making clear just what we understood under that term. Let us now be more specific as we attempt to show what a highly organized human community looks like. We shall facilitate our exposition if we begin with a homely and familiar analogy of an organized field that is not human.

If we were to take a large number of steel needles and to drop them one by one from some height above a large smooth table, we should expect the needles to lie every which way as they came to rest on the table. In other words, we should expect to find that the needles pointed at random in any direction. But suppose that upon inspection of the needles we found that they tended, in fact, to point, by and large, in the direction of southeast. What should we infer from this fact?

A quite legitimate inference from this fact would be that to the southeast of the table was located a magnetic

force that was "organizing" the steel needles as they fell upon the table. That is, from the lack of complete random in the behavior of the needles as they fell upon the table, and from a knowledge of physics we might conclude that "some force was organizing the aggregate of needles as they fell upon the table."

With the analogy of the needles in mind let us now inspect an aggregate of human beings in some imaginary city into which we might happen to enter, and note how the above-mentioned lack of randomness in behavior may indicate the presence of an organizing force. As we enter the city we note that every building has the country's flag unfurled from its windows. The citizens are not walking about at random; the men, for instance, from eighteen to forty are marching down the street in the same direction; they march in step; they are dressed alike; they carry the same equipment in the same way; they smile the same smile. The streets are lined with persons who center their gaze upon the marching men as they wave their hands towards the men and in the same manner; they say the same words and apparently are thinking the same thoughts; they behave in other respects in the same way. And so on.

In our imaginary city we note a lack of random in the behavior of the inhabitants. From this lack of random we may perhaps infer the presence of an organizing force that affects all of the persons, just as the magnet in our analogy affected all of the needles. Obviously the condition described in the city is one related to warfare, in which the inhabitants are perhaps reacting to what they consider is either a threat to their common existence, or a prospect of the achievement of something for their common weal.

The condition of warfare or the threat of warfare is not necessary for the disappearance of randomness. One need only imagine the news of the discovery of gold with its attendant gold rush, or imagine a rapidly rising stock market with the entire populace bent on enriching themselves from it. In either event, thoughts, words, and other acts of behavior would be oriented, or directed by the force, and we might infer the presence of an organizing force from the high degree of sameness of the populace's total activity. As another example of an organizing force we might take a new religion, with a uniformity of garb, of wish, of hopes and fears, of hourly conduct and the like,—even to the minutiae of particular badges to identify the members in the religious organization.

Indeed whenever one notes a high degree of agreement of utterance, or of prediction, or of any other type of activity in a field where one might expect more or less random, then one may be justified in suspecting the presence of an organizing force.

But let us see now what the effect of social organization may be upon cultural goods of any sort.

2. THE EFFECT OF SOCIAL ORGANIZATION UPON CULTURAL GOODS; NATIONAL CULTURE.

The effect of social-economic organization upon cultural goods is to decrease their variety. This is almost true by definition, because, when we say that social-economic organization decreases the randomness of social-economic activity, we but say that the instruments and effects (or products) of that activity will decrease in variety. In other words, there will be a greater sameness or monotony of all types of cultural goods. If one chooses to reckon beliefs, slogans, statements and the like as instances of cultural goods (and they can be powerful

tools of offense or of defense) then these too will reveal a high degree of sameness or monotony.

Furthermore, the effect of an organizing force will be noticeable in the entire production-distribution of the social-economic system's set of cultural goods, whether physical, biological or mental. In short, the nation's entire striation will become organized in terms of the given organizing force, whether the force is one of self-preservation or of self-expansion, or of something else (e.g. war).

Moreover, the longer the given organizing force persists, the more completely the nation's striation will be re-oriented in terms of it, and the longer will be the cultural lag of restriation after the given organizing force has been removed. For example, countries have been known to remain belligerent in organization long after peace has been concluded.

It would seem to follow then that repeated impingements of war, for example, upon a national social-economic system as a whole will result in a greater sameness of material, biological and psychological cultural goods of all sorts,—or, as we shall say, in a higher degree of "national culture." That is, the populace's material goods (e.g. food and clothes) and its biological goods (e.g. its whole treatment of living nature) and its psychological goods (e.g. its beliefs, sentiments, social habits, etiquette, popular evaluations, etc.) will become ever more nearly constant, as a result of the presence of national organizing forces of war. In other words, as the members of a population share ever more a common fate over an ever longer period, the cultural goods of that population tend to become ever more homogeneous.

The presence or lack of homogeneity of cultural goods can be instructive. From a high degree of homogeneity of a nation's culture, one may infer a long antecedent

period of national organization. Thus, for example, from the high degree of homogeneity of the culture of France one may infer a long antecedent period of national organization. By the same token, from a low degree of homogeneity of culture, one may infer the reverse.

But let us now look a little deeper into the forces which make for a greater homogeneity of cultural goods.

3. SOCIAL-ECONOMIC DRIVES TOWARD INCREASED CULTURAL HOMOGENEITY.

If we look into the nature of the economic forces that might lead to a greater homogeneity of culture (i.e. of cultural goods of all sorts) we note first the well-known economies of a mass production of standardized goods and of stock-sizes, when compared to the less economical production of custom-made goods for the individual. Since the economies inherent in mass-production are familiar to all students of social-economic phenomena, we mention them at this time merely to remind the reader that one of the effects of mass production is a greater cultural homogeneity. In other words, cultural homogeneity may be related to a conservation of energy.

The economies of mass-production are not alone in making for cultural homogeneity. Equally important are the activities of the elite discussed in Chapter Five. Since it is very economical to be in the nation's elite, it is obviously worth while for members of the pariah-class to get into the elite. Hence there is the temptation on the part of the pariah-class to imitate the elite in thoughts, speech, manners, views, sentiments, and in physical cultural goods. The imitation may at times be awkward, indeed comical, nevertheless the effect of the imitation is to increase the homogeneity of national culture. If advertisers assure the total population that the socially prominent Mrs. Blank

smokes p-cigarettes, washes her silk stockings with q-soap, supplies her distinguished foreign guests with r-bed linen, s-toilet paper, and t-ginger ale, then the pariahs may attempt to imitate Mrs. Blank by doing likewise in their more humble way. So too, if the pariah-class merely notices the peculiar behavior of the elite without being told, it will imitate the elite. The great homogeneity of English culture is a case in point, and one needs only to read the nineteenth century English literature (e.g. the works of Thackeray or of George Meredith) to note the profound effect of this imitation upon the views and habits of the humbler people. For a literary evaluation of the corresponding French phenomena, we remember the works of Marcel Proust.

Of course when society is organized on the principle of the maximum goods for any given number which is appreciably less than that of the total population of the nation, then there will be a desire for the members of that favored given number (the elite) to get a maximum amount of goods of all sorts for themselves. In this connection we must not forget that one of the goods of society seems to be prestige, or "power" of one sort or another, for the possession of which persons compete either individually or in organized groups. Furthermore we must not forget that though this prestige or "power" by itself is very elusive to view, nevertheless the actual possession of this much coveted prestige or "power" by a person or persons can be manifested by various outward and perceptible symbols. The right to say or do certain things, or to go to certain places or to behave in a certain manner, or to wear a certain garment in a certain way or to have a certain handle to one's name can become an outward symbol of the possession of inward and invisible prestige or "power." The ostentation of wealth (diamonds, fine automobiles, custom-made goods, and the like) can be a symbol of class-membership.

Moreover the sheer ability to follow immediately the changes of vogue is no less an elite-symbol; that is, the ability to wear the latest hat, to read the latest book, to see every play at its première, may be a cultural symbol either of actual membership in the elite, or of a striving in that direction.

Although a constant struggling by the elite for a constant change in cultural goods in order to keep itself distinguished from the pariah-class may induce a rapid turnover of cultural goods at the top, nevertheless as long as the pariah-class imitates it, the change may make for a greater homogeneity of culture. Today, in the United States, because of the achievements of technology, the non-elite can imitate the essential social-symbols of prestige and "power" of the elite with comparative alacrity. And all this, to repeat, makes for an increased cultural homogeneity.

Naturally when many individuals of a nation feel broken in hope, and depressed or desperate in respect to their own lives as well as to those of their families and friends, they may not try to imitate the elite. Instead they may band behind a powerful leader in whom they have confidence and thus identify themselves with that leader in the belief that his success will be their success to the end that they will shine in his reflected glory which they will help him to achieve. In that event the members of the band may wear distinguishing signs,—such as shirts of a given color, or some other badge,—and call themselves by a particular name with particular salutes and the like. The cultural background, however, from which these particular "social symbols" are selected by the band will probably be largely the nation's pre-existent stock of cultural goods of all sorts. The effect of the band's selection of its particular set of cultural goods and social sym-

bols will obviously be one towards an increased homogeneity of cultural goods by an amount that the band succeeds in organizing the nation.

