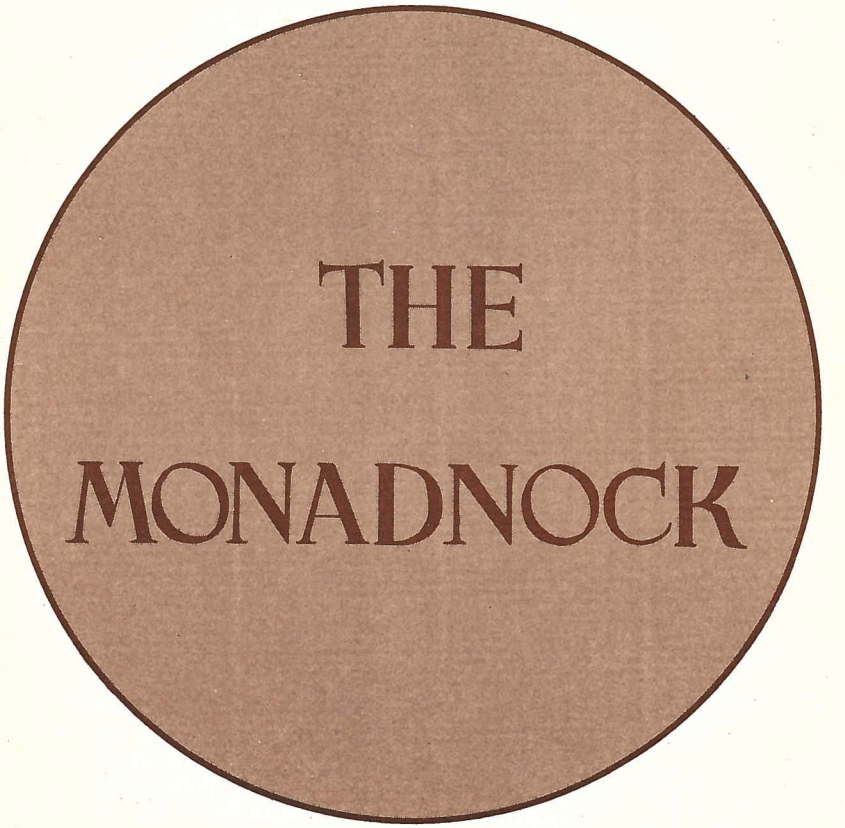
CLARK UNIVERSITY
GEOGRAPHICAL SOCIETY



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THE MONADNOCK

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EDITORS' NOTE

The Spring season is upon us again affecting the geography community deeply. It is a time for summing up, for evaluating the meaning of our efforts. The year has been a good and productive one. The Fall and Winter had moments of tension as twelve students took their preliminary doctoral examinations. The Spring semester has been equally tense for some, waiting at mail boxes for job offers and for news of dissertation funding. For those beginning the graduate experience the year ended with a good start.

It is a very difficult task to document in the Monadnock all the events that occurred in the school this year and to speculate on their meaning to the individuals affected by them or to the geography community as a group. Often, small, spontaneous events become profoundly significant, while larger more formal activities lose their relevance. More important, and yet even more difficult to convey is the spirit of the department. The school provides an unique environment free of rigid structures which results in individuality and intense creativity.

Behind the searchings and occasional frustrations of a graduate education there is also discovery and the development of close friendships. For the editors it has been an especially exciting period, and while we have had to spend some time of our first year of marriage apart, the time spent with each other has been a good supportive one, working, growing and laughing together.

As always the Monadnock tries to represent the interests of graduate students at Clark. Of particular note this year is the inclusion of the annual Atwood Lecture given by Professor Torsten Hägerstrand from Lund University, Sweden. The Lecture was sponsored by the School of Geography and introduced by Dr. Anne Buttimer. The growing ties with Lund and the increasing influence of Dr. Hägerstrand are evidenced by a number of articles in this volume: Paul Oberg's article on time-space, Mick Godkin's note from Lund where he is studying problems of environmental stress, and Jacob van der Vaarts' translation of Grano's Pure Geography.

Also of note is the importance of research in graduate education at Clark. Consequently, this issue describes a number of projects in which graduate students actively participated.

The editors would like to express their thanks to those individuals who contributed to the making of this issue. Special thanks to Ruth Rowles for the cartographic help, Jacob van der Vaart for the group photograph, and to the Secretarial Pool of Clark University for the typing.

David Pijawka
Judith Dworkin

DIRECTOR'S MESSAGE

Ten years have gone by since I came to Clark. In many ways, each year has been a very different and unique one. Much of this uniqueness was a function of the process called development: new faculty, new student constituenties, new programs, new facilities and new equipment. For me, this past year was perhaps the first year in which very little of the exceptional took place. This does not mean that new figures did not appear on the scene or that new courses, programs and students did not make their contribution. What it does mean is that I perceived the School as having reached a new peak of development and maturity. Newcomers are now more readily absorbed into the normal range of activities. Thus, for example, there was a complete change in our cartographic teaching, research and technical operations. The level of excellence which Karl Chang has established in his role of Assistant Professor of Geography and Cartography, and the skills which Ruth Rowles has brought to her work as Director of the Laboratory and Research Cartographer, have made this aspect of our work a more vital enterprise than ever. But we take this change more or less for granted, because it emerged from the unusually solid base that George McCleary had developed. We have also been fortunate in adding a professional map librarian this year, in the person of William McCall. For several years, the map library was organized under the direction of Polly Carew who has retired. The imagination and professional expertise which Bill brings to this post promises that the map library will become a significant part of teaching and research at the School. Again, as important a change as this is, we more or less accept it as normal because of the base out of which it has developed.

Faculty went on leave (Roger Kasperson to the Mediterranean during the second semester; Gerald Karaska to California during the Third Module; Sister Annette to Sweden during the Third Module). Others found much of their time diverted to general administrative activities (Len Berry as Acting Director of Academic Programs and, next year, as Dean of the Graduate School). Their absence as individuals was sorely missed, but we seem to have reached the stage where everyone of us is replaceable, at least on a short-term basis, and the life of the School continues without interruption. I suppose this is what is meant by maturity. We did have important visiting lecturers: Pierce F. Lewis from Pennsylvanis State University, Torsten Hägerstrand from the University of Lund, David Harvey of Johns Hopkins University, Shimon Shamir from the Tel Aviv University, Anne Kirkby from the University College in London, and Alexandar M. Ryabchikov from Moscow State University. These visitors helped to maintain our open system and to refresh us with new ideas.

Probably the most difficult challenge and one that was met successfully this year was to find academic support for our graduate student body. We started the year with a good deal of doubt as to available support levels. As the academic year rolled on, we succeeded beyond our expectations in finding either full or close-to-full support for nearly all of our 42 students in residence. I wish I could predict this same state of affairs for next year. It is now April. We have admitted our students for next year; they are on paper, as high quality a body as are those who entered this year, and, indeed, as those who we have had for the last six years. Our current support levels, however, are only about 60% of what they were last year. While internal university sources of support have been maintained, it is doubtful whether external support, research, and

training functions will be brought to last year's level. Our struggle to maintain graduate work in geography is one which all geography departments face and, indeed, all universities. Nevertheless, the particular financial problems that Clark faces places an unusual strain upon us and special responsibilities on our geography faculty to continue to search for sponsored research projects that not only meet their own interests but also help support the student body. I don't wish to end this on a gloomy note. In general, however, graduate students will have to adjust to the fact that society will be less willing to support them in the next ten years, at least through federal grants, than it has in the past decade. On the other hand, we are not prepared simply to swim with the tide. We will continue our efforts to help the best students that we can attract to Clark to find the means to come to us and to pursue their graduate training in an atmosphere of security and dignity. In this quest, we sorely need the continuing support of our alumni and friends.

Saul B. Cohen

ATWOOD LECTURE: PROFESSOR TORSTEN HÄGERSTRAND

By Sister Anne Buttimer

Introduction

This evening marks the highpoint in a week which will be memorable in the annals of Clark University. If Wallace Atwood were with us here, it would surely be for him a dream fulfilled to welcome among us one of the world's most famous living geographers. It is a happy occasion for Worcester, a city so proud of its Swedish citizens; a happy occasion too for Clark, host to many famous geographers.

To any geographer, in any part of the world today, the name Hägerstrand evokes a uniquely impressive image. Here is our innovator whose ideas have diffused and resounded wherever the discipline is taught and practiced; the pioneering architect of theory, and ingenious author of regional plans. Hägerstrand is a name which holds an esteemed place on the rosters of many national and international scientific organizations. In Sweden, his expertise and energies have been directed through a variety of Royal Commissions ranging from physical planning, regional research, the reorganization of local governmental areas, to planning for the future. Internationally, he has served as consultant on problems of urbanization, population, and transport planning. He was President of the Regional Science Association in 1969, and is currently Vice-President of the International Geographical Union. Throughout Europe and America, his disciples can be found in all kinds of administrative and planning offices, and his ideas have profoundly influenced the political and economic life of Western Europe and Scandinavia.

It is rare that world-renowned "prophets" can also find appreciative audience within their own countries. This is not the case with Professor Hägerstrand. His collection of awards and honorary degrees reveals the recognition he has won from sources as diverse as the Swedish Crown, farmer's organizations and many local civic and scholarly associations. In 1966 he was awarded the Charles B. Daly Medal from the American Geographical Society, and in 1968, the outstanding Achievement Award by the Association of American Geographers. He received the Vitus Bering Medal of the Royal Danish Geographical Society in 1970, and I had the privilege of being his guest in 1973 when the King of Sweden presented him with the Anders Retzius Medal of the Swedish Society for Anthropology and Geography.

Yet fame rests gently on Torsten Hägerstrand. It has neither truncated his vision nor diminished his energies. At each juncture of his intellectual life he has paused to critically examine his work, to reflect on its limitations and possibilities. This kind of courageous self-criticism does not necessarily mean a debunking of the past, or a rejection of views contrary to his own; rather it is a patient and careful refinement, a distillation, a winnowing of the grain from the chaff.

Few of us have had the opportunity to transcend the barriers of distance and language to discover this person as he continues to grow and to become. Last year, this privilege was mine. And my short sojourn with him and his colleagues renewed my hope in a vocation to academic life. I began to realize how prematurely we, in the Anglo-American world, had

classified him and the Lund school with their first major accomplishments -- our so-called "Quantitative revolution" in geography. Torsten's presence among us this week at Clark should serve to modify this narrow preconceived image; we are honored with the presence of a scholar still growing, one whose courage and openness should not fail to encourage us also to grow, to be self-critical, yet self-confident, in opening our minds to the emerging horizons of today.

For this, I suppose, is the essential message of any charismatic scholar. The oft-cited tensions between humanist and scientist, between theoretician and planner, between scholar and person, all appear absurd when you encounter a man like this. His dedication to science and complex mathematical procedures does not lessen his love of Bach, of classical art, folklore, or bicycle rides through the Swedish countryside. It is probably this rare fusion of personal qualities which is responsible for the fresh perspectives he brings to history, and the brilliance of his prognoses about the future. For the contemporary social scientist he challenges us all to recognize the uniqueness of human individuals, and the constraints which may face human choice in the world of tomorrow. And so, his latest efforts have been to capture the dynamics of individual behavior as "an unbroken sequence of actions" in space-time. "Survival and Arena" will elucidate this perspective, and will raise many questions in our minds about our history and our future.

SURVIVAL AND ARENA

On the life-history of individuals in relation to their geographical environment

Torsten Hägerstrand

Survival and Arena is a combination of concepts which perhaps sounds a bit dramatic. That is the intention, since what I am going to discuss are serious and fundamental elements in our existence as it is conditioned by human nature, culture, history and place: birth, family-formation and death, access to home and livelihood, engagement in social cooperation and conflict. Each of these elements is of course a longstanding topic for research in a great number of various disciplines. But my outlook as a geographer leaves me dissatisfied with a disjointed approach. I am compelled to try to deal with them all for the same area at the same time in a contextual perspective and with a synthesis in view. The final aim would be -- to put it boldly -- to try to turn human geography into a study of the conditions of life in a regional setting.

I believe that time is ripe for this kind of effort. There are in fact many signs showing that specialized disciplines, consciously or not, are beginning to ask questions which only a regional geography of the kind I have in mind could illuminate. Biologists with a concern for the ecological development is a case in point. Similarly, at least some engineers are wondering what place their efforts should have in the future service of society in the rich as well as the poor world. Recently I listened to a review of a piece of medical research of great interest in this connection.[1] The analysts had followed by interviews and medical examinations -- also post mortem -- the health history of a large sample of men born in 1913 in a chosen city. Two observations came out strongly. The first was that health and even length of life was related to external living conditions. Low income, unsafe employment, inadequate housing went along with bad health and early death. The second observation was that life style had a strong co-variation with health and length of life. Of course, one can always argue about cause and effect. But more importantly for the student of society is to note a further implicit conclusion. Medical treatment of the already sick person has almost reached its full potential now for scientific as well as economic reasons in a country of Sweden's structure and health care system. If we take health and a full life-time as quality indicators then the major part of further improvements must predominantly come through changes in living conditions and life styles.

Thus, presently an exhortation seems to come from many sides, political as well as scientific, to deepen the understanding of the human world in distributional terms. This problem fits well in the geographic tradition. We are accustomed to dealing with the distribution of phenomena in space. It is a short and logically following step to ask questions about how states and events are distributed between the members or the subgroups of a population in a community. Already a growing number of geographical studies deal with this. Next comes a still further distributional dimension. I am thinking of the kinds of individual life biographies which are taking shape over time within the fields of prevailing distributional forces.

The set of individual biographies of a population in an area is perhaps the most apparent entity which connects the past with the future. It should also be able to provide a yardstick by which we could compare the performance of various structural settings, and perhaps, also evaluate utopias as well as less spectacular political goals. In the term biography I include both the outcome of everyday life and the total life curriculum which unfolds over days and years. This dimension, although the most essential in human terms, has still to be put in place in our picture of the world.

A life biography, seen in its entirety, is made up of both internal mental experiences and events -- more easily observable by the outsider -- related to the interplay between body and environmental phenomena. We must assume that inner experiences and outer events are joined in many intricate ways. The most indisputable connection lies in the sequential correspondence between what happens in the two realms. We have to do with a continuous dialogue between person and environment in a clear sequential order. The major task of a biographical approach would be to look into the nature of this dialogue as it takes place in its ecological context.

It should be clear from what I said before and have published elsewhere[2] that my personal concern so far is the external part of the total problem area. This choice does not entail a dismissal of the psychological dimension. It is only a natural outcome of earlier research. And the efforts are accompanied by a hope that other workers will line up for cooperation on the other side in order to restore the balance.

It is my belief that the introduction of a biographical perspective where human populations are concerned will have beneficial effects over the whole range of geographic inquiry, because it will force us to reconsider many conventional ideas and in particular help us to deal with space and time as a unified entity better than we have been able to do so far. We need a geography today which helps us to see ourselves, our fellow-passengers and our total environment in a more coherent way than we are presently capable of doing. To me the answer seems to lie in the study of the interwoven distribution of states and events in coherent blocks of space-time -- in other worlds in a regional synthesis with a time-depth.

My purpose today is only to indicate the conceptual direction of the approach I have in mind. I am not trying to make an abstract and systematic review of the matter. The comments will be related to historical data from a small region of Sweden.[3] So far the empirical work in the area is not as exhaustive as one would like to have for the purposes at hand. Therefore, what I have to offer now must remain both conceptually and empirically just a minor sketch over a territory to be more fully explored later on.

Life requires that the individual successively and without interruption associates himself with sets of entities emerging from his surrounding. Some elements are actively sought, others cannot be avoided. These entities could be classified in a number of ways. Presently four major classes are sufficient for helping us forward. These are:

(1) other individuals,
(2) indivisible objects (such as other living organisms, machines and tools),
(3) divisible materials (such as air, water, minerals, foodstuff) and
(4) domains.

(It is assumed that the two fundamentals, energy and information, are special aspects which cut through the items of the fourfold classification.) The concept of a domain as used here needs to be expounded more than the others. It refers to a specific kind of social construct brought into being in order to secure a certain amount of order and predictability in human affairs. The concept first of all refers to the intricate lattice of earthbound spatial units in which specified individuals or groups have socially recognized rights to exert control. In this sense the domain appears in all scales from informal divisions inside a home, over workrooms, real estate units and municipal territories up to states and confederations. The units are all geographic in a traditional sense -- although curiously enough only partly recognized as proper objects of research. But secondly the concept stands for "position" ("office") that is to say for a derived "space" which by contrast gives its holder certain rights as well as duties. This kind of domain has sometimes, but by no means always, a fixed location. Even if not it shares many characteristics with the terrestrial domain, do so, for example, rules of entrance limit access. Likewise, in a given area only a limited number is present simultaneously.