To recapitulate, the economies of mass-production and the effects of imitation of a favored group of any sort may make for what we have termed a greater homogeneity of culture. Similarly the organizing forces of national impingements of any sort from within or from without. Cultural goods are tools of behavior; cultural goods are "social symbols" which are in turn tools of behavior.¹ The forces that make for national production-distribution make for a national homogeneous culture.

But in saying that cultural goods are tools of behavior, even though they may also be viewed as "social-symbols," we are brought to the question of the social-economic value of cultural goods when viewed as tools for the attainment of objectives. After all, some cultural goods may have a higher social-economic value than others; hence we may have reason to believe that over the long run some cultural goods will tend to be preserved longer than others.

4. THE CONCEPTS OF "NATURAL" CULTURE AND OF "NATIONAL" CULTURE.

In our previous discussion of cultural goods we disregarded for the time the obvious fact that cultural goods of all kinds must be constructed of something. Thus women's hats must be made of actual materials which in turn must be procured from actual sources of supply.

1. In this connection may the author call the reader's attention to the brilliant writings on the psychology of culture and of social-symbolism by the late and great Edward Sapir, in which can be found extensive discussion of many interesting examples of "cultural symbols." The author, who heard Professor Sapir's lectures on the "Psychology of Culture" in the Harvard Summer School Session of 1936, is deeply indebted to Professor Sapir for many of his own ideas on "Social-Symbolism."

Similarly with the production of actual sheep, goats and such like. Even the nation's stock of slogans, sentiments, ideas, memories, and other patterns of behavior must refer ultimately, directly or indirectly, to some localized given.

As for the nature of physical cultural goods, one cannot overlook the influence of the conservation of energy in the movement of materials over distances through sets of conditions. As already suggested in Chapter Four, the nature of cultural goods in a given terrain will tend in the long run to reflect the material-geographical givens of that terrain. True, the rare and exotic will command a premium in so far as they may be used as symbols of membership in the elite. Nevertheless, because of a tendency to conserve energy, the rare and exotic, by their very nature, cannot completely displace the local native givens, no matter how much they may modify them. If one chooses to apply the term, "*natural culture*," to the influence of native or local givens upon any district's cultural goods, then all cultural goods will probably show some tendency to be "natural," or, if one prefers, to have a "natural component." And this "natural component" will apply to cultural goods of a psychological nature. A given group's sentiments, slogans, ideas, memories, and evaluations will be colored by local happenings. And these local happenings will in turn be determined to a considerable part by the givens of the local terrain which determine the local occupations (e.g. sea-faring, agriculture, etc.)

However, in so far as cultural goods are the effect of a national co-operative social-economic activity, with its mass production, stock-sizes and the like, then just so far will cultural goods have also a "national component." Though the cut flowers on the porch in the summer time

may represent cultural goods with a local background, the car at the front door, at least in the United States, will reflect a national background,—or, if one prefers, will have a very large “national component.” Cultural goods, then, may have both a “natural” (local) component and a “national” component.

This “national” component will not be restricted necessarily to material goods. Our ideas and sentiments may have a “national component.” Great national events, whether positive or negative, whether introvertive or extrovertive, tend to organize the nation’s populace as a whole into a national unity from which there is sometimes no complete return to the status quo. Thus, for example, Washington and Lincoln organized our nation as a nation, and all American sentiments since then have been colored by those long past national organizations.

Cultural goods of any sort, to repeat, may be viewed as consisting of national-local components (the two components being by no means discrete). National traditions, national ways, national reminiscences pervade much of human activity. Some nations, of course, because of their history, may have become nationally more homogeneous in respect to culture than others; for example, the Englishman or Frenchman carries his English or French cultural habits wherever he goes and amalgamates but slowly. Nevertheless, the main trend of all national development, if the data of history mean anything, seems to be in the direction of a greater national homogeneity of culture upon an organic contiguous basis of terrain, albeit with some local coloring. Indeed it is not unthinkable that almost any example of cultural goods in western civilization may be viewed as a compromise between the national traditions of the past and the exigencies of the present, as well as a compromise between the exigencies of the

national system and the exigencies of local givens. Moreover, if the observations of anthropology and sociology on the subject of ethnic groups mean anything, national cultures are obdurate in their persistence and sensitive even as to details. For example, when the Gileadites (Judges XII, 6) took the passages of the Jordan and slew all those, as alien Ephraimites, who could not pronounce the word "Shibboleth" according to the Gileaditic phonetic system, they illustrated the obduracy and sensitiveness of cultural groups even in respect to phonetic details in what must have been small tribal conflicts.

Let us indeed now briefly inspect a few examples of the obdurate persistence of nations in their cultural goods. This brief inspection will serve as a point of departure for a discussion of cultural goods as a compromise between past and present, between group and individual, with special reference to the problems of the United States.

5. "PSYCHOLOGICAL NATIONS" AND NATIONALISTIC MINORITIES.

Up to this point we have paid little attention to the physical characteristics of the individual members of a social-economic group,—that is, whether they are blonde or brunette, whether negroid, Asiatic or Caucasian. In other words, we have paid little attention to problems of physical racial traits, as physical anthropologists use these terms. And we shall not do so now, except inferentially as a corollary to our present consideration of what we shall term a "*psychological nation*." We shall define a "*psychological nation*" as a group of individuals which have a national culture of high degree of homogeneous psychological goods such as beliefs, sentiments, evaluations and other habits or patterns of behavior; in other

words, a "psychological nation" is a group of persons whose mental attitudes, likes and dislikes have been nationally organized.

Let us now take a few instances of "psychological nations" and try to relate their developments to the problems of national production, as discussed in our first four chapters, as well as to those of national income distribution. Our first example will be the Jewish nation, which seems to be primarily psychological, and is particularly interesting because it has no terrain that it can call its own.

a) The Jews as a "psychological nation."

The Jewish nation stands out in history for its amazing preservation of its highly homogeneous national culture under the most adverse conditions. Let us briefly inspect, as a working hypothesis, what may well have been the social-economic factors in the survival of this nation.

The Jews in their early history, like many other early peoples, were exclusive in the sense that they divided the peoples of the earth essentially into Jews and barbarians. The fact that the Jews considered themselves "the chosen people of God" was and is by itself nothing unique. Nevertheless the Jews did make one stupendous discovery which, in the opinion of the author, put them very definitely in a class by themselves. That is, they discovered early that there were not "many local gods" but only "One God." In short, they early discovered that this universe was governed by a unitary principle which today we might describe as that of the continuity of natural law. Regardless of what other attributes the Jews may have given to this unitary principle, they always emphasized the oneness of Jehovah. Furthermore, Jehovah was despotically jealous of potential competitors and tyranni-

cally insistent upon obedience and reverence from his chosen people. Hence the Jews were kept nationally organized not only by constant religious practices but also by a rigorous interdict against the importation of any disturbing alien gods, in the manner of the Romans, the Greeks and of many other tribes. For this reason Jewish culture resisted the taint of any alien religious ideas that might disturb the national homogeneity of their culture. And by the same token Jewish culture rigorously resisted any apostatical internal innovations, if we may assume as reasonably valid the accounts in the Old Testament.

Equal in importance with the conception of a unified divinity were certain Jewish conceptions or rules of interpersonal conduct which on the whole seem to have been dynamically sound (e.g. the Golden Rule, and certain of the ten commandments). These rules, as far as the author (who is not a Jew) understands them and can judge, envisaged no class distinctions. Though a social-economic elite did appear in Jewish antiquity which is reported to have used some of the rules as a religio-Brahministic facade, nevertheless the Jewish ethical code itself does not seem to have demanded or to have endorsed a social-economic elite.

With no provision for a social-economic elite, the Jewish nation was apparently organized from very early times on the basis of the principle of the maximum "good" for the given number. And this given number rigorously included all Jews and excluded all non-Jews. In Chapter Five we discussed the economy of this principle and noted its great advantages. If the author's interpretation of Jewish organization be correct, then the fundamental principle of Jewish national organization was one of high efficiency in a social-economic sense.

But now let us watch this hypothetical principle function, after the Jews had become dispersed. Wherever they migrated through the Middle Ages, they clung together and worked under the principle of the greatest good for their entire number. Implicit in this principle, of course, was the corollary that non-Jews belonged under the heading of consumable goods to be used by the Jews. It was hence inevitable that the application of this principle with its corollary would eventually make of the Jews a social-economic elite.

Yet as soon as the Jews prospered in wealth, then the non-Jews would become envious of them until they finally despoiled the Jews and drove them out. The Jews, now penniless, banded together, if only because misery loves company in its misfortune; and this misfortune organized them even more nationally. The only chance of survival for the expropriated Jews was to become the abject pariahs of the non-Jews. Yet however menial the tasks, the Jews apparently performed them with complete group-consciousness, and with maximum efficiency as they remained psychologically an organized nation. During this period of the dispersion the intimately co-operative spirit of Jewish family life and of Jewish philanthropy probably developed into the most deeply entrenched of Jewish cultural goods. It was but another manifestation of the maxim that in union there is strength. After all an intimately co-operative spirit of family life, and a national trend to love and help one's national brother do seem to be dynamically sound.

The very dynamic soundness of the Jewish social-economy which was induced by Jewish pariah-conditions would inevitably tend to make the Jews prosper again and again, as they arose again and again from the pariah-class, and again and again became a new social-economic

elite,—only to be despoiled again and again. It is small wonder that they have become a highly homogeneous nation in psychological cultural goods even without a permanent terrain for their home.

And it is small wonder that the Jew tends to grasp for material wealth on the one hand, and to have the most profound love of art, of philosophical speculation, and learning on the other. The grasping for material wealth is but the instinctive desire for material security engendered throughout centuries of persecution. And the love of the more psychological cultural goods, such as those of art, of philosophical speculation and of learning, may be connected with the fact that these cultural goods on the whole need very few raw materials. According to the late and great Edward Sapir, who was of Jewish origin, there is in Jewish culture “an idolatrous love of the learned man” (i.e. of learning).

The Jewish nation is obviously interesting to the social scientist for many other reasons. It is a nation that for centuries has existed without fixed territorial limits, and hence exemplifies the author’s contention that fixed territorial boundaries are not necessary to a nation’s survival. On the other hand the fact that the Jewish nation is spread over a non-contiguous terrain is perhaps today its greatest weakness, now that nationalism on an organic-contiguous basis is apparently emerging ever more forcibly. For from the viewpoint of an organic-contiguous nation, the presence of an internal national group of high cultural homogeneity is bound to be felt by non-Jews as a social-economic trust. And the fact that the group has international connections will in the long run render its loyalty suspect. It is probably not entirely by chance that the Jewish nation, being organized nationally by and large on a non-contiguous basis of terrain, should tend to oppose

the growth of the nationalism of others upon a contiguous basis of terrain. Moreover it is probably not entirely by chance that the Jews, sensing the inherent weakness of their position, should want more than anything else a national homeland of their own.

So much then for our theoretical discussion of the Jews as a "psychological nation" against the background of our social-economic principles. In this general connection we refer to the excellent treatise of Hilaire Belloc, *The Jews* (Boston, 1937), as well as the enormous periodical literature on the subject. In the author's opinion, it is not improbable that the Jewish nation is far more psychological than physical; that is, Jews are essentially "made and not born," as the age old cultural traditions of their curious past are handed on from father to son within a clanishness that has made both for their greatness and for their persecution in the past. Today there exists for many a young Jew, according to his statement, a conflict between the deep loyalty to their own racial traditions which carried them safely with their racial identity down through the centuries, and the loyalty to the actual social-economic system of which they are a part. A person cannot cast off the cultural goods of his youth as if it were an old coat; on the other hand an organic-contiguous nation seems to tend in the direction of an ever greater cultural homogeneity, and hence to eliminate cultural islands, or social-economic trusts within it. It may well be that anti-Semitism is in the order of a "cure" rather than of a "disease"; that is, in the order of a reaction instead of an action. In other words, anti-Semitism may be directed against the organization of the Jews and not against their religion, even though the religion is intimately associated with the organization as the great common bond of common tradition. If this interpretation be

true, the primary urge of anti-Semitism is to break up the trust-like organization with only secondary concern about the religious beliefs.

Let us not forget, however, that the Jews are not unique today as an organized social-economic minority within a nation. Indeed the United States consists of many such minorities, though none perhaps as obdurate and established as the Jewish. The dynamics of all these minorities seem to be in many essentials the same: the greatest "good" for the given number, even though many of them may be deemed less stable because they have in common the traditions of Christianity which are not only non-exclusive, but almost militantly non-exclusive.

b) Other nationalistic minorities.

It is only natural that when members of a nation migrate to a foreign shore, they will bring their cultural background with them, if only because they know no other. Furthermore, it is almost inevitable that, in matters of culture, like tends to attract like, particularly when new and unfamiliar alternatives are not recommended as more valuable in a social-economic sense. In other words, a person prefers the company of the like-minded and of the like-behaving, if only because it saves himself the trouble of confronting new ideas or of breaking old habits for the sake of establishing new ones. After all, anyone loves to do what he loves to do, and man is gregarious.

Hence a migration of nationally different persons to a new country like the United States is likely to become segregated into nationalistic groups within that new country, as like seeks the company of like. These groups will tend to remain segregated and thereby to perpetuate their native cultural habits.

If these groups,—we shall call them nationalistic minorities—are in any way marked as pariahs (see end of Chapter Two) then there arises the possibility that they may become nationally ever more organized, as we suggested above may well have been the case of the Jewish nation. Furthermore, by way of protection, there emerges the additional possibility of their deliberately organizing themselves on the basis of the greatest “good” for their own nationalistic minority, with the result that they will try to exploit the country’s resources and the rest of the population for themselves, only, in turn, to increase the antagonism against them.

It is obviously only natural that a nationalistic minority that is treated as a pariah (i.e. as “foreigners”) will think fondly of the homeland, doubtless, at times, with the enchantment that only distance can lend. This interest in the culture of the homeland tends to preserve the native culture of the nationalistic minority, even to the point of diluting its loyalties to the adopted land. And this would seem to be the case, no matter what minority it is, that is, no matter whether it is, for example, British, French, German, Irish, Italian, Japanese, Jewish, Norwegian, Swedish, or any other,—without restriction.

On the other hand there clearly exists an opposing force that serves to level the exotic cultures of nationalistic minorities in a given land of adoption. Thus the given land of adoption may itself have its own evolving set of cultural goods which, in terms of local givens, are far more valuable in a social-economic sense than many of the exotic goods of the native lands of the nationalistic minorities. In this event, the more valuable local cultural goods would apparently tend to prevail, in the long run, and to exclude the less valuable exotic competitors. In

short, regardless of origin, cultural goods of greater social-economic value would seem in time to prevail.

But when we say that the cultural goods of greater social-economic value tend to prevail in the competition for survival, regardless of their exotic or local origin, we have implicitly made a statement about culture in general. For it follows from this statement that the "fabric of a nation's culture" may also be seeking an equilibrium in the terms of what, in Chapter Three, we called social-economic value. This hypothetical search for cultural equilibrium within a nation, in which national culture strives to adopt the more economical at the expense of the less economical in the general amalgamation of cultural goods, may well be important for an understanding of the cultural development of any nation. Indeed, let us suggest its possible importance by a brief and quite superficial discussion of the amalgamation of cultures in the United States in the development of American culture during the last century.

*c) The development of culture in the United States;
the concept of a cultural conflict (Kulturkampf).*

We have seen from our first two chapters not only that the United States developed into an integral social-economic system as far as the production of goods was concerned, but, also that this integrality may be our greatest strength. Nevertheless it does not follow therefrom that we have also developed into an integral social-economic system as far as a homogeneous culture is concerned (i.e. we are not a "psychological nation"); and this lack of cultural homogeneity may be potentially either our greatest strength or our greatest weakness. That is, it may be potentially our greatest strength because it implies a certain open-mindedness on the part of the American nation.

It may be potentially our greatest weakness because it may lead to a temporary national disunity if we permit it to. And though this national disunity may be only temporary, it can be costly for that temporary interim.

We must not overlook the possibility that the roots of a genuine American culture lie deeply rooted in the vast district west of the Appalachian Mountains. The early pioneers of this district were essentially agriculturalists and hence were on the whole engaged in a similar occupation of a very humble though realistic sort. Soil is healthy, and a national culture rooted in the nation's soil is healthy. The early pioneers, whether Yankees, German, Irish or Scandinavian, were confronted by common problems of production and by common problems of defense. Isolated they were dependent upon local co-operation, where nationalistic differences were apparently buried under the simple statement: "This is America, by Gawd!" The record shows not only that "America" was dearly loved by the pioneers, but also that Europe was cordially hated. Furthermore all European mannerisms, as such, were disliked.