Now, consider that a complete record is kept for each individual person as his life is proceeding, enumerating in sequence of occurrence the sets of surrounding entities of the four kinds with which he is associated. Clearly, the record-keeper must apply certain rules for defining association in a consistent way. The rules should cover variations from physical contact to legal right. The record describes the steps of a path or trajectory between points of "contact" with surrounding elements. People will appear in each others sets. Similarly, for example, tools and domains will now be elements in a set around one person and now around another. To a very large extent these couplings are not possible simultaneously but only by turns.

It is now close at hand to interpret all records taken together as describing a closely knit web of trajectories. This kind of understanding gives prominence to the sequential relations of events across the whole population (the time-dimension if you like). The prominence of domains in the channeling of trajectories makes us see space, first and foremost, as a provider of room (and only secondarily as a maker of distances).

As soon as this picture of the world is reasonably clear in one's mind it is easy to see that there are various levels of detail at which one can try to find the determinants that give shape to the pattern of the web as it grows towards the future "at the edge of history." To begin with we have a close contact level. Here we try to understand how elements come to hang together or depart with respect to their most immediate relations. In this respect there is little difference between the chemist's interest in the nature of chemical bonds and the economist's interest in the transaction between buyer and seller. In other words we focus attention on the natural principles or the social rules and regulations at work once the set of elements is at hand. This level of analysis or operation is the research area of numerous sciences and technologies. And the results when applied are moreover the source of much of the particular kinds

of stupidity which from a human point of view are current in the technological society of today. What is missing is the ability -- or willingness -- to see the micro-processes with respect to their conditions and consequences when put in place in the wider situation.

It should not be denied that for example political economy and macro-sociology try to deal with the second society-wide or area-wide level. But they tend to do it in ways as if the step between the two levels was a matter of simple multiplication. The world-picture disregards the many environmental realities which lie between elementary regularities and gross outcome. The web-model suggested here is believed to be able to cast light on just this little understood, in between area. When we broaden the view over a wider field of trajectories we begin to see that all of the specific events of local interaction must take place under the influence of certain fundamental limiting conditions. The access to elements at the formation of sets comes out as an intricate budgeting process. At every next step in the process options are limited because of constraints which operate both simultaneously (as if over space) and sequentially (as if over time). Events and states become place- and time-specific in ways which are beyond the grasp of those sciences which assume away the importance of geography and history.

As an illustration of the interplay between the formation of life-biographies and limited options as they come out in a space-time perspective I am now going to use observations from a small nineteenth century rural community. Attention is concentrated on how the members of the population join and depart from domains, seen both as terrestrial units (farms, crofts, shops, etc.) and as functional livelihood positions inside these. Concomitantly we get an impression of the formation and dissolution of families. This particular selection of elements leaves out the major part of formation of sets for social interaction as well as for production and consumption. Neighbors are not considered nor are tools and materials. We have only to remember that the omitted elements belong to the full picture and that they make their influence felt implicitly. The selection made in my illustrations is partly an outcome of what the sources have to tell in full, partly due to a conviction that family, economic unit and livelihood position are in many ways steering elements in the lives of people.

I will try to demonstrate first the general nature of the relation between a population and the structure of domains in its environment. My example is taken from one single farm seen over a hundred years -- from 1840 to 1940.[4] At the end of the period the unit was made up of 40 acres of arable land, 50 acres of pastures and meadows and 140 acres of wood-land. The total area did not change over the century, a smaller increase of arable land took place at the expense of meadow land. The relative value of the wood land increased considerably.

On the graph (fig. 1) each individual person connected with the farm during the period has been given his own time-channel. It is then indicated over which period he or she existed on the farm. If a person who has moved out returns later on he will resume his private channel again. Most individuals move in from the outside, some are born into the farm. Likewise most move out again but some die on the farm. In all, about two hundred different individuals have moved through. The number living on the farm simultaneously has varied around ten to twelve, the major deviations

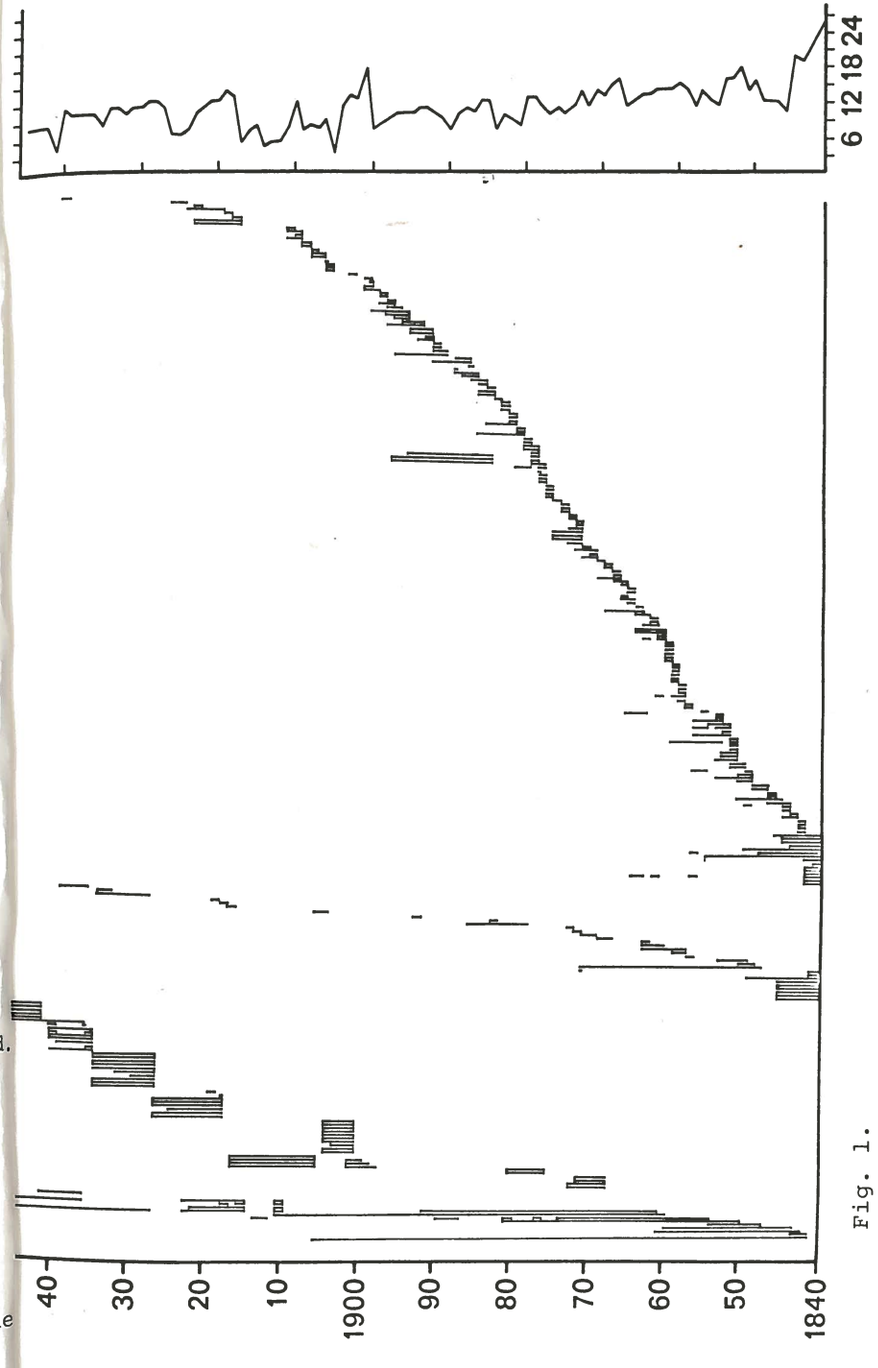


Fig. 1.
A population's association with a farm from 1840 to 1945. Every vertical channel represents the life-line of an individual who has lived on the farm for a shorter or longer period. Bars mark time of stay. In all around 200 different individuals moved through. The scale did not permit the rendering of information on sex, births, deaths and movements in and out. Cluster A represents owners, B tenants, C lodging persons and D farmhands and maids, in all cases with families included. The graph to the right gives the number of individuals registered simultaneously on the farm.

due to variations in the number of children. There might also be some errors in the yearly sums because of delays in the registration of migrations.

The channels and thus the partial life-lines have been grouped according to the functional positions of the adults. This means that wifes are placed beside husbands and children grouped with parents. Inside functional groups individuals are placed in order of entrance.

The first cluster to the left represents the freeholder and his (her) dependent family members. In general these people have remained on the farm over longer periods of time than others, sometimes an entire life.

The second cluster represents tenants with families, that is to say people who did the actual farming. (A small contradiction in the grouping should be noted. A family, located further out to the right because they were returners, actually came back in order to function as tenants.) The characteristic feature of the tenant population is the relatively short periods of stay, as a rule either five or ten years.

The third cluster reflects a peculiar social institution of the time. It is made up of persons lodging and supported on the farm, frequently elderly relatives, sometimes friends which are hard to distinguish from household aids. This kind of position was filled only occasionally.

The fourth cluster, finally, represents the progression of servants employed in farmwork, a mixture of farmhands and maids, sometimes married and with small children, more often single. They came in from the vicinity, frequently several at a time, stayed one, two or a few more years, and moved out again.

So what the graph communicates is how an economic organization, the farm with its various functional positions, cut out shorter or longer slices of life-time from the total life-time of the population of the surrounding area. Owners were the only more stable part of the population. The rest, also family members of owners, just passed through while involved in some sort of carrier. It should be easy to imagine how -- if we had access to corresponding graphs of all farms over a wider area -- the population actually formed a web in their search among the available domains. Farms did not have much to do with each other in terms of economic transactions but they formed a closely knit system in terms of population flow.

The most striking overall feature is the stability of the pattern of through-flow over time. The highly standardized parade persisted rather unchanged up to around 1920 when positions for farm-workers ceased to exist at least as whole-year tasks. If information of a similar detail had been available concerning equipment, we would in all likelihood have been able to see how machines went in as servants disappeared. The stability of pattern means that individuals and families had to make their successive choices within a rather rigid structure of options. The relatively constant organization of the farm meant that new people as a rule could come in only after others had left. The timing of stay for tenants and servants was regulated by traditional and standardized forms of contracts. Therefore, movements in and out occurred with a high degree of regularity over time.

In order to illustrate the generality of the pattern a second domain is chosen a couple of miles from the first (fig. 2). The period covered is now much shorter, 1880-1890, and the data is presented in a more aggregate form. This particular unit was made up of a central farm, occupied by the owner, plus five small crofts and tied cottages. The physical base consisted of 80 acres of arable land, 90 acres of pastures and meadows and 300 acres of woodland. The square of the graph should now be understood as a compact "spacetime" box, the vertical side representing years and the horizontal representing "roominess." This time the trajectories of people have been aggregated into groups in order to make the quantitative input-output relations more distinct.

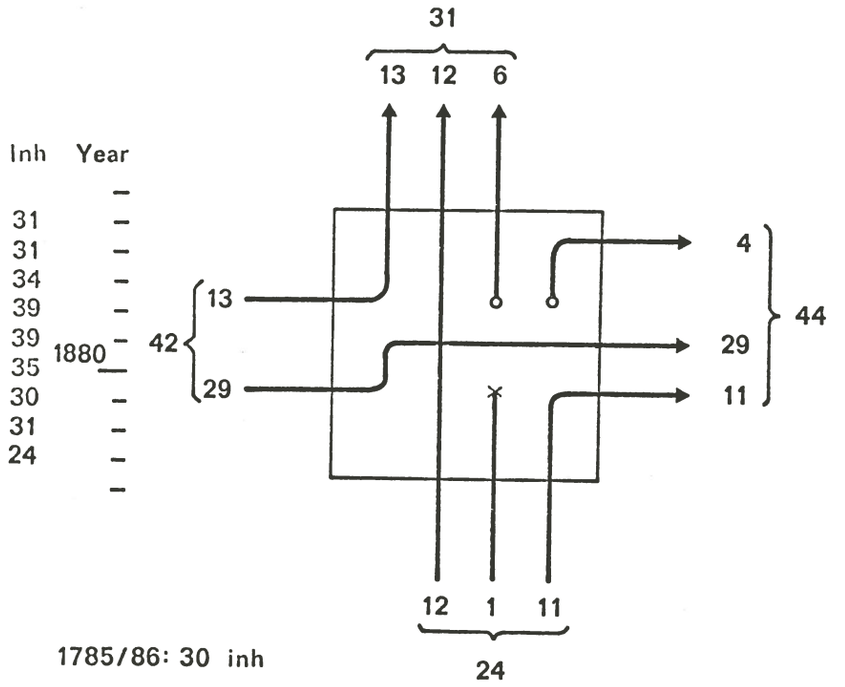


Fig. 2. The box represents a farm in "space-time" terms, observed over a decade around 1880. The vertical axis describes the length of the period of observation. The horizontal axis describes the "holding capacity" of the farm. Arrows and figures indicate in what numbers and space-time directions people have moved through the farm. Arrows coming in from below and moving out upwards account for those who lived inside the area at the start of observation, resp. remained there at the end. Arrows coming in from the left side and moving out on the right account for residential moves in to and out from the farm. Death inside the farm and period is marked by a small cross, births by small open circles. The number of inhabitants each separate year is given in the left column. 76 separate individuals lived on the farm for a shorter or longer period.

As many as 76 different individuals resided inside the chosen area some time during the period of observation. But out of these only 12 remained all the time. No less than 29 just moved through, staying one or two years. One died and 10 were born. Of these 4 moved out with parents within the period.

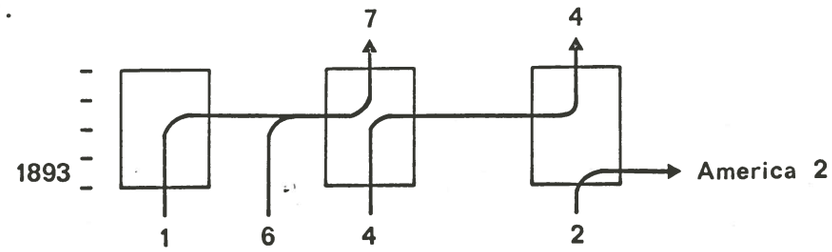
Despite this great turnover the number of people inhabiting the whole unit is also in this case remarkably stable from year to year. One hundred years earlier, in 1785, this farm had 30 inhabitants, that is around the same number. Practically no clearing of new land for new holdings took place inside the domain in the meantime. Thus it seems safe to say that the unit had a rather fixed number of positions for adults from year to year -- an expression one must assume of quite definite carrying capacity from the point of view of production. Throughout the decade we observe how different individuals came in to fill positions vacated by those who had left for something else. Only the owner with family and some older crofters made up a stable population.

Given a constant number of positions inside a territorial domain, like the two farms chosen as examples, new individuals cannot move in until vacancies arise because others move out, die or retire to the more elastic class of dependent family members. In times when the adult population grows in number above the generation of ultimate vacancies (retirements and deaths) the trajectories which cannot become accommodated have to seek destinations elsewhere. A different solution for the excess population is to refuse to accept the given structure and to try to enforce a generation of entirely new livelihood positions. This was actually what had happened up to about 1860 in our sample parish. The number of inhabitants grew from 1200 in the year 1750 to 1700 in 1860. New livelihood positions were created during this period through division of holdings and clearing of still remaining marginal land for crofts and tied cottages. The demand for land was such that rather impossible, hilly and boulder-strewn pieces of land were made into arable patches. Still the excess of births over deaths had been 1100 during the same period so only less than half of the natural growth had been accommodated.

By 1860 the period of internal colonization was coming to an end. The size of the population came to a standstill up to about 1930 when the modern depopulation began. The natural growth was now taken care of by large-scale emigration to America (more than 700 individuals left the parish) and by moves to the developing industry in Sweden. On the whole no new livelihood positions came into being in the parish during the remaining part of the nineteenth century. Rather the reversed process began to take place in that some small-holdings were abandoned and farms which had been divided earlier were consolidated again.