This does not mean that European cultural habits were not adopted when of social-economic value; on the contrary. For a simple and obvious example, there was an interchanging of cooking recipes that led to a richness of cultural diet that only those brought up in the West can appreciate; similarly with methods of tillage, cattle-raising, cheese-making, and the like. Practically all were Christian, and the answer to every religious argument was "Thus spoke the Lord" with chapter and verse cited; the Bible was the basis of the common American national culture. Not to believe in the divinity of Jesus Christ was a speedy means of committing commercial and social suicide. Furthermore, Christian charity was a real force on

the frontier, with food and gifts for "poor Mrs. Nailer" or for "poor Mrs. Swanson"; politically this tendency was often dangerous because frequently an incompetent person was elected to office because his family needed the money; nevertheless culturally it made for homogeneity. The Civil War, not the Revolution, seems to have been the great national event. When the "old soldiers" marched on Memorial Day, the towns were beflagged, as all came out to cheer. Practically everyone's grandfather had been in the Civil War, and everyone had been brought up on Lincoln, Grant, and on grandfather's gallant deeds. There was even a boyhood rivalry about grandfather's deeds. The author remembers a pioneer's picnic where a certain grandson was instructed to sit in a rear seat in order to signal to his grandfather whenever his well-rehearsed speech could not be heard. Since, in the opinion of the grandson at the time, this speech contained rare gems of oratory which merited special emphasis, he gave the signal of loudness whenever a gem was in the offing, until by the end of the speech the old colonel was bellowing like a bull and the entire audience, confusing noise with art, burst out into loud applause. At the next picnic there were other grandsons in the back row, and all afternoon there was bellowing and more bellowing as the Civil War was chronicled again and again. Of course it was funny, but it made for cultural homogeneity, even as the Homeric epics made for cultural homogeneity in their day.

Similarly there was rivalry about horse-flesh, about crops, about property in general; it was a period of polite braggadocio that might well be repudiated as "vulgar" by older European cultures but which made for the establishment of a genuine American culture, because it set, in terms of local givens, the rules of the game according to which all were welcome to play. It was a time when

American Democracy was really "democratic" (in the sense of no classes and no privileges). For example, the idea of not going to the public school never entered a person's head; a private school was put in the class of a "reform school." It was a time when foreign affectations were politically, socially, and commercially dangerous. Abraham Lincoln was a real popular hero and not a religio-Brahministic facade of a social-economic trust of exploiters.

If we have spoken of the terrain west of the Appalachians, the terrain of Mark Twain, Will Rogers, and of Willa Cather,—that is not because it had no connection with the Eastern sea-board which is historically the oldest part of the country. On the contrary the culture of the West had its basis in the culture of the East that went westward with the frontier. Today the East, which is historically the oldest part of the country, is probably in ethnic matters the youngest, least amalgamated, and in many ways the least genuinely American, if one overlooks striking examples to the contrary. West of the Appalachians the polarization is one of a government of the American people, by the American people and for the American people, with a great suspicion of affected "foreign ways." East of the Appalachians one is more Europe-minded. Only along the Eastern seaboard does one find to a high degree an organization of the excessive loves and hates for European nations against which President Washington warned in his farewell address. Incidentally, in this connection, the author doubts that the presence, in the East, of this alien-mindedness is necessarily due exclusively to a greater proximity to Europe. Much of it is due to the fact that the latest waves of migration have rested very largely in the East and that there has simply not been sufficient time for amalgamation. In other words,

some of the alien-mindedness is due to a cleavage between the social pariah and the elite. The pariah is thrown back on his native cultural goods because, as a nationalistic minority, he feels excluded. On the other hand, the elite have affected pro-British and pro-French manners as a social symbol in order to distinguish themselves from the pariahs who are not necessarily lacking in skill, intelligence and charm, and are not essentially British or French. That these extremely pro-British and pro-French manners may be largely affected is evident to visiting Englishmen and Frenchmen who are accustomed privately to laugh at the *gaucherie* of the American imitation. That the manners may be merely an escape mechanism, and but conceal a certain feeling of social and intellectual inferiority and of contempt for American culture is only too evident to the psychologist who notes not only the utter apologetic obsequiousness of these anglophiles and francophiles in the presence of even the most mediocre Britisher or Frenchman, but also the smug superciliousness of the same exotophiles in the presence, say, of a truly brilliant American achievement. Of course we must remember that we are speaking of the excessive foreign loves, and not of the natural and justified admiration of the cultural achievements of foreign nations. Furthermore up to 1914, the vogue (in intellectual and musical matters, at least) was pro-German. Next year it may become something else, like pro-Mexican, and anti-European.

It is only natural that our own American culture may suffer at times from comparison with the old and established cultures of Europe, when viewed from the frame of reference of Europe. It is also only natural that in so far as Europe has a "better mouse-trap" for our American problems, it would be economical for us to adopt it,—and

we generally do adopt it. Nevertheless the attempt on the part of some to force American culture into the century-old patterns of Europe is folly, if only because it is impossible; the sturdiness of those European cultural goods rests upon the soil and century-old history of Europe which is not our own, and need not beget an inferiority complex in us, as seems often to have been the case. Our inclination towards an inferiority complex in the face of Europe has, of course, its humorous side. While young academic America was pedantically, indeed slavishly, imitating the architectural monuments of Europe's past, "poor old Europe" was developing the new and highly functional modern architecture. While American exotophiles were apologizing, say, to the English and French for the bourgeois crudeness of American culture, other European countries considered the technical efficiency, beauty, orderliness and practicality of the old American way worth imitating. In short American culture is not without its foreign imitators who are apparently winning battles with American efficiency against the inefficiency of the more static cultures of Europe. When Europeans say "practical America," they seem to refer to the existence of an American culture, or, if one prefers, to an American way of doing things, of which we as people have no reason to be ashamed; indeed we have every reason to be proud of it. Despite its original Anglo-Saxon basis, American culture represents the selection and interfusion of much of the best that the Old World had to offer. It is becoming an entity of its own with many godparents. Even our language is no longer English. It is American.

It seems no exaggeration to say that today in America we are in the final phases of a profound cultural battle (i.e. technically a *Kulturkampf*) which was perhaps inevitable from the nature of our history with its exten-

sive foreign immigration. In one respect a conflict of culture may be of positive value to a nation by preventing a certain national lassitude and self-complacency; but in another respect, by keeping the nation in a state of constant turmoil, a cultural conflict can inhibit production and distribution, even at a time of great emergency when any turmoil may be construed as a threat to the state.

However there is a certain risk in exaggerating the importance of a cultural conflict between the alien-minded and the native lest one make of it a scape-goat for ills that are purely intranational. After all, unsound internal administration can also cause turmoil. Indeed it would seem that today in America much of our uncertainty is traceable to a confusion of the alien-native and scientifically sound and unsound to the end that one is not sure whether a given political formula for protecting, say, America against a potential enemy may not directly play into the hands of the potential enemy. One must be careful about the tendering or accepting of political formulae.

d) Political formulae as cultural goods.

At this point we may ask whether political formulae are not also cultural goods. Let us approach the question from a distance.

We may view, say, a Ford automobile as an example of American cultural goods; and similarly the patterns and blueprints of the automobile—that is, the ideas and capacities of which the automobile is the physical embodiment. Even without the actual auto, the crystallized ideas themselves for the manufacture of the auto are cultural goods. Similarly with an actual medicine, as well as the formula of its manufacture and the knowledge of its use. In short, formulae, ideas, knowledge and skills are tools and, in so

far as they are peculiar to a given nation, may be reckoned among that nation's cultural goods.

But if a formula is a tool or a cultural good, then all the formulae for solving social or national conflicts of any sort fall into the class of tools and cultural goods, and possess a positive or negative value depending upon their capacities to save energy in the attainment of objectives. In other words, social formulae, or social advice, are comparable to medicinal formulae and to medical advice. And by the same token the person who prescribes social-economic cures and agitates for their acceptance can lay himself open to the charge of quackery and charlatanism if not to intellectual dishonesty and subterfuge just as well as the doctor. Furthermore he can be just as guilty of national sabotage as the person who dynamites an arsenal, and far more dangerous. Thus the American social-economic system can be severely damaged by deleterious social-economic formulae relating to its internal or foreign affairs. No matter how many professors or university presidents can be enlisted in support of a given formula, the formula remains sound or unsound depending upon its intrinsic merits and not upon its religio-Brahministic facade or the number of names on a petition.

The man in strategic political, academic or commercial position of influence should therefore be particularly careful that he does not use merely the prestige of his position to state and advance a social cause without the necessary fact-finding and reasoned logic which one has the right to assume will precede any such statement of social cause. For after all, to pretend to a knowledge or to skills which one does not have is by definition charlatanism (or quackery); and any attempt to escape censure or defeat in argument by evading the issue is, by definition subterfuge.

It is by no means certain that today we are not suffering in America from social agitations that are largely charlatanism, and from dogmatic statements that are essentially nothing but subterfuges in spite of professional endorsement. Indeed it is quite possible that the alleged paralysis of American production-distribution, as well as the reported fear, disunity, and depressed spirits of the people result to no small extent from a feeling of the presence of disloyalty, of charlatanism and of subterfuge among those who hold positions of trust and who control the instruments of influence and of persuasion. The author often wonders if the academic profession in America must taste of the concentration camp before its leaders learn that the radio-microphone and the newspaper reporter are powerful social-economic tools which are of great social-economic value if used by the expert, but of correspondingly great danger in the hands of the social-economic charlatan, even though that charlatan wears an academic gown and a cap with a gold tassel. The author may return to this topic with copious illustrative material in future publications, should he see fit.