The process of abandonment gives some further insight into the relationship between the space-time trajectories of people and the underlying structure of options. In fig. 3 three different small-holdings, each capable of accommodating one family, are represented as space-time boxes over a four-year period. A movement out to America of a family of two in the year 1893 initiated a series of local moves during the following year. In this process a holding came to be abandoned in 1895, situated two steps and two years away from the one the emigrants had left. This example is just one case among a great number of similar ones.

Fig. 3.



The boxes represent three small one-family holdings in space-time terms. Arrows should be understood as in fig. 2, except that residential moves have been placed in the actual year when they took place. The holdings were located within a range of around eight miles.

In all its simplicity this graph has a lot to say about the difficulties in drawing conclusions concerning social processes from overt behavior. That the holding to the left became empty because somebody moved away does not say very much because moving away was a normal step to take. The interesting thing is that nobody around chose to move in to the empty position, something which up to this time had also been a normal kind of event. But suppose now that a contemporary researcher had wanted to get hold of the reasons for abandonment. To whom should he direct his inquiry? The abandonment is a non-event. An expected step did not take place and it is impossible to localize a specific decision-maker. What one can say is that the gross balance between human trajectories and positions within perceptional range began to offer more freedom of choice than had been the case earlier.

The data shown so far must be sufficient to indicate that we are viewing an economic arena made up of a rather fixed set of domains in the form of territorial units and livelihood positions inside them. In fact it would not be too difficult to enumerate the kinds and numbers of options available in the parish. More approximately stated, the main groups were free-holders, farm tenants, crofters, craftsmen, farm laborers in tied cottages, servants and dependent persons (wives, children, sick and retired). Only the number of servants and dependent persons varied to a greater extent and in a somewhat random fashion around an average.

Given this simple structure a young person did not have many building blocks inside the area for making a carrier. If this state of affairs did not satisfy him, he had to move elsewhere, but during the nineteenth century, still there were few chances of finding destinations which differed radically from that of his home-area. The exception was of course offered by the wider opportunities in America.

In order to demonstrate what kinds of life biographies took shape under the prevailing circumstances, a sample of individuals have been followed from birth and onwards as long as the population records of one single parish permit. The sample of about 500 individuals includes every child born in the parish from 1860 to 1869.

A first classification was made with respect to the social position of the parents at the birth of the child. Group I includes free-holders and farm-tenants as well as a few estate-owners and officials. Group II includes crofters and craftsmen. Group III comprise farm laborers and servants. Group IV, finally, holds unmarried mothers of all social classes.

A first set of graphs (fig. 4-10) gives the basic information concerning each individual. The vertical "life-line" marks the time spent within the parish from birth and onwards. A small cross indicates death, a short horizontal line, change of residence inside the parish or to and from Swedish destinations, and a dot, movement to (or from) America.

The life-lines are ordered in four subgroups in all graphs. The first subgroup (A) includes all individuals of the cohort who died within the confines of the parish. The second (B) marks the very small fraction of individuals who survived within the parish for at least 75 years. The third (C) represents all those who have at some time moved out permanently to other places in Sweden. The fourth subgroup (D) contains those who emigrated directly to America.

Individuals stemming from the different social groups come to be divided up in subgroups in essentially the same way. The only more striking deviation comes out for the children of unmarried women. All except one of these dissappeared very early. Infant death rate is here twice as high as for the other groups. Clearly, it must be kept in mind that the sample is too small for really significant conclusions about differences.

Already the gross resemblance between the fate of the members of all major groups shows that there existed a fundamental similarity in living conditions over the entire population of a farming community a century ago. Apart from this general observation we will need a little more precision than the graphs can give immediately in order to get hold of the differences between the social groups.

Let us first consider how members of the different groups (group IV excluded) die or leave the parish of birth at various ages (Table 1). Decade by decade we compare the added length of observed life-lines with what we could have found if everyone had survived up to 75 years of age and remained in the parish. The difference is expressed in percentages.

The decline in the amount of added life-time during the first decade is to a rather large degree caused by early deaths. On the whole infant mortality is strikingly high.[5] As time goes it turns out that the farmer's children, sons and daughters alike, remain in the parish to a somewhat larger degree than the other groups. Nevertheless between the ages of 20 and 30 already two thirds dissappear. Crofters' sons tend to leave first. The greatest differences between classes are on the whole among the males. Some differences among the females are discernible but they are not very great.

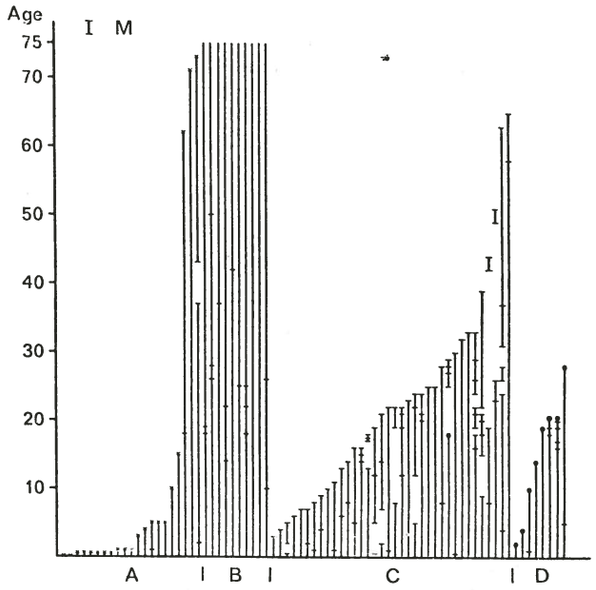
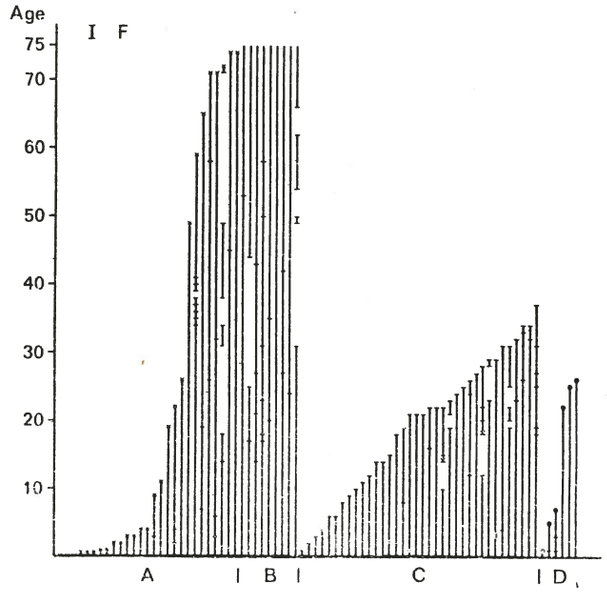
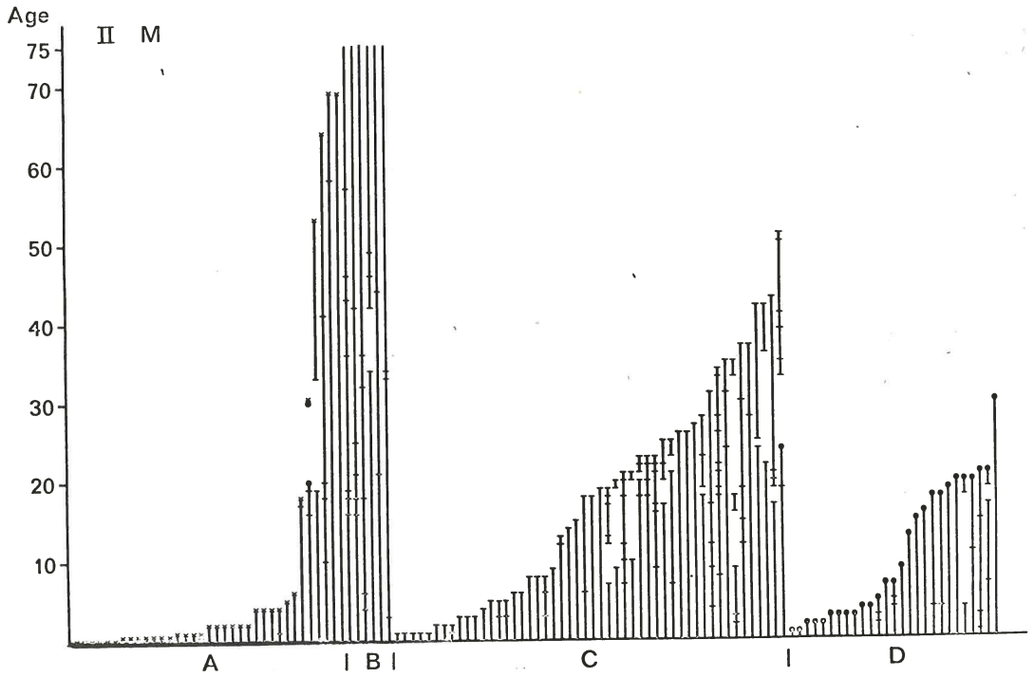


Fig. 4. Life-lines representing each male individual, born in the period 1860-1869 are descending from group I (freeholders and farm tenants). A small cross indicates age of death, a short horizontal line residential move (inside parish or Sweden) and a dot migration to or from America. Subgroup A died in the parish of birth, B survived there up to 75 years of age, C moved out definitely to Swedish destinations and D emigrated definitely to America (some may have returned to other parish in Sweden).



ig. 5. Females, born in the period 1860-1869 and descending from group I (freeholders and farm tenants). Notation as in fig. 4.



ig. 6. Males, born in the period 1860-1869 and descending from group II (crofters and craftsmen). Notation as in fig. 4.

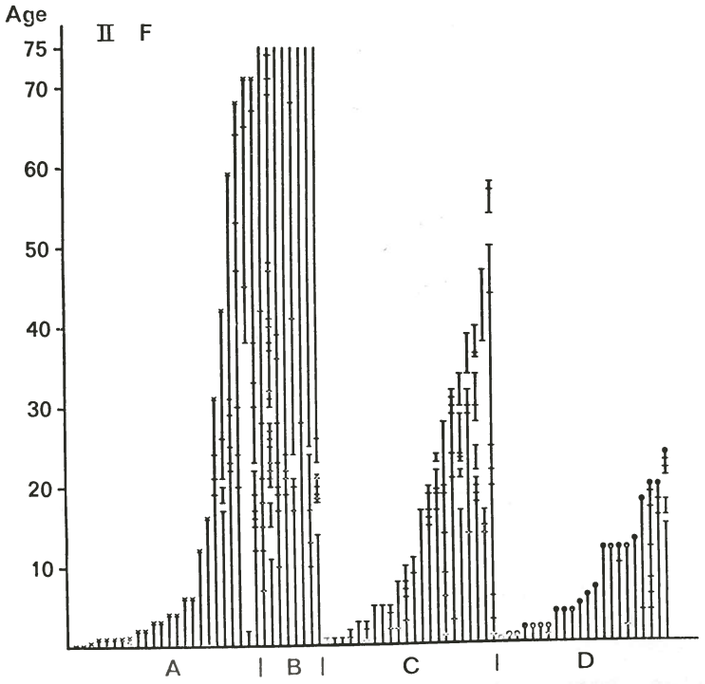


Fig. 7. Females, born in the period 1860-1869 and descending from group II (crofters and craftsmen). Notation as in fig. 4.

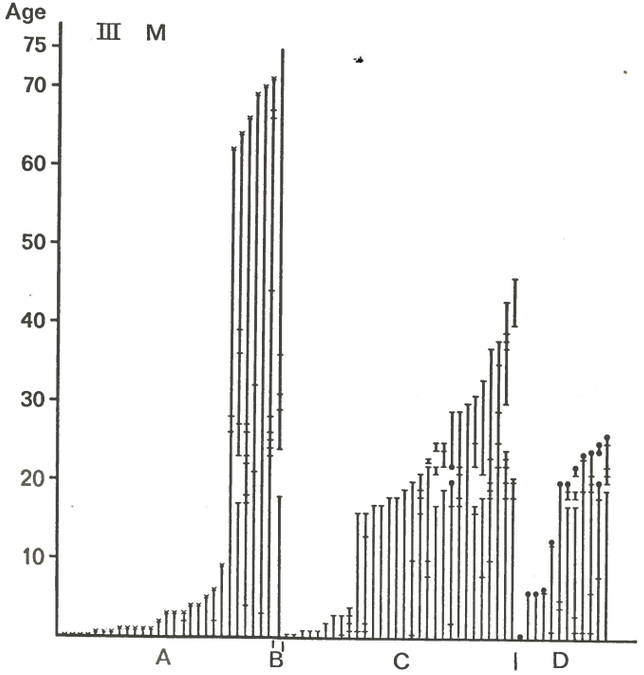


Fig. 8. Males, born in the period 1860-1869 and descending from group III (farm labourers and servants). Notation as in fig. 4.

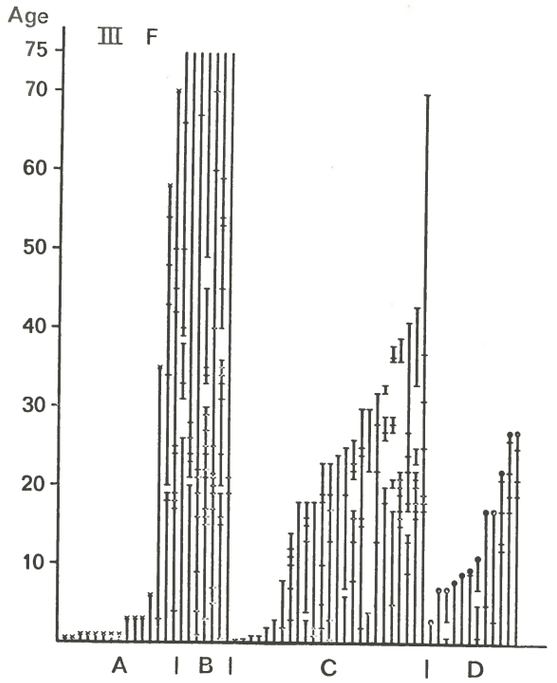


Fig. 9. Females, born in the period 1860-1869 and descending from group III (farm labourers and servants). Notation as in fig. 4.

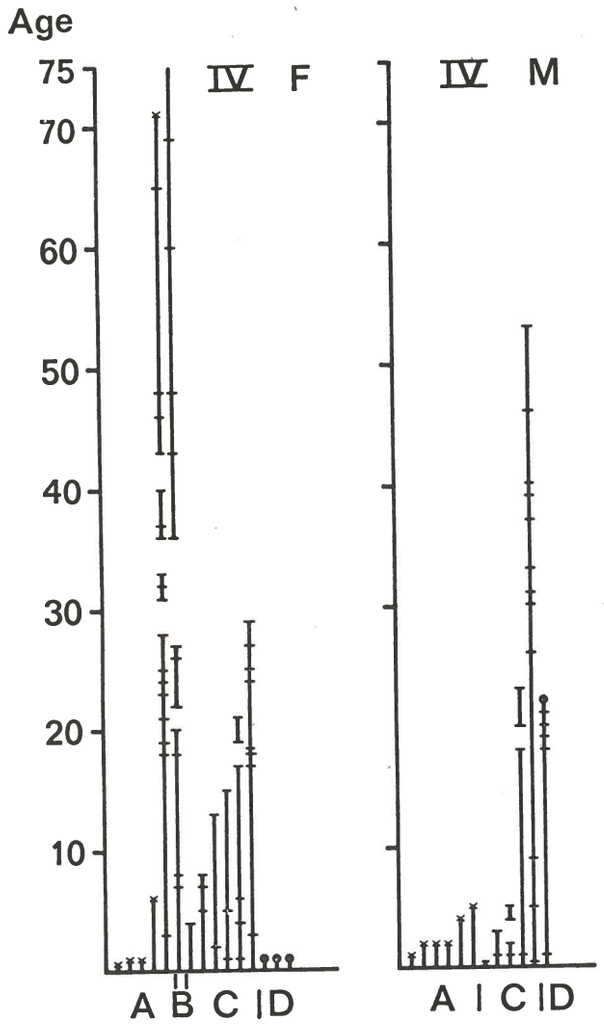


Fig. 10. Males and females, born in the period 1860-1869 by unmarried mothers from all social groups. Notation as in fig. 4.

The clearest differences between classes emerge when we observe bility (Table 2). The typical age of changes of residence comes between and 30. But mobility is rather low among farmers' children of both xes. The highly mobile individuals are the daughters from crofters' and borers' homes.