However let us now inspect the question of national homogeneous culture from another angle.

6. EXCESSIVE NATIONALISM IN CULTURE, AND THE TENDENCY TOWARDS INTERNATIONAL LEVELLING; THE CASE OF GERMANY AND EUROPE.

Thus far we have tried to suggest the nature of the possible forces of nationalism that make for a national culture as opposed to a local culture. By way of recapitulation, we remember that we noted in our first four chapters that what we are in the habit of calling a "nation" may indeed represent a bio-social entity when viewed as an organized complex of production. In Chapter Five we saw

that the distribution of consumable goods tended to be orderly within a national entity. Furthermore the production of consumable goods as well as their distribution seem to be subject in the long run to the proposition: "in union there is strength and in number there is strength"—the strength to produce, or to procure, or to prohibit. Naturally if one wants the moon as a consumable good, then the problem of organization to procure it may be fraught with difficulties. In fact, we have found no reason for supposing that a social-economic system can not die of its own mistaken judgment.

In the present chapter we have argued that the tendency towards national homogeneity—or of equilibrium—applies to what we have called cultural goods. In other words, we have argued essentially that we should find that our formula for the generalized harmonic series might apply to a nation's cultural goods of all sorts, if we could but reduce them to measurement. (Before we close we shall inspect this problem of measurement of cultural goods.) Of course cultural goods are subject to local modifications; we know that the cultural goods of the farmer are different from those of the sea-farer. Nevertheless, because of the economies of mass-production and of the activities of the elite, there are forces that make for a national component in cultural goods that strike one's notice the moment one crosses the average international frontier (even to some extent the American-Canadian frontier.)

However the extent of the national homogeneity of cultural goods would seem to depend quite as much upon external forces as upon internal ones. As long as the national population is embarked upon a national project in the international field which is of great importance to all

its individuals, then the nation will become highly organized as a unit, and its culture will become highly homogeneous as the diversity of its cultural activity decreases to within the minimal limits consistent with the exigencies of the national project. But as soon as that project has been carried out, then, in the absence of another project of equal moment to the entire population, a reaction may appear in the direction of lessening the homogeneity of culture, as the individuals seek more of their liberties again.

Germany under the government of Mr. Hitler has been organized as a total whole in the sense that, during that government's life, the entire nation is said to have been ever more polarized in the direction of one set project which the people felt was intimately connected with their survival as individuals or as a group. It is reported that the individual has been sacrificed to the nation in the course of this project. During this project, all activity was said to have been governed by the need for maximum efficiency; and to this end the individuals were organized with maximum efficiency. If these reports are true, then during that period there existed what we might call a high degree of nationalism in which one should expect to find also a high degree of cultural homogeneity with a low degree of cultural diversity.

But let us now see whether this high degree of nationalism or of cultural homogeneity can persist indefinitely even after the project has been successfully completed. In short, what will happen to German nationalism if Mr. Hitler does actually win control of Europe? Much will of course depend upon what Mr. Hitler does with his control.

Let us suppose for the sake of the argument (for we make no predictions) that Mr. Hitler, if victorious, decides to exploit Europe for the sake of the German people, to

the end that German nationals will receive the great bulk of all production. In this case Mr. Hitler will encounter difficulties. For it takes time and energy not only to produce goods, but also to consume them. There is no point in producing quantities of automobiles, fine houses, beautiful roads and delicious food, drink and the like if the persons for whom they are produced are so busily occupied with organized military activity that they cannot enjoy them. As soon as only a given number of the population have the leisure time to consume the goods of production, then this given number becomes an elite, and the remaining persons who are less favored may seek to become members in that elite or else to destroy it. Personal liberty, that is, the right and capacity to do as one pleases, seems, in a way, to be one of the goods of society, a good for which man has been known to organize. Indeed in order to secure for themselves permanently a high degree of personal liberty, people have been known to sacrifice it temporarily. It would seem, then, that after years of regimentation of the individual in order to accomplish a group-good, the individuals might at last wish to share of that group-good as individuals.

It seems to the author at least that Mr. Hitler cannot avoid the implications of saturation which one sees only too clearly in our formulae. Mr. Hitler's greatest asset, in a way, was the precarious economic condition to which he objected and which dispassionate and expert statesmen in the "democracies" only too readily admitted. National hunger is a great mobilizing force for national unity. If this hunger is removed, however, the great organizing force is also removed. After all, the soldier who foregoes when there is little is likely to want to enjoy when there is

plenty. It may not be easy to regiment a nation in the midst of surpluses.

If all of Europe is brought into one great social-economic system under German domination with the German people as the elite and with all others as the pariah, then the history of this elite may well be that of the old Roman elite; the pariahs will eventually overthrow it. And in view of the high degree of intellectual and industrial capacity of some of those who would be classed as "pariahs" to Mr. Hitler's assumed elite, the overthrow might come sooner rather than later. (We repeat at this point that we have no knowledge of Mr. Hitler's intentions.)

Of course, if all of Europe is brought into one great social-economic system (i.e. a United States of Europe) under German leadership, then the ensuing political and cultural history of Europe would be interesting. In a certain sense the United States of Europe might well recapitulate some of the critical steps in the history of the United States of America whose struggles between the whole and the parts finally resulted in a bloody four-year Civil War. Of course, a recapitulation of much of our history might be avoided by a United States of Europe, if only because of the "social nature" of many present-day consumable goods which were lacking eighty years ago; we must not forget that many of our present-day consumable goods, as, for example, the automobile, tend to bring people ever more in contact with one another. As soon as Mr. Hitler were to open up arterial highways for his automobiles (whether driven by Germans or Frenchmen), then Europe would become ever more a social-economic entity of increasing cultural homogeneity, in which any subsequent imposition of custom's barriers would be resisted by all except the extreme

nationalists. For people seem to like the goods of the machine age.

Cultural, political and economic history are intimately connected, and all that we have said previously about the equilibrium of cultural goods would apply to a United States of Europe, no matter what Mr. Hitler might or might not feel about it. The cultural goods of highest economic value would eventually prevail; and insofar as the peoples agreed as to their likes and dislikes, their cultural goods and their cultural activity would agree. Thus if the Germans were to exploit all of Europe economically, they would in time weld Europe together culturally and politically if only because of the economies inherent in the mass production of standardized products. The same railroads and highways that would open up all parts of Europe for exploitation would also purvey the common culture to all parts of Europe. One need only imagine the delivery of an American mail order catalogue to every door throughout Europe in prices of a common currency in order to envisage the sudden onrush of the common cultural goods into far corners.

In this connection it would make no difference what Mr. Hitler's intentions were (and we make no assumptions about them, one way or another). If he enslaved all subject populations, he would still have to feed and clothe them, and again with a common set of standardized cultural goods. Even if Mr. Hitler in his hypothetical enslavement were to resist successfully all attempts at sabotage and passive resistance, nevertheless the "slave" of great native skill and high training would be of such great potential value that the elite might well be tempted to put him in a superior position. Again the history of the Roman empire might repeat itself as the masters became dependent upon their slaves and weakened before them.

Moreover in the common stream of cultural goods, superior products would tend to prevail in spite of their origin. For example, many of the great cultural goods of France would flow through Europe in spite of an assumed German domination. It is even conceivable that a subject national culture might be the one to conquer Europe, in the same way that Greek culture conquered Rome. However, since Europe has produced many great cultures, it would seem more likely that a new and very real European culture would emerge which, though originally eclectic and subject to vogue, would become amalgamated into a single homogeneous whole with only inconsiderable local variations. European speech through the generations would probably become a linguistic hodgepodge (not unlike the analogous pidgen-English) to be ennobled as a standard language by some great future poet. It was one of the great mistakes of the Versailles treaty that linguistic barriers were viewed as the social-economic frontiers for the future, instead of the social-economic frontiers of the past.

In sum there is no reason to suppose that a total-social-economy of Europe cannot in time emerge, and emerge for the same reason that it is in the process of emerging in the United States, even though a generation or two may pass before its emergence. And, in the opinion of the author, it may well emerge, regardless of the nature of any peace settlement, because of our assumed universal fundamental drive for economy in society, and not because anyone may or may not want a European social-economy. But let us leave Europe for a moment.

Mr. Hitler's greatest potential "threat" to the Western Hemisphere, in case of victory, is the obvious fact that Europe will have millions of mouths hungry for many of the surplus agricultural products of the western world.

They may want much if not all of the surplus coffee of Brazil, for example. And since the Brazilians want to sell this surplus, they probably will sell much of it to Europe in exchange for European goods. Hence, because of this and other instances of exchange, there may well emerge over the long term a world-culture with marked local colorings, as the international striation of world-trade seeks the routes of maximum economy.

But will Germany try to arrogate all world production for herself (i.e. try to "dominate" the world)? Let us suppose she does try to. "World-production" is a big word. If South America were to start producing as much coffee as possible there would be quite a lot of coffee to be drunk. Similarly with scores upon scores of other products. If Europe would consume all these surpluses and pay for them,—well and good; the higher the standard of living used throughout the world, the better it will be, as far as many are concerned. But in the event that these surpluses remain unconsumed, then it is doubtful that any social-economy under prudent direction will simply accumulate year in, year out, surpluses of coffee, tea and many other goods simply for the sake of hoarding them. Much may be said for the accumulation of vital industrial raw materials, of which there is no local supply. Thus, for example, if the United States had hoarded tin and various metals of the platinum group with the same acquisitiveness with which we have accumulated gold, we should now possess industrial stores of great value. The chief reason for hoarding, however, in the opinion of the author, is the feeling of insecurity that the supply may be cut off (if we overlook the "prestige-value" of having a greater amount of a given something than any other nation in the world).

The point of our present argument, however, is not the prediction of what Mr. Hitler will or will not do. For after all, there await the victors in Europe the possibility of famine, disease and above all the profoundly crushed spirits of those who mourn their dead and wounded as they face the staggering costs of warfare in a world filled with anxiety that daily takes its toll of mentally and nervously broken persons. Not only is "the world" somewhat larger than the paranoid believes, but even "Europe" is a sizeable entity. Simply to exploit Eastern and Southeastern Europe might reasonably be expected to consume many years, even with the help of the United States, should we be tempted by the prospects of this great profit.

The point we are arguing is the long range probability that national and international culture will seek an equilibrium, even as national and local cultural habits seem to seek an equilibrium. This does not mean that the gentlemen of Asia, for example, will inevitably wear the dress of the gentlemen of New York, London and Hamburg; on the contrary, the gentlemen of New York, London, and Hamburg years hence may go to their offices in the summer in kimonos and in the winter in eskimo garbs. In this connection it might be remarked that if recent world cultural history means anything, it means that the fusion of international and national culture has already advanced far.

The argument advanced in Chapter Four on international production, on international striation, and on the multiple-nuclear solution of terrain would seem to apply also to culture. The international commercial conflict which many believe has been simmering for years has also been a cultural conflict. The spread of Northern European cultural goods, with or without bayonets, has carried with

it too often the implication of a supercilious superiority, as their purveyors lounged in their exclusive club houses in foreign countries. It is not unthinkable that the peoples of vast portions of the earth have become tired of being "saved" from their inferior cultural habits, no matter how much they may be inclined to admire the ingeniousness of some of the imported goods. In a certain practical sense even the American people seem also to be showing signs of weariness at having their native cultural habits called uncouth by some of the nations of Europe, particularly as they see these same native cultural habits imitated more and more throughout the earth.

Because of this hypothetical weariness at the exotic, as well as because of a certain nervous fear of being shut off from world supplies, we may be facing a period of excessive national self-sufficiency in production and in culture; that is, excessive in the sense that the more economical tool, or pattern of tool or of behavior, may be frowned upon if it is not of native origin. Indeed this excessive nationalism in the quest of national security at all costs may lead to the founding of overseas empires to insure raw materials. In the opinion of the author, and for reasons set forth in Chapter Four, overseas imperialism, or any imperialism that is not organic-contiguous tends only to mobilize the rest of the world against it (and "the world" is a big word); any nation, including the United States or Germany, that feels tempted to indulge in this sort of commercial-cultural imperialism might take as a possible warning all that has happened since September, 1939, to the French and British Empires. The United States is a large piece of contiguous terrain; nevertheless a glance at the globe of the earth suggests that there is enough of the "world" outside of the United States to

punish seriously any American imperialistic arrogance or careless power politics no matter how sublimely we may moralize about it.

Of course we stand too close to present-day international, commercial, and cultural phenomena to appraise them accurately. Nevertheless the need for immediate decision in order to cope with immediate emergencies demands some sort of appraisal. In this connection it is perhaps well to remember that it is in general wise to separate the "disease" from the "cure" in all phenomena, or the action from the reaction. Above all one must not confuse the symptoms of an infection with the cause of the infection, even though the two may be intimately inter-related, with each one adding to the effectiveness of the other (e.g. a high fever may be the symptom of the weakening inroads of an infection and itself, by further weakening the patient, contribute to the infection which thereby increases the fever). It is a fair question to ask today whether the European war of September, 1939, should be viewed primarily as a disease or as a cure of diseased conditions, and whether Mr. Hitler is primarily a source of infection or a symptom of an infection,—a symptom that will pass as the infection of disequilibrium recedes. Here a correct diagnosis is in order, particularly if one is concerned with the problem of therapy. For in the final analysis, the value of any judgment, or of any prediction or of any suggested therapy is not better than the soundness of its basis in dynamics.

Again and again the fundamental question must be posed to all statesmen, historians, and others concerned with human activity: is human history a matter of random or a matter of law? If one answers "random," then all judgments, predictions and suggested therapies are bootless because the future will depend entirely upon the fall

of the dice. If one answers "law," then the next question is: what is the law? And until this question is answered, the man of practical experience and of sound hunches would seem to take precedence over the pure theorist. As long as man's social and individual activity, like all other activity, remains a manifestation of natural law in operation, then indeed man may propose, but the final disposition will be nature's.

Natural law seems to prevail even into the minutiae of cultural activity. To the casual observer it might appear a matter of supreme indifference whether the pleats of a woman's dress should fall to the right or to the left; yet to the tribe for whose culture these pleats have meaning, one kind of pleat may be correct and virtuous and the other kind wrong and lewd, just as the presence or absence of shoulder straps on an American bathing beach may make all the difference to the policeman between virtue and immortality.¹ Friendships can be broken, revolutions emerge, and warfare spread because of differences in cultural manifestations which, though slight, lie deeply rooted in the cultural habits of the persons or peoples concerned.

In view of the preceding discussion, it is evident (as indeed it has always been evident to every student of human society) that human social behavior is very complex. Nevertheless the author has set forth data that suggest that behind this complexity lies a drive towards an equilibrium of forces with a maximum conservation of

¹The author tenders, as a potentially classic example of the finality of social evaluation, the experience of a classmate at Harvard, who, while a member of the cross-country squad, took a wrong turn on course and soon found himself in the downtown district of Somerville. Clad only in jersey and running pants, he knew he would be respected as an athlete as long as he kept running, but that he might be arrested as indecently dressed if he simply walked. Mile after mile he kept running though utterly exhausted.

energy. This fundamental drive towards equilibrium, which we assume pervades all human activity, is the final human verity. If we care to personify it as a "doctor," we may say that in human social activity "Nature is the great doctor." The end result of wars, revolutions and conflicts of all sorts is greater equilibrium. In other words, peace and lazy contentment are the objectives of human social activity (according to the author's assumptions). Nature tries to heal cultural and commercial unbalance in order to restore equilibrium. And we might well view the storms of war and revolution as nature's means of restoring a greater equilibrium. And as with human ills, so too with social-economic ills, there is the risk of exacerbating and of spreading the infection by thwarting nature's healing processes with ill-advised therapies. Naturally it is the height of economy to abet natural process; yet often those mar most who intend most to aid.

For if we are correct in appraising the fundamental drive of society as a drive towards the equilibrium of forces, then we may doubt the wisdom of interfering with this fundamental drive without cogent reason. Taking some examples of recent American activity, we may question the wisdom of the movement which we have termed the Anti-Nazi Hate Crusade. It is quite thinkable that this movement only added to the international and intransigent confusion and helped frustrate the natural urge towards equilibrium. It seems to have contributed neither to peace nor to the preservation of the "Democracies"; nor has it curbed Mr. Hitler; indeed it may inadvertently have contributed to the very reverse. Because of its attendant economic boycott, it was essentially a vast international social-economic trust, or cartel against nations whose internal economies were already suffering from shortages of materials. If such a cartel were organized against the

United States, we too might find ourselves recapitulating much if not all of recent German internal history; in fact, as a reaction to this cartel whose activity was apparently largely centered in the United States, the other nations of the world may well unite against us in economic coercion, now that this Anti-Nazi Cartel has apparently succeeded in alienating the respect and friendship of many other nations for the United States. Furthermore the cartel may have actually helped Mr. Hitler by adding to the internal turmoil within the nations harboring the cartel. For not only did the influx of refugees disturb internal national equilibrium and give rise to friction and animosity, but the apparent attempt of the cartel to squelch criticism of its activities and to stifle resentment may only have had the effect of exacerbating the reaction while driving it temporarily under cover at a time when national unity may be imperative. No matter what slogans of "religious freedom" or of "human rights" may be used to describe any organized social-economic activity, the organized social-economic activity risks eventually arousing a countering reaction in which the once attractive slogans become terms of suspicion. Thus, for example, the word, *trust*, describes perhaps the greatest of all assets in the well-ordered society; nevertheless, because of the use of the word as a slogan by organized pressure groups, we have "anti-trust laws." The attempt of a minority, by sheer organization of the instruments of production, and of distribution and of persuasion, to impose its will upon the flow of social-economic forces in the direction of equilibrium may only cause those forces to remove the minority.