Emigration to America, finally (Table 3), was an act which in this neration took place before the age of 30. In at least half of the cases e emigrants accompanied their parents as children. The strongest ten- ncy to emigrate is found among the chilfren of crofters and laborers. should be noted that if we had been able to follow over time also those o moved away to Swedish destinations we would undoubtedly have found many

ble 1A. Number of children born in Asby parish, Ostergötland, from 1860 to 1869 (still-born included). Division in groups according to position of parents at time of birth: group I freeholders and farm tenants, group II crofters and craftsmen, group III farm labourers and servants, group IV unmarried mothers of all groups.

	I	II	III	IV	Total
Males	75	118	70	12	275
Females	78	76	59	15	228
Total	153	194	129	27	503

Note the big difference in number between males and females in group II.

ble 1B. Observed time spent by all individuals within the parish expressed as a percentage of maximum possible time if every individual had survived up to the age of 75 and stayed within the parish all his life.

	Males			Females		
Age	I	II	III	I	II	III
70-75	14	5	2	14	11	12
60-70	17	7	7	17	14	15
50-60	20	8	10	19	16	17
40-50	20	10	11	20	18	17
30-40	22	13	14	21	21	21
20-30	33	19	22	36	23	32
10-20	52	36	45	58	35	50
0-10	74	59	63	77	62	69
% decreased before 10	23	25	30	19	21	20

Table 2. Number of residential moves within the parish of birth or acro its border per 10 individuals still living in parish per decad

	Males			Females		
Age	I	II	III	I	II	III
70-75	0	0	0	2	5	0
60-70	2	0	4	2	5	3
50-60	1	3	0	3	3	5
40-50	4	10	4	6	7	11
30-40	5	13	13	14	14	22
20-30	15	15	32	11	36	31
10-20	10	14	14	7	23	23
0-10	6	8	8	4	9	11

Table 3. Number of moves to and from America per 10 individuals still living in parish per decade.

	Males			Females		
Age	I	II	III	I	II	III
70-75						
60-70						
50-60						
40-50						
30-40						
20-30	1	2	4	1	1	2
10-20	1	2	2		3	1
0-10	1	2	1	1	3	2
% emigrated	11	23	17	8	29	20

Table 4. Steps between groups from time of birth up to the age of 50

Males

From \ To	I	II	III
I	15	1	
II	5	5	1
III		5	2

Females

From \ To	I	II	III
I	14	1	
II	1	9	3
III		5	5

more emigrations later on. So where emigration to America is concerned we do not get the full picture.

The next question to ask is to what extent steps between social classes took place during the progress of life. The available information is poor on this issue since relatively few individuals came to live a long period inside the parish of their birth. Let me first be very specific and show two individual biographies with respect to their association with domains and families. They are very different and they are representative of their social classes.

The farmer's daughter (fig. 11) moved several times inside the parish. But first, up to 27 years of age, she followed her parents in their moves and then -- without an independent existence as single -- she started out with her own family. There is of course a possibility that she lived elsewhere for periods shorter than a year, which is the minimum unit for registration of a move. This uncertainty does not apply to her married period. The final years of life were spent with the son who had inherited the property. All her life she remained in the social class of her birth.

The crofter's daughter left home early -- at the age of 16 -- in order to join the circulating population of servants (of fig. 1). At the age of 33, after many changes of residence, she became the wife of a crofter. Her final years as widow she spent in the poor-house. Also she lived her whole life in the social class of her birth. One could even justify the opinion that the final years meant a step down.

An overall description of the long term transitions of individuals between social classes is given in Table 4. What is compared is the social position at birth with the position at the age of fifty. At this age further steps over class-boundaries do not seem likely. The women who are married or widowed or act as housekeepers in a borther's home have been put in the same category as the men. Now fifty years is a rather long time and it might well be possible that the same designation, say farmer or crofter, in the registers from the beginning and from the end of the period means rather different circumstances where standard of living is concerned. But it is less probable that the social rank-order should have become reversed due to the general economic development. So in this respect the transition matrix should give a reliable picture.

Individuals attached to the farms, whether as owners or as tenants, show practically no social mobility. They have been able to stay where they set out. The middle group is more mobile. The figures are so small that their distribution must be understood just as hypotheses. But seen as such they give some interesting indications. Almost half of the men have moved upwards whereas the women have remained the same or tended downwards. Among the individuals of the third group, finally, a considerable number has moved up but not more than one step. The farms were closed domains to them.

I hope that the various descriptions presented, although very scattered and incomplete, have provided some palpable content to the web model as described at the beginning. We have seen on the one hand the biological human population, viewed as trajectories or life-lines, and on the other, a structure of channels made up of domains with which individuals associate according to various rules of entrance and of durations of stay.

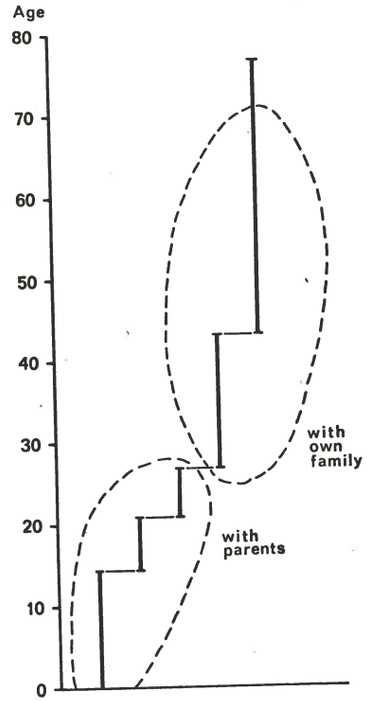


Fig. 11. Residential moves and family association of a freeholder's daughter.

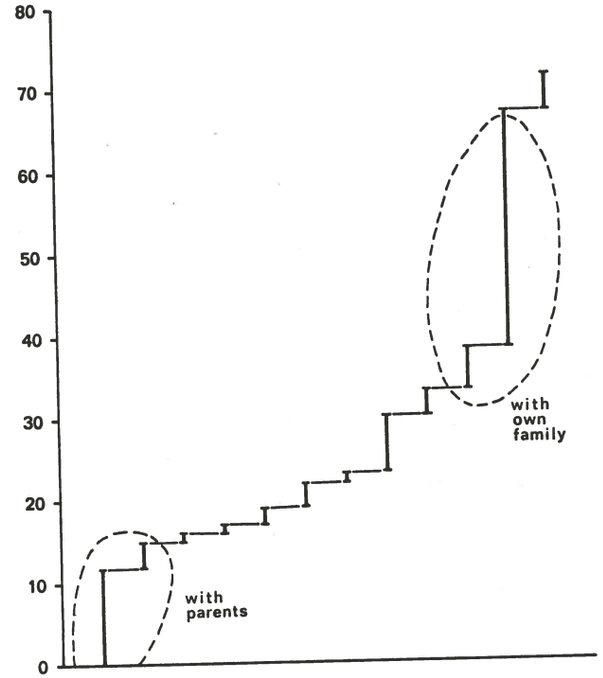


Fig. 12. Residential moves and family association of a crofter's daughter.

other aspects of the conceptualization, not openly included here, such as production, consumption, and social interaction, are describable in essentially the same way although we would need to go down to more detail in order to do it.[6] As indicated before, stable primary groups such as families, and delimited spaces as territorial and positional domains, form the frames within which much of the other activities are contained. Although one must assume that there exists a mutual developmental interdependence between the frames and their content, historical evidence seems to justify the notion that primary groups and domains show a considerable stability as well as strong controlling power over other elements. There are, therefore, grounds to pay special attention to them as has been made here.

The central analytical problem is to look into how more exactly the human trajectories, primary groups, domains, and the other items left out here, fit together. In conclusion I will discuss briefly this matter with respect to what my empirical examples have dealt with, in more detail: population versus domains. I repeat once again that the expression "domain" is used to designate both territorial space and livelihood positions in the socio-economic system (competence spaces).

The first question to ask is how the suggested way of looking at the man-environment complex, derived as it is from a relatively simple and rigid agrarian setting, is more generally useful and particularly so in a highly differentiated and swiftly changing modern society. The population side is simple to deal with conceptually. The idea of a life-line as a representation of an individual existence is fundamental in demography (and is in fact applicable to all living populations). What geographers can do with it as a further elaboration is to change the rather bare life-line concept into the more containing space-time trajectory. This entails also the obligation to view it as a distributional dimension and consider the various factors behind the sequence of states and events as they become projected over the individual trajectory. A fundamental curcumstance with respect to this distribution is that for each individual the outcome is a budget specification of his most precious resource, his life-time. Every choice -- or if it is not really a choice -- every peice of use consumes beyond recall a part pf this resource.

More open to variation is the understanding of the options offered in the environment through which the searching trajectory has to move. The pure social component of options is rather simple since all we have to deal with is the set of human trajectories which join and depart. Beyond that one can probably differentiate conceptually the physical and biotic surroundings in many ways. It seems to me that among conceivable starting points, the concept of domain as understood here in a twofold way, should have a very high degree of generality. The phenomena which the concept stands for have as principles a biological foundation. The terrestrial domain can be seen as a human elaboration of the animal territory. On pure practical grounds it is hard to believe that any human society could be livable without the imposition on space of some kind of domain structure. Livelihood positions (competence spaces) are rooted in human nature in a different way. Originally they must have come into being because every individual has a limited capability of mastering a wide variety of techniques for physical and psychological reasons as well as because of time-budget constraints. To these factors are added, in the more elaborate society, the many pressures towards organizational stability which a com-

plex flow of information, people, things and material calls for. The working of the whole requires that there be a great deal of certainty about what kind of input needs to go where, and what kind of output one can expect from where. The obvious solution is to institutionalize positions with defined tasks, frequently tied to terrestrial domains, without regard to which particular individuals are going to hold them. It might well be an impossible task to map empirically the total spectrum of livelihood positions in an urbanized region -- a population census gives only an approximate idea -- but we need not doubt that the phenomenon can be identified as an ordering construct. We note for example how the number of inhabitants of an area is frequently nearly constant from year to year or changing only slowly, irrespective of the fact that a substantial proportion of the population, seen as individuals, has been exchanged through migration. This could hardly happen without a latent structure of considerable stability.

The basic point I want to arrive at with this discussion is that the concept of budgeting in the spatial direction is still as applicable in modern society as it was in the historical example. First, the population of any delimited area has always a fixed number at any fixed moment. This means that the groups (clusters) of individuals that can be formed for various purposes simultaneously are very much interdependent. Take the case of a playground. If 15 children are present and the majority decides to play a game which needs 10 participants then the remaining group has, for the time being, been cut off from playing all games which need more than 5 participants. In this respect there is no difference in society at large as is well illustrated by the case of transportation where public transport is collapsing because a majority prefers private movement.

Secondly, the domains are likewise limited in number at any cross-section of time. Therefore, the fit between human trajectories on one hand and terrestrial spaces and livelihood positions on the other, is again a budgeting problem and a very complex one. So for example, dwelling and work-place must go together as a combinable pair for the indivisible individual, but in spite of that, they mostly come into being in urban society as separate sets of domains under rather separate controlling forces, largely beyond the power of the individual.

The double space-time perspective requires us to try to see the simultaneous (the spatial, the room-providing) allocation of human trajectories over limited options as directly connected with the sequential (the temporal) allocation of states and events over the limited life-time or shorter periods as the case may be. Great efforts have been made both in research and politics to deal with the entrance conditions under which an individual can become a holder of a domain, in particular a competence space, and what rights and obligations the holding entails. This is in line with the dominating weight in most scientific and political thinking which is given to the micro "close contact level," mentioned at the beginning. But we will never be able to understand what the open and hidden rules and regulations lead to in terms of distribution of life biographies of various content until we are willing to throw light on the quantity and quality of options which define what the individual person can actually do step by step and what the constraints at work lead to in the long run.

I do not want to give the impression that I believe the pattern of options to be absolutely rigid and not responding to the reactions of

people. There is change to a varying degree. But it is also very clear, from the straying debate about the future, that even those, who believe that the primary goal of human effort is to help everybody to carve out a decent life, are at a loss concerning what the distributional forces look like. But how could it be otherwise with the very small attention given to the total landscape in terms which are realistic from the individual's local point of view.

What I am suggesting seems to beg the question of supplies of data of an almost unthinkable extent and intrusiveness. But I am not so sure. Although one must learn how to respect the continuity requirements of the individual, from a research point of view, we naturally have to deal more with types than with single cases. Further, structural conditions might well be better understood from data sources other than those which inform us about single individuals. After all, the main question is to try to find out what choices and behavioral combinations are made available by the "geographies" -- I cannot find a more telling term -- that people have come to be part of. A host of little understood relations between spatial, social, and biographical distributions should become possible to grasp without recourse to the actual behavior of large samples of meticulously investigated individual persons. The amount of detail which my approach seems to call for should not be mistaken as a request for pedantic empirical completeness in the description of past history or for technocratic (computer-wise) regulation in future planning. I am looking for a way of finding conceptual coherence in the geographer's understanding of the human world all the way from home to globe and from day to lifetime.

FOOTNOTES

1. Professor G. Tibblin, University of Göteborg, Sweden.

2. Cf. T. Hägerstrand, Space, Time and Human Conditions. In Dynamic Allocation of Urban Space (ed. Karlqvist-Lundqvist-Snickars), Saxon House, Farnborough, 1975.

3. Asby parish in the province of Ostergötland.

4. I believe that this material conveys a rather unique piece of information. I cannot show it without mentioning that my patient wife Britt put it on paper many years ago. For decades it has served as a structuring conception behind my view of the world.

5. Note that also still-born children have been included. The reason for this is that in a time-perspective these influence to some extent the relation between family formation and change of position.

6. Cf. for example T. Hägerstrand, on socio-technical ecology and the study of innovations. Ethnologia Europaea, Vol. VII, 1, 1973-74.

IS GEOGRAPHY "BAD SCIENCE"?

By Courtice Rose

Introduction

Trying to live on both sides of the subjective-objective dilemma has long been the characteristic of the - thought at least - lifestyle of most social scientists. The many discussions stimulated by the question: "Can there be a science of human behavior?", are crisscrossed with arguments favoring on the one hand, an "objectivist" stance, which maintains that complete description and explanations of human actions can be given in causal terms, and, on the other hand, the insistence that human beings and things are intrinsically unique, and therefore to understand a human action is to know its motive, something which is known only in the mind of the actor. Geography, as one of the social sciences, has vacillated between these two positions over its recent history, at times siding with the "objectivists" in an effort to become more "scientific" and thereby erase any hint of its "lower order status in the hierarchy of sciences", (a label which Kant had used in describing the field of geography), and at other times, exhibiting great flashes of humanistic insight in a parallel effort to enrich the symbiotic man-land and man-man bonds which compose our terrestial environment.

Among the questions posed by geographers in this epistemological debate have been: i) What is Geography?, and ii) What kind of explanations does it offer? For a discipline that has traditionally had one foot in the natural sciences and the other in the social sciences, the answer to the first question can never be totally devoid of a very perplexing dualism, to the extent that practically every geographer has his personal definition of his professional activity; and virtually every attempt to define the scope of the field has been deemed unsatisfactory by large segments of the practitioners who would classify themselves as "geographers". The answers to the second question are no less perplexing but perhaps more appropriate for discussion since it has been only recently that geographers have found it necessary to examine the relationships between geography and certain contemporary philosophical schools. In effect, this examination means the specification of a paradigm (or paradigms) for modern geography.

The Context of the Question of Geography as "Bad Science"

The question of geography as "bad science" is here posed in a very specific sense. Social sciences, according to Kuhn (1962) illustrate well the transition from a pre-paradigm to a post-paradigm period in the development of a scientific field. Even though the acquisition of a paradigm is no guarantee for the transition to maturity, the process of acquisition itself may in fact, be more important than what is acquired. But this process is fraught with pitfalls:

> "normal science sets in in some unjustified manner by a set of fashion-following scientists starting to imitate each other without proper pre-examination of the paradigm, (i.e., without the alleged insight that a certain paradigm is relevant to a

particular field being a genuine insight). But the fact that new science can be exceedingly bad does not cause it to cease to be bad science (as opposed to bad philosophy, bad painting or what have you). In the end, phoney scientific normal-research lines collapse, or fail to yield any results, or topple, or evaporate - or so one hopes..."

(Masterman, 1970, p. 75)

Accepting for the moment, Kuhn's definition of science, (Kuhn, 1962, p. 24), this description of the occurence of "bad science" poses several questions with respect to geography as a pre-paradigm science:

i) Is there any paradigm at all in modern geography?
ii) Are there several paradigms in geography?
iii) Can two or more competing paradigms be isolated, one of which might be a candidate for the transition to maturity, and thereby quality geography as "normal science," albeit poorly done?

The interpretation of the phrase "bad science" is a crucial one. In this paper, an effort will be made to adhere to Masterman's use of this phrase, meaning that although not as rigorous, fully-developed or sophisticated in comparison with other sciences, such as physics or mathematics, a science undergoing the transition to maturity is still a science. The transition process being incomplete is thus the meaning attached to the word "bad," there is no moral or ethical connotation implied.

It should be stated that many other definitions of the term "science" are possible. Kuhn's definition of the term contains the basic positivistic assertion that facts in normal science are objective facts, things which can be quantified. That there is an "objective reality" which is somehow external to and independent of the mind is an assumption rejected by existential thinkers and phenomenologists, who return to "the things themselves" for the meaning which they either fulfill or are given by people. (Mercer and Powell, 1972). Science, according to this viewpoint, is itself, hopelessly intentional and always takes place in a particular subjective context; therefore, facts can only be subjectively known or "experienced."

2. The Existence of a Paradigm in Geography

The assumption that the notion of "geography" can be investigated at all using a paradigm is one which should first be stated. Using any of the many senses in which Kuhn employs the word "paradigm", particularly that sense in which a paradigm is thought to be an artifact which can be used as a puzzle-solving device, the meaning of the phrase "geographic paradigm" leaves many dimensions of geography virtually ignored. The reasons for this can be traced to the impact on the field of Newtonian-Kantian absolute concepts of space and time. Both of these concepts, as they have been articulated in geography have served to remove the center of interest from man as a thinking, feeling, free subject with soul, consciousness, meaning and integrity, to man as a quantifiable, n-dimensional, logically operating biomass. The skepticism is evident - if geography really deals with man's experience on the earth, then the scientific model of man, including the notion of a paradigm, may be irrelevant to the more anthropocentric focus of geographic concerns.

Nonetheless, there is an abundant legacy of "geographical knowledge" dating to the presocratic period[1] which does point to at least a "metaphysical" type of paradigm for geography, that is, there has been a set of organizing principles and beliefs about the "geographic perspective" or the "geographic point of view", and in this sense, geography could satisfy Kuhn's criterion for a paradigm; that it provides a "way of seeing" the world. In the elaboration of this paradigm the importance of the contribution of Kant cannot be overemphasized. Kant's distinction between rational (a priori) and empirical (sense-derived) knowledge placed the realm of geography squarely within the empirical sciences - its job was to "study natural phenomena occurring on or near the surface of the earth" (May, 1970, p. 150). Essentially chorographic in nature, geography was a nomothetic discipline, seeking laws in a lower level system of nature and employing an integrated, "synoptic" view of the world, a perspective which Kant argued, no specialized discipline such as biology or geology could do. Implicit in this viewpoint was a positivistic notion of science - statements can be formulated and put forward as candidates for geographic laws which do in fact meet the basic requirements of scientific testability. A great many geographers have accepted Hempel's deductive-nomological type of explanation, including its probabilistic formulation, as unquestionably defining the appropriate form of explanation for geography (Guelke, 1971), and as late as 1969, one of the only major contributions to the philosophy of geography urged its practitioners to accept the inevitability of the scientific method in geography, (since "there was no logical reason for supposing that they [scientific laws] cannot be developed in geography", and hence to concentrate on theory building (Harvey, 1969)).

The acceptance of positivism as a general orientation in geography had significant implications when the interest of geographers turned from physical geography to human geography. The increase in scope was accompanied by a number of philosophical stances, notably possibilism (Vidal de la Blache, 1926), the behavioralist approach, (not in the Skinnerian sense, but in a functionalist sense), and the systems approach (Chisholm, 1967). What remained common to the evolving paradigm was the insistence that empirically verifiable truths with logical consistency could be derived for human behavior. It is not surprising then, that many would define human geography as being "concerned with understanding the spatial behavior (in the sense of a choice of a location in space) of operationally defined individuals and aggregates" (Walmsely, 1974, p. 96).

What can be derived from this digression on the nature of geography is that there has existed for some time a "metaparadigm", (in Masterman's sense), for geography but that in neither of Kuhn's "sociological" or "construct" senses has this notion of a paradigm in geography been actualized. The result has been that many of the characteristics ascribed to the non-paradigm science, e.g., the collection of easily accessible facts only, the equality of all facts and the less-than-scientific character of research, are all observable in the day-to-day activities of geographers but that being the case does not necessarily mean that the transition to maturity is not in process. Secondly, this "metaparadigm" has remained for the most part tacit in nature, and it is only after this transition is complete that geographers will know that this type of paradigm exists, (since we cannot know what it is that the paradigm consists of except in an ex post facto manner).

3. The Stage of Multiple Paradigms

The stage of multiple paradigms, (according to Masterman) is one in which each new methodology is likely to spawn a paradigm of its own resulting in much discordance in the field and the perpetuation of discussion on fundamental issues. If one of these paradigms deepens and defines a "crude analogy," finite in its extensibility and incomparable with any other crude analogy, thereby establishing a central insight into the field, this paradigm may emerge to lead the discipline out of the multiple paradigm stage of evolution.

That geography has for the last fifteen years existed in a stage of multiple paradigms is clear enough - witness the plethora of techniques which practitioners in the field have urged us to accept as "the Paradigm": spatial analysis (particularly locational analysis), diffusion theory and time-space models, systems analysis, topology, regional simulation, environmental perception and most recently, phenomenological analysis. Is it any wonder that the field of geography is in state of general dissonance?

Two of these approaches deserve further comment. Perhaps the closes resemblance to a paradigm in the "construct" sense has been the model-based paradigm of the late 1960's, (Chorley and Haggett, 1967). Based on the two vectors of locational relativity and topological-geometrical form, this paradigm was claimed to satisfy Kuhn's minimum requirements fo success: the solving of problems which brought the old paradigm (commonly known as regional geography) to its crisis point; the appeal of wha is elegant, appropriate and simple and thirdly to contain more potential for expansion. One of the principal features of this paradigm was its whole-scale borrowing of models from other disciplines, e.g., from physics (potential models, minimum effort models and diffusion theory) from biology (ecosystems, colonization and succession models), from psychology(decision theory, perception models), from economics (multiplie models, input-output analysis and linear programming) and from mathematics (packing theory, graph theory, game theory and point-set theory). Yet this model based paradigm is a pale shadow of the "metaparadigm" of shared exemplars to which Kuhn refers nor does it contain the deeper "crudeness" which is at the heart of a paradigm and which not only serves as a puzzle-solving device but also points the direction toward new research problems. In short, this model-based paradigm has been thought to have outlived its usefulness, and as has been pointed out, it is ripe for overthrow (Harvey, 1972).

A second candidate for a paradigm in geography is the rapidly emerging field of phenomenological analysis.[2] At present it is extremely difficult to decide whether this candidate has attained the status of a paradigm or simply remains one of several methodologies available to the geographer. In the "metaphysical sense", phenomenology appears to provide a "way of seeing" the world, and with its emphasis on "essences", "intuition", "verstehen", and "intentionality", this approach appears to tackle the problem of relating the form of explanations in geography to the nature of man's experience in the world. As yet, however, this candidate has provided no indication of its ability or a paradigm in the "sociological" or "construct" senses.

Precipitated by the recognition that in the model-based paradigm, man was made over into objectifiable phenomena, not merely contingent in, but essentially determined by the world, (Samuels, 1971, p. 36), the phenomenological approach urges the geographer to take a more subjective stance, view the problems posed from the actors' frame of reference and formulate explanations which embody the actor's own intentions and attributes as essential determinants of the simple meaning of a particular situation. Basically, the phenomenological approach concentrates on revealing the "essences" of phenomena and not on the derivation of empirical facts or lawlike statements to connect these facts (Mercer and Powell, 1972). After a period of initial neglect during the 1960's, the phenomenological approach has emerged very strongly in recent geographical literature with the realization that many of the current problems in geography appear to lend themselves to phenomenological analysis, since the concepts being investigated, e.g., the "quality of Life", "neighborhood", "social space", are experiential rather than factual (Walmsely, 1974). Whether this approach can sustain the criticisms of its overinclusive character (Greer, 1970), its idealism (Harvey, 1972), and its tendency to have no single, clearcut formulation but rather a variety of interpretations, remains to be seen. Perhaps the most serious criticism is that the phenomenological approach may in the final analysis offer only a more complete description of a particular geographic phenomenon rather than an explanation for its occurrence, but if one accepts that all knowledge is compounded of both subjective and objective components, and that some of the goals of inquiry may lie in another realm - the realm of the will and personal meaning, then the phenomenological approach may well prove to be a valid candidate for a geographical paradigm.

4. Geography as premature "Normal Science"

It is, by now, evident that the field of geography has had at least one candidate for a paradigm and that a second candidate is rapidly developing. Either the continued deepening of the phenomenological approach, or the rethinking of a positivistic approach, (particularly the relaxation of logical empiricism and the turn to many-valued logics, e.g., Olsson, 1970), could lead geography into the dual-paradigm stage of evolution toward "normal science". At this point, both options are open. Masterman's description of "fashion-following scientists starting to imitate each other" is a very apt one for the present practitioners of geography. And in this sense, we are perhaps bearing out Feyerabend's principle of proliferation - having abandoned the model-based, positivistic paradigm for the moment, we are rapidly experimenting with other possibilities; the perception school, the systems framework and the phenomenological approach are three of the most obvious alternatives. But the principle of tenacity is also in evidence - why not still attempt to derive logically consistent explanations for our observations of the world using essentially a positivistic approach but recognize that these explanations will be influenced by the currently accepted meanings (and values) which we attach to such words as "science", "fact", "Knowledge", and "truth"? A neopositivistic approach recognizes such "meaning variance" and emphasizes the need for a dialectic between the subjective and the objective, between the observer and what is observed and between what can be known empirically and what can be known intuitively. Here, is would appear, is a possible candidate for a new paradigm in geography, one that has a clear antecedent in "metaphysical" paradigms of geography as well as the capabilities of increasing the congruence between what

is embodied in its theory and what is actualized in the real world - and perhaps one that does not "in the end collapse, or fail to yield any results, or topple, or evaporate...".

Conclusion

In the specific context of this paper, geography probably is "bad science" - it is incomplete, it is in transition, it is science-in-the-making. But it is still science and assuming that it will therefore continue in the transition process from a pre-paradigm to a post-paradigm science, the following statements can be made:

i) Classical geography possessed a "metaphysical paradigm" which held geography was a "perspective" or "point of view" concerning relationships between man and his environment. It was based on Kant's notion of geography as a lower order, law-finding empirical science with particularly synoptic characteristics.

ii) Modern geography possesses at least two candidates for a paradigm: the first a model-based "construct" paradigm which is primarily behavioral in character and relies very heavily on techniques borrowed from other disciplines such as physics, biology, mathematics and statistics; the second, a newer, "metaphysical" paradigm based on the phenomenological approach to man's experience in the world, which, despite its brief history, could offer true paradigmatic potential were it to deepen and develop some core concept or "crudeness".

iii) The older, behavioral paradigm appears to be no longer of any use to a growing body of practitioners in geography and thus it can be expected that it will be replaced either by an expanded phenomenological paradigm or by a revitalized neo-positivistic approach. The latter would seem to offer the most appropriate alternative to modern geography's search for a paradigm.

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NOTES

[1]Thales was apparently the first person to discuss the annual flooding of the Nile River, and Anixamander was probably the first cartographer in history.

[2]The first exponents of this approach were O.H.K. Spate (1960) and D. Lowenthal (1961), but the movement has gathered a recent momentum with the works of Relph (1970), Yi-Fu Tuan (1971) Mercer and Powell (1972), Harris (1971) and Samuels (1971). The principal philosophical works followed have been those of E. Husserl and M. Merleau-Ponty.

THE PHENOMENOLOGICAL INVESTIGATION OF LIVED SPACE: ONE APPROACH TO BETTER UNDERSTANDING EVERYDAY GEOGRAPHICAL EXPERIENCE

By David Seamon

If one were required to name geography's main contribution to man's quest for knowledge, one probable answer would be the geographer's attempts to clarify the relationship between man and the earth on which he lives. Together with human ecology, geography has demonstrated that man is an ecological being who lives in delicate interdependence with his surrounding environment, including other men. Man modifies his natural world according to the level of his culture and technology. On the other hand, the natural environment conditions man's behavior and ultimately figures as a crucial component in his continued existence on the earth.

In his concern with man as an ecological being, however, the geographer until the recent past has generally ignored the fact that man is also an existential being who generally behaves toward his environment as his experiential situation dictates. As an ecological being, man exists in nature as one interdependent organism within a great interlocking earth system -- the spaceship earth, if we wish to borrow the most recent terminology. As an existential being, man has an intentional role as he actively mediates his lived situation in terms of the surrounding environment. This short essay stresses man's role as existential being in the environmental situation, and considers one small portion of human geographical experience -- the structure of lived space. It argues that a consideration of lived space is important to geography today not because it will provide additional data about the external earth-world, nor because it will help better predict human behavior. Instead, this essay suggests that such study is important because a more complete understanding of lived space will help each of us as individuals to develop a better appreciation of the geographical space in which we live -- an appreciation which is keenly needed in a contemporary world where space and place are all but devoid of experential meaning.[1] As Eliade has suggested in his important book, The Sacred and Profane, modern man has very much desecrated the space in which he lives, and the result may well be a spatial wasteland.[2] Or, as the French phenomenologist, Merleau-Ponty, has suggested, "being is synonymous with being situated."[3] As geographers, we need to better understand the full significance of this phrase "being situated," and establish its meaning in terms of geographical lived space.

An Incipient Exploration of Lived Space

In uncovering the structure of lived space in human experience, one of the best approaches is existential phenomenology, which at its simplest, considers the underlying fabric of man's everyday, taken-for-granted experience in the world.[4] Applying this perspective to lived space, we must ask ourselves if out of the multitude of our daily encounters as beings situated in space, we can uncover any pervasive and consistent patterns. In other workds, can we discover any basic experiential structures if we search out the undercurrents of spatial experience? Once we have begun to uncover the discern this experiential mosaic, we can perhaps begin to better understand our own experience as beings in a geographical world, and also help other people discover them.[5] At the same time we may begin

to recognize an underlying structure of human experience which if violated could create a less-than-optimal or even deleterious life situation. For example, one case in point may be Eliade's mention of the sacriledge of space in modern Western society.

What exactly have phenomenologists (and a very few geographers using the phenomenological perspective) so far discovered about the dimensions of lived space?[6] A first observation is that unlike the geometer's and physicist's space which contains a series of precise points extending over an objective area, lived space is a living presence, a space-situation in which the experiencer is forever immersed. In our ordinary, assumed, everyday experiencing of the world before us -- the 'natural attitude', as the phenomenologist calls it -- we are satisfied with the given meaning of our lived experience and fail to recognize -- indeed, generally have no interest in recognizing -- that this meaning is given to us automatically and unconsciously, before we can catch its arrival.

This immersion in space is generally such a taken-for-granted and natural part of our everyday situation that its presence eludes most people. Yet if we can lift ourselves free of this immersion (which is by no means an easy task) and survey it at a distance, we can catch its sense and so recognize that the world is always before us an instant before we can catch its coming to presence.