Perhaps there is no greater danger to our American government than the established but fallacious belief that "in numbers and in organization there is *truth*." We do not

doubt that in numbers and in organization there is *strength*. This strength, if oriented by a sound proposition, may be of great value to a social-economic system; but, by the same token, if unsound it may lead the whole population over a precipice. At the time of present writing there seems to be a powerful organization in the United States that is operating under the slogan of "Defend America by Aiding the Allies." The social-economic value of this movement depends upon the practical value of the proposition and not upon the strength of the organization. The naive belief that a majority of ayes is all that is necessary to establish the prudence or expediency of a given course of action has probably caused the ultimate downfall of many a potentially great nation. One would not determine the inherent mechanical soundness of a projected bridge by submitting its blueprints to a popular vote with public rallies and all the other paraphernalia of popular elections; no less so a projected course of political or economic action. In the long run the nation whose leadership has the greatest sense of social-economic forces,—whether this sense is empirically founded or only intuitive,—will have an enormous advantage over other nations in the competition of "engineering" social-economic forces. And under the term social-economic forces we mean the combined forces of the individual, of the social group, and of physical energy.

In the preceding sentence we have mentioned the forces that govern the individual as part of the forces of social-economics. In this connection we need only recall the actual effects of individual leaders upon many historical social-economies in matters of production, expansion, etc.—and the reverse. Equally important may be the effect of the individual upon culture. The king who is fond of music, or of porcelain, or of painting, or of horse-

ricing, or of innumerable other things may succeed in profoundly modifying the cultural trends of his country. Similarly the great artist, like Shakespeare, or the great ethical teacher, like Jesus.

It is evident that in appraising the individual against his social background, one can never be certain to what extent the individual is but a symptom or a spokesman of the trend of his background and of his times. In fact it is impossible to isolate completely the individual from the background of which he is a part; it is equally impossible to isolate completely the background from the individuals who stand out from it. And not only is it impossible; it is apparently also pointless. What we have in general been designating as human social-economic activity is rather to be viewed as a great international-national-individual web of shifting striation, in which it is difficult to interpose bounds of complete demarcation.

Of course in our discussion of cultural drives in the present chapter we have been dealing largely in working hypotheses under very broad headings: (1) the characteristics of social organization, (2) the effect of social organization upon cultural goods; national culture, (3) social-economic drives towards increased cultural homogeneity, (4) the concepts of "natural culture" and of "national culture," (5) "psychological nations" and nationalistic minorities, and finally (6) excessive nationalism in culture and the force of international levelling.

It is curious irony that these cultural problems which are vitally important to us today are the ones which we find great difficulty in reducing to measurement. Some, of course, feel that what we call the "cultural" component of human activity bears the same relation to the fundamental "economic" component of human activity as the frosting bears to the cake; indeed world-history of the last

few centuries shows only too clearly with what ruthless disregard for cultural values western European civilization proceeded against the cultural habits of "inferior peoples." The author, however, does not believe that the "cultural component" of human activity is merely an outer frosting. The simple statement, "a bar of soap is a bar of soap, isn't it?" may be a sign of profound insight into human realities, but it may also be a sign of profound naiveté about human realities. Indeed it is not unthinkable that one of our greatest human problems today is the resolution of the conflicts of personal vanities and of cult and local habits of behavior to which individuals and groups can cling with a stubborn tenacity. In other words, it is quite conceivable that the "psychological component" of economics (whatever that term may mean to those who use it) is no less important than the materialistic, and that the leader who understands how to organize the "psychological component" of group-activity has won more than half the battle in organizing the materialistic.

Yet nothing is gained by using the terms "psychological component," "cultural component," and the like unless one can define them, for one can be just as dogmatic about quasi-scientific polysyllables as about the more humble slogans of the cave or of the tribe. The author has not defined these terms; in fact, he doubts that there is any discrete entity called a "psychological component" or a "cultural component" or the like in even so obvious a thing as clothes. If the reader will but look at himself in a mirror, he will note the utter impossibility of segregating the exotic influences, the national influences, the social-group influences, the local influences and the individual and family influences in his dress. In the words of Alfred North Whitehead: "Sharp-cut scientific classifications are essential for scientific method, but they are dangerous for

philosophy. Such classification hides the truth that the different modes of natural existence shade off into each other.”

And yet our disquisition on cultural drives in the present chapter may have been something more than a word-picture to serve as a caveat to author and reader that many other factors belong to the laws of national forces than those of the distribution of incomes, or of the persons in communities.

Though the author will not strive to show in the present study what he thinks some of those “many other factors” may be that enter into present-day human society from the international through the national down to the individual, nevertheless he will here hazard the belief that whatever the “many other factors” may be, they all will be found to seek a condition of equilibrium with a maximum conservation of energy. By itself the utterance of this belief is meaningless; nevertheless it has not been made frivolously. For the author can and shall at least state his complete and private working hypothesis, on the basis of which he has uttered the above belief. Though the present statement of the author’s complete working hypothesis does not by itself add to the credibility of any of the author’s previous statements which only rigorously scientific inquiry can support, nevertheless it will suffice to show the background of which the present empiric findings are but a small part.

7. THE AUTHOR’S WORKING HYPOTHESIS ON NATURAL, OR ORGANIC BALANCE: THE GENERALIZED HARMONIC SERIES WITH p TAKING ON VALUES FROM NEGATIVE TO POSITIVE INFINITY.

During our entire investigation we have scrupulously reminded the reader that we have advanced no theoretical

proofs of the inevitability of our formulae. Our very emphasis on the lack of theoretical proof has served to indicate the great value which we attach to such proof. Nevertheless the author does not mean to imply that from the absence of theoretical proof in the present study, he concludes that theoretical proof is impossible. On the contrary, he merely implies that as far as he is concerned theoretical proof from the present kinds of data is impossible. In his belief the theoretical proof will be more easily delivered from other sets of analogous data.

The fact that we have found empirically so clear-cut an approximation to our generalized harmonic series, and particularly to our harmonic series proper, has wide implications. The author believes that human beings do not have a special set of natural laws for themselves, but rather that they but represent a special set of conditions under which natural law operates. Hence he suspects that the laws that govern human activity will also be found to govern other non-human activity. Though the conditions of the human social-economic system and those of the anthill may be vastly different, nevertheless the laws which operate in both are the same, according to the author's assumption.

By the same token he believes that the laws of the social complex and of the individual component may be the same, and hence that the laws governing, say, the nation may be the same as those governing the individual. Indeed, as far as the author is concerned, the individual person may be viewed as a social-economic system quite as appropriately as the nation, for the individual too is engaged in moving masses of materials over distances through sets of conditions (and similarly with a tree or a fish or a bird).

However if the individual person does in fact behave according to the laws that govern the state, then we should

expect to be able to disclose the laws of the state by studying the behavior of the individual. Thus, for example, if the equation of the generalized harmonic series is in fact a law of what we call national organization, then we might well expect to find the harmonic series in human behavior

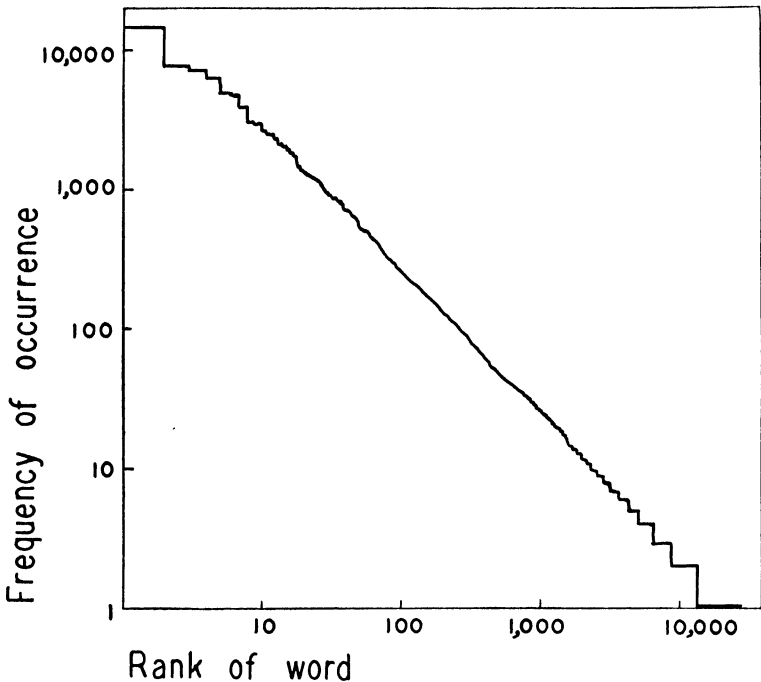


FIGURE XXXII. WORD-DISTRIBUTION IN JAMES JOYCE'S ULYSSES
(HANLEY'S INDEX).