There are, in fact, infrequent times in our normal experience when by chance an incongruity arises and thus the world we took for granted suddenly surprises us. For example, consider the following situation. You walk from your house one cold sunny morning and see your neighborhood covered with fresh snow fallen the night before. In its whiteness and sparkle, this place which you completely took for granted yesterday seems suddenly new and strange. For an instant this everyday environment is not what it was, and you are surprised, shaken, and delighted simultaneously. In this case, a considerable change in scene has made the environment something it wasn't before -- your natural attitude is temporarily suspended and the neighborhood is briefly a new place. Quickly, however, the new scene flips back to the old, and so you fall back into the normal everyday state of immersion. The important point to be made here is that the strangeness of the new situation strikingly contrasts with regular routine, and so the usual taken-for-grantedness of the everyday world is highlighted -- if only for an instant.[7]

An important first phenomenological finding, then, is that the space in which we find ourselves is always present before us before we can catch its coming to presence. The phenomenologist also points out that just as in lived time where present is related to past is related to future, so the many points of our lived space -- better termed 'places' -- are experientially linked to other places. For instance, the sidewalk-place in front of the nearby cafe may not generally be meaningful to me by itself as a place, yet it is a point over which I pass to get to a destination -- say the drugstore farther down the street -- and so it links me in space with other places over which I must move to get to the drugstore. Imperceptible and fluid as these lived places are in lived space, yet they merge in my experience to create a series of personal paths and regions, each of which possesses some sort of meaning for me and relates to some purpose. For example, a year ago I set myself to become familiar with University Park, which is across the street from the Clark University campus. I established the habit of walking there frequently, and soon the park

became a meaningful place for me -- as a whole and as a space through which I walked over a regular path. In this case, the wish to know a place created in me meaning for that place, and so the park became a significant region in my everyday experience. The key word here is 'wish' -- or 'intention', as the phenomenologist would more generally say. Only because I had the intention to familiarize myself with the park as a place did familiarization develop. Of course, I also could become familiar with the park if I had used it as a shortcut to get to a place of work. But, in this situation too, my intention -- i.e., going to work -- establishes as an aside my awareness of the park. Thus, spaces and places become meaningful to us as we intentionally direct our awareness to them in some way.[8]

The combination of meaningful places and spaces that the individual holds is highly idiosyncratic, since each unique world experience creates a unique set of lived spaces. The phenomenologist recognizes that indeed each person's lived space is unique, yet he also recognizes that pervading the unqiueness is a pattern of underlying structures that may be much the same for most people over all the world.

In this regard, we can first say that lived space has a distinct axis system coordinated with the human body, involving the six directions of up and down, front and back, left and right. All coordinate systems have a center and this fact leads to another discovery about lived space: it is centered on the individual himself -- his body is the zero point of his own spatial corrdinate system, and from that center extends instantaneously and completely the lived space in which he finds himself. However, though man is the center of his own lived space, the phenomenologist points out that man feels more comfortable in some places than in others. Bollnow has called this point of comfort a "natural place" and suggests this is the true center of the individual's lived space.[9] The phenomenological literature argues that this natural place is generally the home, and carves out for the individual a private inner space where man can return to himself and redefine his true essence. As Bachelard succinctly explains, "the house is the human being's first world."[10] Yet though the house may be the center of one's home space, this space may contain more than just the dwelling. The boundary between the inner space of home and the outer space of the public world does not end abruptly. As man interacts with the world beyond his home he actively assigns values to its spaces and comes to differentiate experientially a series of lived spaces that thin out from the relatively known to the comparatively unknown to the completely unknown.[11] The meaning surface of this space fanning out from the individual's lived center may vary greatly in intensity, with fondness and other positive values attached to some of its segments; fear, dislike and other negative values associated with other of its parts.

Eliade has suggested that in the past traditional societies divided their world into two crucial regions of meaning: sacred and profane space. The sacred space rediated out from a sacred center at which an axis mundi -- perhaps a mountain, tree, holy shrine, or some other environmental feature -- linked the society's present world with the heaven places and the underworld. Beyond this sacred space surrounding the sacred center was the unknown profane space. For these societies, man's world was not a horizontal space that rambles on indeterminately as Eliade suggests is the case with Western man today, but instead it was a space of verticality that united at the center of the material and spiritual worlds. This centered sacred space also manifested itself in microcosm at various levels

in the society's lived-space patterns. Secondary holy sites were located in relation to the axis mundi, and in turn sites linked the present world with the above and below. Evan at the scale of home, the structure of sacred space dominated the arrangement of home space, and the house became a microscopic model of the greater cosmos.

Understanding the Significance of Lived Space for Contemporary Geography

The above picture of lived space is sketchy and incomplete, but gives an incipient impression of what space means experientially. Recapitulating, we can say that space is an integral and automatically given part of human experience; the experiencer is immersed in lived space, assuming its presence without being consciously aware of it. Though each person creates for himself a unique lived space because his life experience is unique, there are some underlying structures that are more than likely common to most men's spatial experience: the fact that man's world is spatially centered; that the true center of his life space is the home; that beyond the home is a series of spaces which fan out from the relatively known to the completely unknown; that at least in earlier cultures, space took on a sacred quality and linked the material and spiritual worlds in a spatial fashion.

In terms of geography today, at least two of these structures -- the notion of centering and the notion of sacred space -- seem especially significant. The phenomenological literature on lived space suggests throughout that man is a centered being, or "situated being," as Merleau-Ponty would have it. If centering is a crucial characteristic of human experience, then it behooves the geographer to consider in more detail what centering means experientially. For a start, we have seen that the basis of centering is the body -- my body contains my self, and where my body is at the moment is the center of my lived space. Thus, one point the geographer might consider in more detail is the role of body in centering. Merleau-Ponty has suggested that the body, or body-subject as he calls it, possesses its own form of knowledge and language.[12] For example, he suggests that body knowledge stores potential movement patterns and carries out the movements when the individual moves in space. Thus, the need for an experiential center may relate at least in part to the need of the body to have a stable reference point from which it can move and to which it can return. Without such a central point, the body would have the difficult task of learning a new set of movement patterns each time the person changed his position of residence. With a fixed point of dwelling, the body would no longer be required to relearn such new movements, since the person would continuously leave from and return to the same place.

The phenomenological literature has also suggested that at the lived center of his lived space the individual can create an inner world and be the self he really is -- it is his "first world," to use Bachelard's phrase. In this place man can return to himself and redefine his true essence. Without it, Bachelard suggests, man is a "dispersed being."[13]

As geographers, we must more clearly determine if centering is an integral part of human experience, and just as importantly, we must consider the roles that actual physical space, place, and environment have in centering. For example, does the home necessarily require actual physical

substance and position in space? Do individuals who live in no physically stable location, for instance, gypsies, lose something in life experience, or do they carry some kind of center with them -- perhaps their wagon or a cherished heirloom? It may be that centering is relatively independent of physical space and environment -- perhaps it has more to do with a happy social environment? And what effect does the need for centering have on the many people of today with a transient life style -- young people on the move, business move frequently switching jobs? Does a lack of stability produce negative effects on such life situations?[14] If centering is as crucial a structure in human experience as the phenomenological literature suggests, then all these questions are of crucial concern to the geographer.

The geographer also needs to consider more closely the notion of sacred space. It was suggested at the beginning of this essay that for modern man, space and place are very much devoid of meaning -- the technologies of communication and transportation have overcome and levelled geographical distances and sites. To fill this possible emptiness of meaning there may be needed a kind of geographical aesthetic, which might help to reaffirm the significance of space in human experience. The existence of sacred space in the past indicates that older cultures' relationship with the world around them included an attitude of concern which manifested itself spatially. If as contemporary men we wish to reestablish this orientation of concern, then we need to understand how men of the past came to know their world space and feel religious attachment for it. Out of this discovery, we might begin to find the potential richness in the meaning of geographical space.

Of course, a major difficulty with the notion of lived space is that it is contrived and mostly refers to space, which is but an artificial portion of geographical experience. As we live as beings in a geographical world, that world encompasses more than just space -- it includes environments, places, landscapes -- and that confusing term, nature. Or more accurately, that world conjures up a subtle and organic concoction of all these geographical ingredients. Thus, the notion of lived space provides an entry into the world of geographical experience of the geographer, but ultimately his patterning of lived geography must extend farther and become more intricate. For in the end, the geographical lived world encompasses considerably more than just lived space.

FOOTNOTES

1. Because of conventional social science's search for theories and laws, man's existential situation as a being in a geographical world has only recently become an accepted topic of study in geography, though earlier students such as Von Humboldt, Vidal de la Blache, and Wright were aware of the importance of such study--but not in these terms. Generally, the social scientist's focus has been on other men's attitudes, perceptions, behaviors, experiences relating to environment, landscape, nature. Now, as a result of a new humanism and the increasing influence of phenomenology and existentialism, geographers are beginning to ask some crucial new questions: What am I as a being in a geographical world? What are my attitudes, perceptions, behaviors, experiences in terms of environment, landscape, nature? What are my responsibilities as a citizen of the earth? In other words, social science is finally beginning to realize that to understand what other men are, he first must understand what he himself is, and the striking discovery here is that he knows practically nothing about himself. Marvin Samuels' dissertation, Science and Geography: An Existential Appraisal (Seattle, Washington: University of Washington, 1971) is so far one of the best pieces written on the importance of an existential viewpoint in geography; several of the points made in this present paper are suggested by Samuels' work. This essay also owes very much to Anne Buttimer; her Values in Geography (Washington, D.C.: Association of American Geographers, 1974) is an excellent introduction to existentialism and phenomenology as they might help the geographer better understand himself and his responsibilities as scholar, teacher, and human being. In a broader vein, Theodore Roszak's Where the Wasteland Ends (New York: Doubleday, 1973) is a brilliant critique of man's present environmental life style and traditional Western science, which has unintentionally done so much to alienate man from himself; this book cogently explains the need for increased self-study in today's turbulent world.

2. Mircea Eliade, The Sacred and the Profane, New York: Harcourt, Brace, and World, 1959. Another excellent book that subtly suggests that modern man has ruptured himself spiritually from his natural world.

3. Maurice Merleau-Ponty, The Phenomenology of Perception, New York: The Humanities Press, 1963, p. 252.

4. Three useful introductions to the relation of phenomenology to geography are Edward Relph's "An Inquiry Into the Relations Between Phenomenology and Geography," Canadian Geographer, 14 (1970), 193-201; Yi-Fu Tuan's "Geography, Phenomenology, and the Study of Human Nature," Canadian Geographer, 15 (1971), 181-192; and Anne Buttimer's Values in Geography, particularly the appendix. One of the best overall introductions to the phenomenological method is Herbert Spiegelberg's The Phenomenological Movement (The Hague: Martinis Nijhoff, 1965, Volume 2 is especially good because it includes an explication of the phenomenological method. For a good overview of work done in existential phenomenology, which is the basis for this present paper, see N. Lawrence and D. O'Connor (eds.), Readings in Existential Phenomenology (Englewood Cliffs, New Jersey: Prentice-Hall, 1963).

5. Sadly, little work has been done to assist people in better understanding their own everyday experience--geographical and otherwise. A superb example of this kind of 'do-it-yourself' phenomenology is Johann von Goethe's Theory of Colours, originally published in 1810 (Cambridge: MIT Press, 1970). In this book, Goethe provides a series of experiments that the reader may conduct for himself to discover the nature of light and order as they manifest in his own experience. Many of Goethe's descriptions of color experience in the everyday geographical world--for example, colored shadows--are stunning. The most exciting thing about a work like Goethe's is that the student actually comes to understand color experentially--not just intellectually, which is the case of conventional science. In his dissertation, the present author is seeking to create a program for discovering some basic dimensions of everyday geographical experience in this same 'do-it-yourself' way.

6. Two good overviews of lived-space are O. F. Bollnow's article, "Lived-Space", in Lawrence and O'Connor (see note 4 above); and Christian Nordberg-Schultz's Existence, Space, and Architecture, especially Chapters 1 and 2 (New York: Praeger, 1971).

7. In his Phenomenology of Perception, pp. 280-282, Merleau-Ponty provides an excellent discussion of our taken-for-granted immersion in the everyday world; especially good is his description of a walk through Paris, p. 281. The phenomenon of immersion is crucial to a proper understanding of man's encounter with his everyday environment; geographers need to consider it in much more detail, starting with illuminating insights that Merleau-Ponty provides.

8. Actually, the description of intentionality offered here is a bit too simplistic. For the phenomenologist, intentionality is the crucial characteristic of human consciousness: we are always conscious of something, we are always directed towards something. At the same time, the object of our intention works to direct our intention, thus there is a kind of continuous sustaining dialectic between intentionality and world intended. In terms of the mentioned park, my wish to know the park sustains my familiarization and understanding of the park, which in turn sustains my wish to know more. For each person, the park as an intented object will be a different place, because everyone has a different constellation of intentionalities relating to the park. Thus, for the walker on the way to work, the park may have no significance at all--it may be nothing but an unnoticed space that must be crossed on the way to work. For the teenager, the park may be a basketball court: for the old man it may be a bench and a daily afternoon chat with cronies in the summer sun. In short, the intentional threads that immerse man in his world are unique for each person. In part, the phenomenologist is interested in discovering if out of the uniqueness of individuals' constellations of intentionality, there are shared patterns--for example, the need for centering--which are common for many people--perhaps all people.

9. Bollnow, p. 180.

10. Gaston Bachelard, The Poetics of Space (Boston: Beacon, 1964), p. 7.

11. Bollnow, p. 180.

12. Merleau-Ponty, especially Part I, Chapter 3, "The Spatiality of One's Own Body and Motility."

13. Bachelard, p. 7.

14. For one interesting but sketchy commentary on transience in today's world, see Chapter 5, "Places: The New Nomads," in Alvin Toffler's Future Shock (New York: Bantum, 1970). Also very pertinent here is the life of the American migrant worker, who is vividly described in part by Robert Coles in his cogent book, Migrants, Sharecroppers, and Mountaineers (New York: Little, Brown and Company, 1967). This book's descriptions of peoples' contact with the land are extraordinarily beautiful and revealing. They provide a wealth of experential information that could be usefully incorporated into a phenomenological investigation of geographical experience.

TIME-SPACE: THE McHARG-HÄGERSTRAND MODEL

By Paul Oberg

From Torsten Hägerstrand's paper, "The Use of Time and Structure of Space", has come a new conceptualization of how people behave in relation to space. There are several qualities of the time-space concept which make it a particularly useful idea. First, it is a purely descriptive model, one which avoids the controversies of causality in the relationship between man and environment. And as a descriptive model it is graphically simple, being easily constructed, and quickly and easily grasped by the reader.

Secondly, Hagerstrand's time-space model tackles the most fundamental issue of man-environment relationships, that of the everyday, normal life of normal people. The vast majority of human bahavior occurs in "familiar places at familiar times." But still the most striking quality of the model is the degree to which it can be manipulated. By specifying only temporal and spatial parameters a great deal of flexibility and a wide range of application is afforded, as all processes must occur in time and space.

Briefly, the time-space model has been used to trace human movement during a given period of time, and to measure accessibility landscapes. An individual's ability to move in space, or possession of potential access to a given location, is limited by a set of constraints. These constraints have been labeled "capability constraints", "coupling constraints", and "authority constraints".

Capability constraints refer to the individual and his specific situation. Such constraints can be seen as partially the result of biological make-up, and partially as a techno-cultural variable. Man has increased his "potential space", for a given amount of time, through the invention of devices to "overcome" his natural means of locomotion, such as the domestication of the horse, and the jumbo-jet.

Coupling constraints define where, when, and for how long the individual has to join other individuals, tools, and materials in order to produce, consume, and transact. Activities which require a piece of anothers time-space budget, or tools not generally in the possession of the individual, are controlled by coupling constraints.

Authority constraints spring from the basic characteristics of what Hagerstrand terms "domains". A domain is defined as a time-space entity within which things and events are under the control of a given individual or a given group. Whether or not one can purchase beer after midnight, or a child can leave the schoolroom during class, is controlled by authority constraints.

All of these constraints result in a daily time-space budget, or a "daily prism"(see figure 1). Daily prisms operate under the assumption of daily normalcy which includes two items. One, people's daily lives are organized according to a twenty-four hour day; and two, activities during the normal day always begin and end at one's home. But in terms of con-

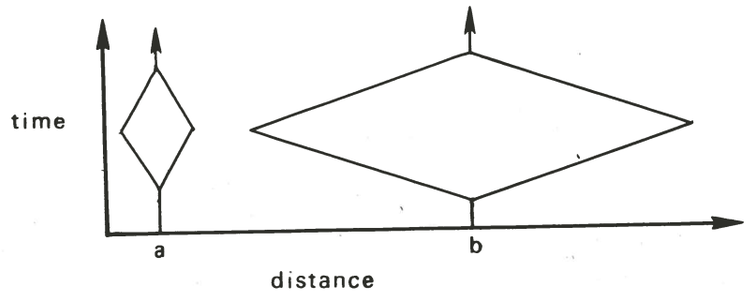


Fig. 1. Daily prisms, where "a" and "b" are residential stations. Because the mode of transport from "b" is more efficient, that daily prism is larger (after A. Pred)

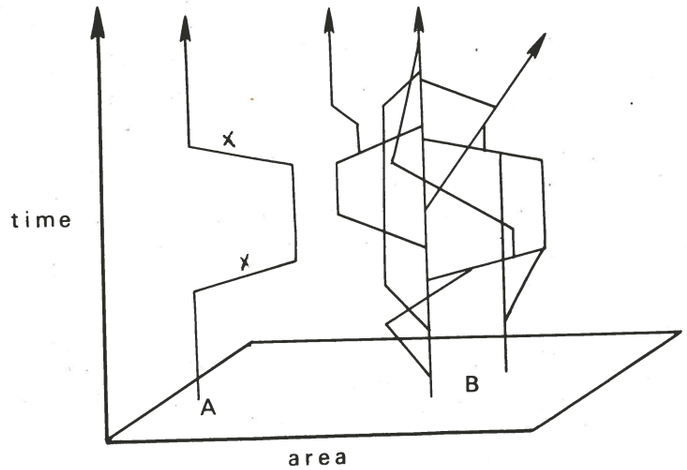


Fig. 2(a). Time-space path, where "a" represents home, and "b" denotes another location in space, for example, place of work. Movement to and from "b" is shown by lines "x". (After A. Pred)

Fig. 2(b). Multiple time-space paths of "John Doe", demonstrating the confusion caused when several paths are combined for the use of general description of time-space behavior.

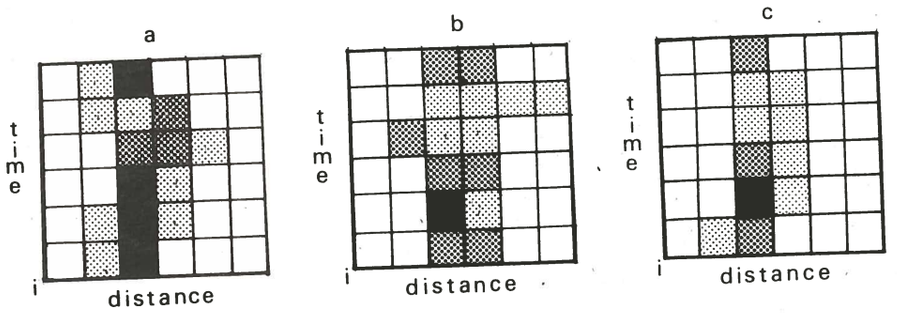
straints it is easy to see that individual time-space budgets vary for different individuals. An automobile driver has a wider space potential than does a walker. One who needs more sleep has a narrower time budget. The invalid and the bedridden are limited by coupling constraints.

For most individuals, merely describing their daily prism is not enough, at least in "modern" cultures. The degree to which invention has increased man's potential movement, even assuming daily activities begin and end at home, is so great that a general daily prism may actually describe little about the environment in which that individual has spent his time. But Hägerstrand's model can be used to describe movement for an individual during a single specified day (see figure 2a). One obvious difference between the daily prism and the more specific time-space path of an individual is the graphic complexity. The former is two-dimensional while the latter is "three-dimensional". And herein lies the hurdle to more meaningful use of the model as a descriptive tool.

If one accepts the notion of the limitations of the use of daily prisms, because of the mere scope, and can appreciate the difficulty in generalizing the description of behavior with a flat "three-dimensional" representation, then the problem is immediately apparent. For example, if it were advantageous to have a general look at how John Doe uses time and space, and he usually goes to work, and usually eats lunch at the same time and place, and usually has no social or business meetings at night, one would learn very little by constructing a daily prism. Likewise, if the specific time-space paths of John Doe are drawn up for a month, and plotted together for the purpose of general description, the convenience and clarity of the model are gone (see figure 2b). This is also true if one is interested in a general description of behavior of a group of people, even if the graphic representation is based upon one single day.

From Ian McHarg's work with cost-benefit planning of highways comes a perhaps unlikely answer to the problem of generalization with Hägerstrand's concept. By specifying the variables pertinent to a locational problem, the variables can be isolated, and "optimal" paths or sites may be fixed according to the criteria appropriate to each variable. McHarg realizes though, all particular spaces to not fall into the categories of best or worst, but that degrees of favorability exist. For example, obviously the least expensive plot is optimal and the most expensive plot is pessimal, but other parcels of land fall into intermediate categories. If a transparency is made for the area in question for each variable, and the most desirable locations are left clear, while the least likely locations are colored some designated shade of grey (with locations falling between optimal and undesirable also falling between clear and the darkest grey, and in the same order), then a map can be constructed for that area based upon those criteria. When the transparencies are overlapped the "best" path of location will be the "clearest" or the lightest shade of grey, while, because of the shades of grey are additive, the most costly areas will approach black.

The grey-scale technique can be applied to time-space budgets, but the scale is not from "best" to "worst", but from most likely to least likely occupations of space in a given time interval. To generalize about an individual's time-space path is to realize that the individual does not arrive at work at the same time every day, or that he only goes



Figures 3(a) and 3(b) show the daily prisms of person "a" and person "b" in terms of distance from point "i". Figure 3(c) shows the potential in terms of probabilities of both persons "a" and "b" being in the same place at the same time.

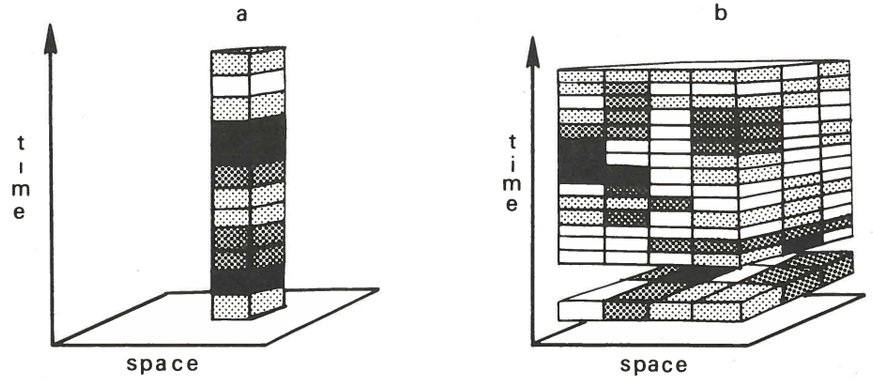


Figure 4(a) is an example of a "space specific" time-space interaction model The "time specific" model, Figure 4(b) can be used to show spatial behavior or interaction within a given interval of time.

bowling on Wednesday night. But it can be said that on a normal day that individual will probably be here or there at a given time. And each space in time can be assigned a probability according to one's behavior. A place which an individual never visits has a probability of zero for that person, and other places at certain times, say at home in bed at three o'clock in the morning, will have a probability associated with it which approaches one. So by applying McHarg's grey-scale to behavior in space, with the highest probabilities at one end of the grey-scale, and the lowest probabilities at the other, a probabilistic daily prism, or time-space path will appear (see figure 3).

This process can be used in one of at least two ways. First, specific data can be collected which plots movement for each day over several days. By overlaying these plots an individual's normal time-space budget becomes more apparent. And if this process is done for several people, and then combined, the final product will approximate a potential interactive system in time and space. The darker the space, the more likely that at least two of the people in the sample will be occupying that space at the same time. (Although McHarg's grey scaling goes from light to dark the scales in this paper are in reverse order.) The potential interaction graph does not show interaction, but only indicates that the possibility of interaction in that space and at that time does exist.

The shortcomings of this simple approach are twofold. While one axis is time, the other is not space, but distance. Therefore, the existence of a greater than zero probability in any box, identically located for two or more people, does not necessarily indicate the same parcel of space. It simply indicates that the space is at an equal distance from some central point. In other words the areal aspect of the time-space model is lost.

Secondly, this method is not compatible with three-dimensional representation. The darker sections of the model which are in the foreground will obscure the probabilities associated with the spaces in the background. This problem can be overcome in numerous ways.

If the primary interest is in one specific area of space, the graphic representation can be made "space specific" (see figure 4a). In other words, the model would become a single column, with different levels of activity occurring in different temporal sections of a specified space. Conversely, if the primary interest is in specific people or a group of people, the model can be split into areas of equal time, or made "time specific" (see figure 4b). In this manner movement can be "viewed" by a "stop-camera" technique.

In studies where potential interaction between individuals is of interest, and where the individuals constitute a "group" and interaction occurs primarily within a few specific places, another technique can be applied. By constructing a graph with one axis representing the potential interaction, or probability of interaction, and the other axis representing time, space specific curves can be drawn, showing the relative level of interaction at each place for each time period (see figure 5).

The impact of Hägerstrand's recently developed time-space concept has not yet been felt, but the degree of interest it has raised so far is probably a good indicator of its potential. Its implications for man-environmental geography are obvious. Indeed, at this stage in the development of behavioral geography, and environmental psychology, any method which delineates not only the environmental variables, but also behavioral rhythms, is invaluable.

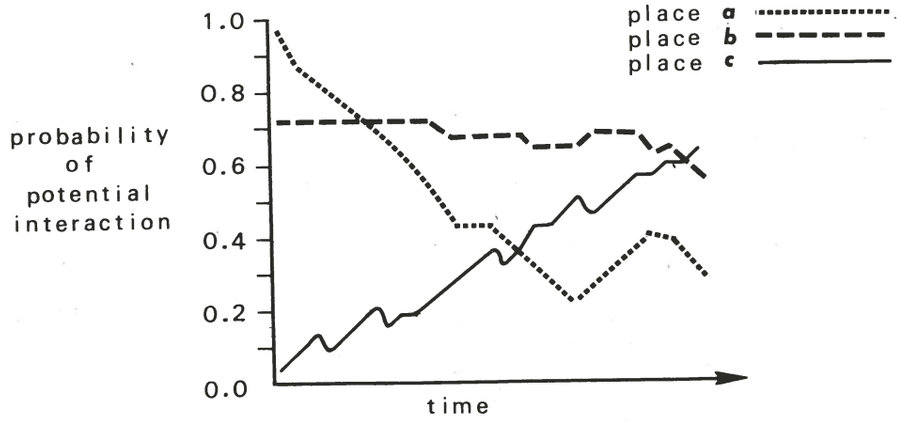


Fig. 5. Space specific potential interaction probabilities over time.

To some degree, a distance decay function comes into play in the influence between the environment and human behavior. It seems reasonable to expect more influence on one's behavior from someone occupying the same time-space, than from someone remote to that place at that time. The technological increase in communication and transportation has probably reduced the significance of this relationship. By introducing probablistic time-space behavior the importance of frequency of interaction with the environment can also be operationalized. This is not to say that the "environment" which is most often the closest to an individual is the strongest influence upon his behavior. It only suggests that the "behavioral variables" can now be observed and "measured" in a manner which is more realistically related to actual behavior.

Furthermore, the environment is not stable throughout the normal day. It fluctuates with time, and often in space, much the same way as does human behavior. With the use of the grey-scale technique the patterns and rhythms of the environment can be described in terms of the amount of traffic, the level of noise, the intensity of light, the degree of pollution, and so on. The combination of evnrionmental rhythms and behavioral patterns is also possible and might demonstrate how normal behavior and the normal environment vary throughout the day.

Individual time-space budgets vary in many aspects, or along different continua. By constructing a matrix from any two varying criteria normal daily prisms can be simply categorized. For example, one variable of the matrix might be a measure of the total potential area covered by an individual in a normal day, and depending upon an arbitrary limit, one "belongs to" either an "open," or large, system, or a "closed," or small system. In this sense area is thought of as distance from some point of origin, usually one's home. The other variable of the matrix is concerned with direction. If one's time-space path tends to follow straight lines, or to be bi-polar, then it is said to be "linear." Those who exhibit patterns more evenly distributed around the point of origin fall into the category of "spatial" time-space patterns.

To further illustrate this categorization, a few examples may be helpful. Commuters or elderly people might exhibit much the same pattern in that their normal daily prisms tend to approximate a straight line in space (but not in time). Such patterns are linear, as would be the time-space budget of an airplane pilot. The daily prism representative of an ethnic life style tends not to be confined to a corridor of space, but rather approximates a circle. Ethnics, farmers, cab drivers, and salesmen would be expected to have such "spatial" patterns. On the other hand the ethnic and the elderly people generally travel only short distances from their home, and therefore fit into "closed" systems. Salesmen and commuters will usually fall into the category of "open" systems because of the greater distances they travel from home each day.

It is important to point out that this categorization is mainly based upon the spatial aspects of time-space budgets and is by no means the only manner in which they can be arranged. Temporal-spatial patterns also vary in the amount of time which is "mortgaged," or pre-structured, or the degree to which time-space is parcelled or continuous, or undoubtedly in several other meaningful ways.

Temporal and spatial measurements need not be restricted to conventional intervals. Space may be weighted such that more important sections are enlarged, or probabilities associated with those sections can be shifted. Spatial relationships may be distorted, as may be necessary in the case of multi-story buildings. Space or distance may be scaled in terms of time or access. In other words, a given space may be five or ten minutes away, or it might be open or closed to different individuals.

Time may be "warped" according to the "type" of time concerned. In a cognitive sense some time periods are relatively longer than others, although the same number of minutes has passed. Stressful situations may drag while relaxing or enjoyable times may pass quickly. The cognitive length of time may differ between structured situations, such as work duties, and unstructured times, or "free-time" situations.

Again, it is the flexibility built into the probabilistic time-space model which makes it such a potentially potent descriptive instrument. Most processes should be easily accommodated by this concept. In lieu of the usual call for further research, I wish simply to urge the use and further development of the model.

COMPARISONS OF CONNECTIVITY: TOWARD A PERSPECTIVE ON DEVELOPMENT IN THE LEAST DEVELOPED COUNTRIES

By Garry Kessler

The UN has recently developed a list of 25 least developed nations, using such criteria as 100 dollars or less GDP per capita, 20% or less literate population over 15 years old, and 10% or less share of GNP in manufacturing.

In order to find ways to understand how level of development is manifested in the national physical infrastructures of these countries, it is first necessary to identify which infrastructures are to be examined and then to describe these infrastructures in a way which permits comparisons of one to another. By way of definition, an infrastructure is a network of interconnected flows. These flows may be either tangible or intangible, such as goods transported on a railroad system or ideas disseminated by an educational system. Similarly, the networks themselves may be either visible (physical) or invisible (institutional), like the wires of a telephone system or the space over the back fences of a gossip net, both of which may transmit essentially the same type of flows. For the purposes of this paper only a country's internal, land-based, transportation networks (road and rail), and later only a portion of them, will be considered.

A country's transportation network may serve a variety of purposes and hence be described in a variety of ways, depending on the nature of the flows. Gould, in his study of Ghana, focused on commodity flows while showing the development of the infrastructure through time. Such a system is, therefore, composed of the producing and exporting localities. That the 25 least developed countries, like Ghana, rely on but one or two, if any, primary exports facilitates such an approach. However, at the same time, this shifts the focus away from direct attention to the peoples of the nations to goods which are consumed by external markets.

That these external markets have been and probably will continue to be a primary factor in shaping the infrastructures is not denied. However, if these countries are to obtain some degree of strength, they must be able to rely on some degree of internal commercial strength. With this in mind, an infrastructure should not be approached with the question "why was it built this way?" but with "here it is - how well can it serve internal commerce and the people?"

For this reason, this study was based on population data, the urban hierarchy. As a limited amount of demographic data for these countries was available to us, Mali, Ethiopia, Somalia, Sierra Leone, and the Malagasy Republic have been chosen as representative of the 25 for a pilot study. To delineate their urban hierarchies, their cities were grouped into categories by population size to obtain a vector of frequencies.

As working with the entire urban hierarchy would have been cumbersome, a cutoff had to be established in this vector. It had to be made under assumptions that allowed intercountry comparisons. This immediately ruled out the use of the UN percent urban statistic in establishing a cutoff because the ground rules for this statistic are not consistent

from country to country. With no alternative procedure available, arbitrary cutoffs were assigned where the cumulative frequency curves departed sharply from vertical. (In the case of Ethiopia, however, instead of all cities up to 15,000 only those up to 10,000 were excluded because it was not felt that 17 nodes were representative of the system). The following table includes the cutoffs being used and the percentages of the total populations implied.

Table 1

Country	Cutoff	% Total Population	UN % Urban (Year)	
Mali	10,000	8.0	11.0	(1961)
Ethiopia	10,000	7.0	8.9	(1969)
Somalia	10,000	9.5	20.0	(1970)
Sierra Leone	5,000	11.0	14.0	(1970)
Malagasy Republic	15,000	13.0	14.1	(1970)

This established a set of nodes (cities) uniquely arranged in space for each of the countries. What remained was to link the nodes to each other. To accomplish this, a rather loose definition of link was used. All-weather roads and rail lines were considered equivalent and used for links. Multiple links were counted as one, with the shortest link being used. If there had been an occasion, rivers would have been treated similarly. Ocean and river ferries were considered as bridges. These were arbitrary decisions solely designed to reduce complications while attempting not to distort the networks. These decisions would have to be reconsidered if internal evaluations of the networks were the goal, instead of international rankings.