(and *pari passu* and *mutatis mutandis* the generalized harmonic series). For this "law of the generalized harmonic series," if true, is a law of the economical organization of energy in moving masses of materials in three-dimensional space by living process regardless of who or what the living process is that moves them.

The question then arises: can we find our harmonic

series elsewhere? And the answer is given in Figure Thirty-two where we see that the distribution of the words in James Joyce's *Ulysses* (Hanley's Index) when ranked in the decreasing order of frequency of occurrence approximates the now familiar harmonic series with striking closeness.

As strange as it may seem to the reader, human speech-behavior apparently offers an excellent analogy to what we might call national social-economics, and it is by no means certain that the student of the problems of value, meaning, organization, and competition in the world of economics would be ill-advised to scrutinize the nature of these problems in the linguistic analogue, no matter how absurd it may seem to him at the time. It is of course not the author's present purpose to explain the word-distribution of Figure-Thirty-two which has been discussed in the author's previous publications (cf. *The Psycho-Biology of Language*, Boston, 2nd ed. 1939; also the *Psychological Record*, II (1938) 347-367). Rather is it our purpose to point out that the harmonic series is apparently quite a respectable series in human organization. In a future publication, the author will present some instances of word-distributions where he has found that the value of p lies between 0 and 1.

Yet how could we build a bridge of logic from the harmonic series for communities in Figure One of Chapter One to the harmonic series of Figure Thirty-two, not to mention the close approximation to the harmonic series in the distribution of incomes in the United States in 1929? The only factor which these distributions have in common,—and it is not a trivial, common factor,—is that all reflect the effect of a human organization of something.

But let us proceed a step further. The chemists tell us that, despite variations in structure and despite the great

complexity of organization, protein molecules all contain carbon, oxygen and nitrogen in the amounts of about 51%, 25% and 16%; to this the author observes that these percentage amounts are also about the following: 1, $\frac{1}{2}$, $\frac{1}{3}$. In other words, in the material called protein which is of such paramount value in the elaboration of living process, the author observes an approximation to a harmonic series. (The author reserves this observation for his own future treatment.)

Are we perhaps not now coming to real grips with our problem as we ask: what is this harmonic series? Why should nature be so infatuated with this harmonic series (if nature is?) The author for his part believes that the series is implicit in the organization of space in a particular way. That is, if one were to organize the completely economical workshop for the artisan, one would find the harmonic series as an inevitable consequence of the organization of the use of tools in space. And it is here with the model-workshop that the author hopes to deliver his theoretical proof of the inevitability of his series. (He reserves this topic for his own future treatment). Should he succeed with this theoretical proof, he would suspect not only that the cell was trying to be a most economical "workshop," but that all living organization of all kinds tried to be a most economical "workshop." But again we remind the reader that this is but the author's private working hypothesis which he reserves exclusively for himself, and only advances now in outline to suggest the background against which his studies of national laws and of linguistic laws have been made. (cp. G. K. Zipf, "On the Economical Arrangement of Tools; the Harmonic Series and the Properties of Space," *The Psychological Record*, IV [1940], 147f. In this article, p. 159, is offered a working hypothesis for p , for values from negative to positive

infinity,—the values from negative infinity to 0 being the physical phase of organization whereas the values from 1 to positive infinity are for the mental phase).

And so, to repeat, in speaking of cultural drives in what we might call the bio-social entity of a “nation” as well as in speaking of production and of distribution, and of pressure groups of all kinds, we may have been laying the groundwork for what may in time be *proved* to be the case. Naturally the author believes, perhaps mistakenly, that final proofs will in time be delivered; indeed such a quickening belief, no matter how mistaken, seems prerequisite to the endless but fascinating empiric research which any hypothesis entails. Should these proofs be forthcoming, then perhaps we can live with the reassurance that the end of life is the living thereof, and that all in the last analysis is balanced and just and harmonious, even though at times we cannot understand the inscrutable Hand that does the final balancing.

But this is a very mystical note for an essentially empiric study. It is but a vista of what may be the long trek ahead of empiric science in which all roads of specialized science will eventually converge into one. In the present study we have but taken a very small step in that trek. Let us very briefly summarize what that step was intended to show.

8. SUMMARY: THE NATION AS A BIO-SOCIAL ORGANISM IN THE PROCESS OF EVOLUTION.

In the present study we have shown that some essential aspects of the organization of human social activity are matters of rigorous law that can be described with high mathematical precision by comparatively simple formulae, from the inductive viewpoint.

Perhaps the most important implication of our formulae

is that what we call a nation (e.g. the United States of America) is in fact a bio-social entity quite as much as a colony of bees or of ants or of termites. Furthermore it seems evident from the nature of our findings that national entities may well have priority over international groupings of nations, even though an international federation of national entities is not only not impossible but indeed highly likely in the course of human social evolution.

A further implication of our formulae is the obvious close relationship between a nation's organization and the physical geography of its terrain. We have cited the case of the United States which grew from many different parts into a homogeneous whole. Indeed we have noted how much of our own Civil War and post Civil War development was but the orderly operation of the empiric laws which we have been at pains to disclose. Furthermore we have cited the case of Germany with her struggle for "living space" (Lebensraum) and again noted the precision with which our empiric laws have operated in respect both to her internal organization and to her territorial expansion. And by the same token we have seen the inherent weaknesses of the overseas empires, like those of England and France, and of the extreme precariousness of any "balance of power" which apparently runs counter to what we may call the natural laws of national and international balance.

Our formulae have suggested interesting implications about the existence of a saturation point of national growth. We saw the possibility that our national depression of the 1930's might very well be intimately connected with the attainment of a condition of saturation of national organization in 1929; with the attainment of saturation appears the possibility of the emergence of sectional fissures in the United States for which, in fact, evidence is

not lacking. By implication, the existence of a saturation point in national growth would seem to preclude the likelihood of "word domination" by any nation, no matter how well organized its attempt. For it seems that the more a prospective "world-dominator" progresses with his economic, military, or propaganda organizations, the more he is likely to mobilize an increasingly strong opposition. Our assumed laws of equilibrium play no favorites; they may turn—internally and externally—and cast down the very person whose advance, for the time being, they had abetted. Our findings do not contradict the ancient warnings against pride, arrogance, and madness in office in any country.

In addition we have seen that the distribution of consumable goods to the population is a matter of fairly rigorous law whose nature we have attempted to disclose empirically. In the light of this law, we have noted the meaning of the terms "elite," "pressure group," and of the more serious terms of "revolution" and "civil war." And we have observed reasons for suspecting that the United States is at present in a pre-revolutionary condition,—indeed that the internal conditions in the United States in general may well be viewed as grave; many of the internal problems of other nations are apparently not absent here.

We have attempted to show from a qualitative discussion of the whole problem of the specialization of labor and of materials in industrial production that our observed laws may well be the result of the conservation of energy in the handling of materials. And we have tried to suggest the possible influence of these laws upon the most intimate minutiae of cultural and individual behavior.

In brief and in sum we have found reasons for suspecting that what we call a nation is essentially a very sensitively balanced bio-social organism which is today in the process of rapid evolution. We have seen why a nation tends on the one hand to borrow from alien cultures and

on the other hand to repel or neutralize or to amalgamate alien cultures within it. We have noted the possible economic and cultural causes of internal economic and racial conflict. Though our laws show why class and religious hatred, revolution, civil strife and even international war will arise as these laws operate, nevertheless these laws show why these conflicts will also in time subside, and that a more peaceful contented equilibrium is in fact the goal of these laws in operation. Indeed the turmoil of war and strife are perhaps to be viewed primarily as the correctives and the "cures" of maladjustments, rather than as their causes, even though the reverse may appear superficially to be the case today, because of the stupendous international dislocations and class disturbances that have perhaps been caused by the rapid onrush of the Industrial Revolution in recent decades.

As a single statement of our findings we might say: "In union there is strength, and in numbers there is strength; hence strength for the attainment of an objective lies in the organization of numbers."

In setting forth our findings and our deductions from the above, we have not hesitated to show the value of a knowledge of social-economic law in minimizing conflict. If we have assiduously refrained from espousing a cause or from urging a program upon the reader, that is because we are but offering our findings, for whatever they may be worth, to the constructive statesmanship of others.

If the laws which we have disclosed are wrong, they should be ignored. But if they are essentially correct, they will operate without the author's coaxing. Should they be essentially right and of service to constructive statesmanship, then,—who can tell?—perhaps in the future we may learn more from history than the admitted fact that we have to date learned little from history.

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