With base maps constructed from these nodes and links, it became possible to examine some of the characteristics of the infrastructures relating to development. Immediately apparent from the maps are vast areas of the countries which contain nothing at all. These areas tend to be relatively undeveloped because of their harsh environments and the lack of resources necessary to overcome them.

To obtain an index inversely related to the size of this relatively undeveloped area, a country's roads were assumed to serve an area of approximately 15 km to each side. (Ref. note: Harvey, M., "Urban Hierarchy - Sierra Leone," Econ. Geog., July, 1974.) The figures in Table 2 below were obtained by superimposing a grid on the map of each country. The grid was oriented parallel to the line connecting the most populous city and a center point (found by averaging the x and y sums of the cartestian coordinates of all of the nodes). This method of grid orientation avoided any possible bias which could have been introduced by a constant compas orientation by providing a unique, essentially random direction for each country.

Grid size was varied in proportion to map scale to obtain grid cells of a constant 30 km in size. Both the total area of the country and the number of cells intersecting with roads were counted. When counting the cells on the roads, care was taken not to double count the cells at the intersections of more than one road. Roads within the border of the country but connected to nodes outside the country were considered to be

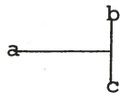
part of the internal system. To obtain the index, the number of road cells was divided by total cells. The following is the result.

Table 2

Country	% Area on Net
Mali	15.8
Ethiopia	22.8
Somalia	29.1
Sierra Leone	55.3
Malagasy Republic	28.4

Further information may be obtained by weighing the grid cells on the net with their respective populations from a density map. This would yield a second index of population less than 15 km from a road. However, the required density maps have not yet been obtained to do this.

Kansky developed a number of graph theoretic indices for the purpose of examining the structure of the net itself. However, an examination of some of the assumptions underlying his work prevents adoption of the indices. He defines a link as connecting two and only two nodes. This immediately creates difficulties. An examination of any of the base maps reveals many violations of the one-link-two-node relationship. There are a number of causes for this situation. The data cutoffs, for instance, eliminated nodes at some intersections. More importantly though, systems such as the Malagasy Republic are substantially trunk-feeder systems and all of the countries display this to some degree. To illustrate the degree of the problem, all of the one link connections for each node were summed and divided by the number of nodes minus one (minus one because a node was not counted as linked to itself). This yielded the number of one link connections for an average node ($\bar{C}$) according to Kansky's assumptions. Then the number of roads eminating from each node were summed and similarly divided, obtaining the number of actual roads eminating from an average node ($\bar{R}$). $\bar{R}$ was then subtracted from $\bar{C}$, and the difference divided by $\bar{C}$ to obtain the percent of one link connections due to the trunk-feeder aspects of the system or in other words, the percent violation of the Kansky assumption. For example, assuming the following system (a, b, c)



n = 3

the result would be:

C		R			
a	2	a	1	$\bar{C}$	3.00
b	2	b	1	$\bar{R}$	1.50
c	2	c	1	$\bar{C}-\bar{R}$	1.50
total	6	total	3	$(\bar{C}-\bar{R})/\bar{C}$	.50
				$\bar{R}/\bar{C}$	.50

The following table indicates significant differences between the Kansky type connections and the actual roads, as high as 50% in two of the countries.

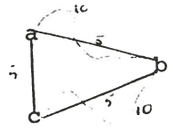
Table 3

Country	$\overline{C}$	$\overline{R}$	$\overline{C}-\overline{R}$	$(\overline{C}-\overline{R})/\overline{C}$	$\overline{R}/\overline{C}$
Mali	3.38	2.46	0.92	.27	.73
Ethiopia	3.03	2.20	0.83	.27	.73
Somalia	3.42	2.15	1.27	.37	.63
Sierra Leone	4.23	2.12	2.11	.50	.50
Malagasy Republic	3.88	1.94	1.94	.50	.50

Furthermore, Kansky's link is defined as being of unit length. This implies that his graphs (maps) are shape independent. The maps of the five countries, however, are specifically and uniquely oriented in space. Their shapes are relevant aspects of the networks' abilities to function. For example, take two maps of three nodes each. Each map connects the three by links of the least possible road distance. Therefore, both maps are ideally connected. Now one map (A ▽) contains three edges, while the other (B, ⟋⟍) contains two. Naturally, graph theoretic measures, based on nodes and edges, show that A is better connected than B, while our assumptions, based on internodal distances, stated that they were both ideally connected. Shape just cannot be ignored in the real world.

With the definition of a link established, Kansky proceeded by defining a path between two nodes (A and B) as that route which contains the least number of links to get from A to B. This would not have presented an insurmountable obstacle if the subject of study were a city, often having fairly uniformly block sizes, or even a developed country where road densities are relatively high and uniform yielding a fairly consistent road length between nodes. Even for a group of cities or nations, the differences in scales could be accounted for by the average road lengths. In the countries under study, though, it is already apparent from Table 2 that road densities are neither high nor uniform. Therefore, the true shortest path in km frequently is not the shortest path in links. To assume that the travelled route from A to B is the one with the least links, just is not realistic.

Rather than forcing Kansky's model on the countries and consequently distorting the systems to fit the definitions, for this study, the concept of links was discarded, and three new definitions were set down. Dc_{ij} is the shortest straight line distance between any two nodes i and j; Dr_{ij} - the shortest road distance from i to j; Ds_{ij} - the straight line distance between i and j following the shortest road path. So for a system of three nodes (a, b, c)



the distance matrices would be:

	a	b	c
a	-	5	5
b	5	-	5
c	5	5	-

/Dc

	a	b	c
a	-	5	10
b	5	-	5
c	10	5	-

/Dt

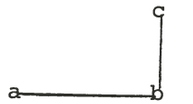
	a	b	c
a	-	10	20
b	10	-	10
c	20	10	-

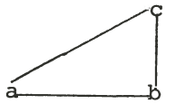
/Dr

These are, also, least path matrices, quite analogous to the least path link matrix described by Haggett and Chorley, and those suggested by König and Shimbel. Summing the rows of the matrices yields a vector of vertex accessibility numbers (va) and the sum of Va is the dispersion (D).

Three indices were developed based on the three dispersions: Dc - the minimum total internodal distance (the ideal), Dr - the total road distance (the actual), and Ds - the total structural distance. These dispersions are graphically represented for a theoretic network (a, b, c) by the following:

Dr,  - the actual road system

Ds,  - the structural system

Dc,  - the ideal system

where $Dr \geq Ds \geq Dc$ and $Ds_{ab} = Dc_{ab}$, $Ds_{bc} = Dc_{bc}$. The difference of the structural from the actual (Dr-Ds) represents the effect of terrain. It should be noted that this definition ignores the variable altitude aspect of terrain and includes only the two-dimensional components displayed by a flat map. The difference of the ideal from the structural (Ds-Dc) is the structural component of the system. In the example above, it would equal $(Ds_{ab}+Ds_{bc})-Dc_{ac}$. In other words, the effect of the structural component is the sum of those distances which must be travelled when there is no direct link between two nodes minus the length of such a direct link. The sum of the effects of both terrain and the structural component is also useful in that it is the difference of the ideal from the actual (Dr-Dc). As already noted, when international comparisons are made, differences in scale must be accounted for. One method of doing this in a manner that facilitates interpretation is to express each of the differences as a percentage of the ideal, obtaining the set of inefficiencies: (Dr-Ds)/Dc for terrain, (Ds/Dc)-1 for structural, (Dr/Dc)-1 for both combined.

The following table was compiled by calculating these indices for the five countries under study, plus the United States.

Table 4

Country	(Dr-Ds)/Dc	(Ds/Dc)-1	(Dr/Dc)-1
Mali	.13	.17	.30
Ethiopia	.14	.29	.43
Somalia	.12	.12	.25
Sierra Leone	.10	.24	.34
Malagasy Republic	.18	.23	.40
United States	.14	.08	.22

Before concluding, there is still a loose end to be tied up. In almost all of the statistics discussed above, factors having to do with the size of the system were divided out. As this information is at least descriptively relevant, it should be recaptured by an index. Average link length will satisfy the need. Merely to divide total road length by the number of links is insufficient, however. Our interest is in the average link as it is used by the system. To obtain this, Dr must be divided by the dispersion of the link matrix of shortest road distance paths (Dl). This is required because the same link is usually on many different routes connecting a variety of nodes. It should, also, be emphasized that the dispersion statistics discussed above also take this into account as they were similarly calculated. Below is a table of the average link lengths.

Table 5

Country	Length
Mali	234 km
Ethiopia	128 km
Somalia	266 km
Sierra Leone	66 km
Malagasy Republic	237 km

For the purposes of discussion, one may view the content of this paper in distinct sections. The first section deals with access between two entities, the urban network and the country as a whole. The urban network seen in terms of roads, while the country as a whole can be viewed either in terms of its population or its land. However, as already noted, the accessibility between a country's population and the roads of its urban network was not measured. Nevertheless, in conjunction with a scale factor (average link length - Table 5), the land-road accessibility factor (% Area on net - Table 2) serves primarily to describe the wide variety of physical situations represented by these countries.

Mali, for instance, is a huge country with an average link length of 234 km and only about 16% of its area close to the main roads. Sierra Leone, on the other hand, is relatively compact with an average link length of only 65 km and 55% of its area on the roads. This simply means that it is easier to get around Sierra Leone than Mali. It does not imply that Sierra Leone satisfies transportation needs better than Mali. A quick look at a map will show that most of those hard-to-get-to places in Mali are in the desert, and not too many people want to get to them anyway.

A second set of statistics is concerned with accessibilities only within the urban network itself, or the internal efficiency of the network. Actually, the statistics calculated are theoretical inefficiencies coming from two distinct sources. There is the terrain factor which assumes that all of a road's deviations from a straight line path are due solely to the effects of terrain. This ignores the possibility that the road departs from the straight line in order to cut through a more densely populated area. In addition, this statistic only accounts for the deviations in existing roads. It does not account for the effects of roads that have not only been rerouted but have not been built at all because of bad terrain. Those effects are included in the second source of inefficiency.

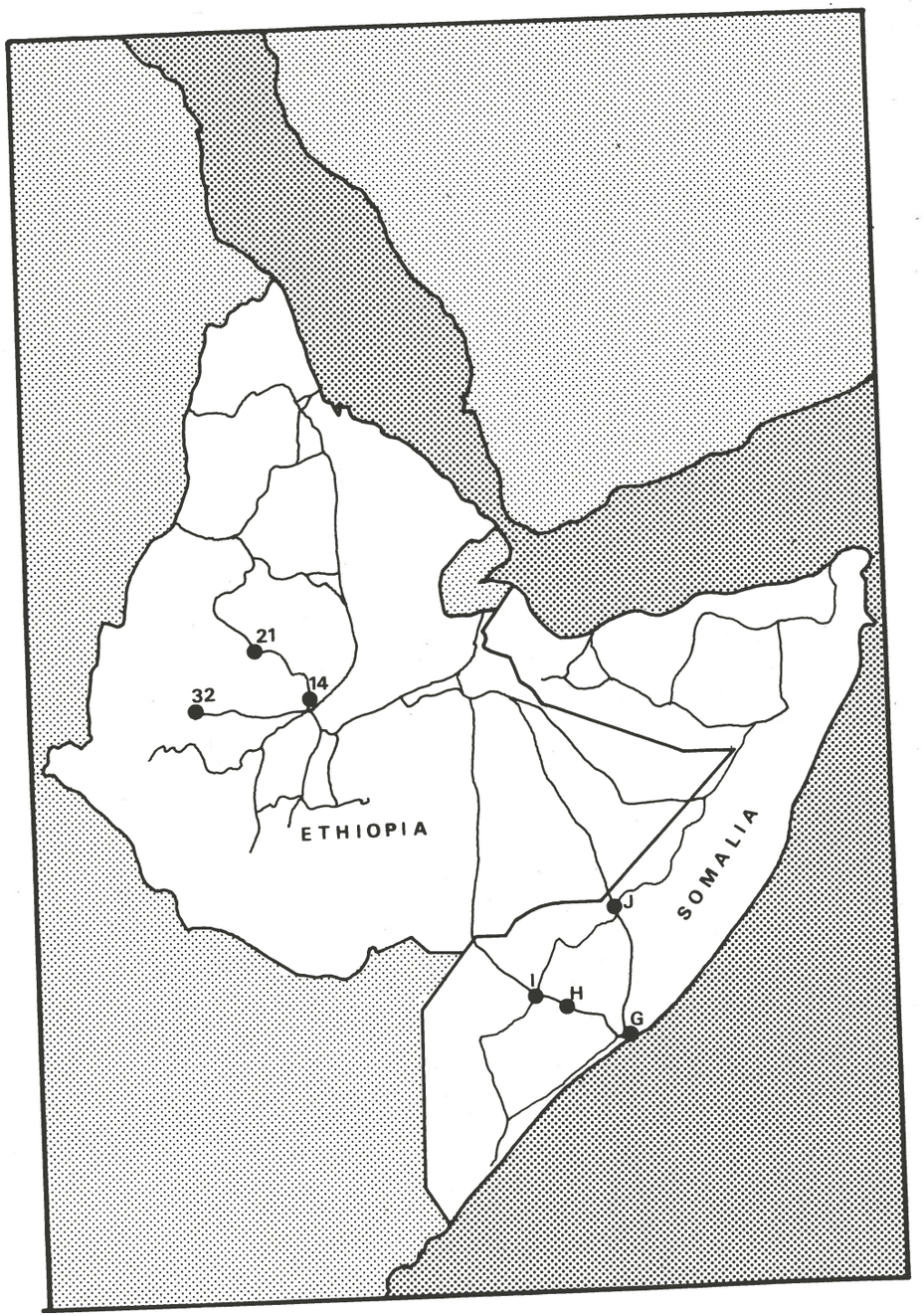
As previously discussed, this second source of inefficiency is structural. As with the terrain factor, this inefficiency is beasured against an ideal. In this case the ideal is assumed to minimize travel distances, such that for a three city system the ideal network would appear as a triangle, a—c—b. However, when new roads are proposed there is an additional consideration. It is cost, and cost is a function of road length. Therefore, a second ideal that minimizes total road length is possible. For the same three city system, it would appear as a Y, a Y b. Obviously, when roads are built, these to goals must be compromised with each other. However, operating efficiency is the primary concern in this study, and to evaluate it the first standard, that of distance minimization is sufficient.

It is this evaluation of efficiency with respect to terrain and structure that now provides some insights into how a nation's level of development manifests itself in the physical infrastructure. Terrain appears to be the proverbial immovable obstacle. Within the five country sample, all of the values for the effects of terrain cluster around 13 to 14 percent inefficiency, even though a degree of variation is displayed between the Malagasy Republic (.178) and Sierra Leone (.103). When a comparable analysis was made of the urban network of the twenty-six largest cities in the United States, a terrain factor of .138 was obtained. Albeit, the sample size is really too small for generalizations, however, within the sample developing countries overcome the terrain obstacle to no lesser degree than developed nations do.

In the area of structural efficiency there are some significant differences, however. The sample of five countries breaks down into two distinct groups: one composed of Somalia (.122) and Mali (.166); and the other composed of the Malagasy Republic (.227), Sierra Leone (.241), and Ethiopia (.285). In theory, these countries represent points on a continuum. However, for this discussion it is helpful to think of them as falling into to distinct groups, one at .14 and the other at .24.

In comparing the networks of Somalia and Ethiopia, a qualitative difference in the structures is notable. The network of Somalis is geometrically composed primarily of closed polygons of six sides of less (such as the triangle formed by the Bardoa, Belet Uen, and Mogadiscio - nodes I, J, G respectively, although this would not be so without the two major roads that go through Ethiopia. In polygons containing more than three cities, the diagonals (such as from Bar Acaba - node H to Belet Uen - node J) are not filled in to any great degree.

On the other hand, the Ethiopian network contains a number of in-



complete polygons in its composition. (For instance, the straight line route from Addis Ababa - node 14 to Nekempt - node 32 ends at Nekempt - node 32.) The structural index is most sensitive to these open-ended routes, as they represent the greatest structural inefficiencies. In other words, in order to get from Nekempt - 32 to Debra Markos - 21 in Ethiopia, one must go from Nekempt - 32 to Addis Ababa - 14 and then backtrack from Addis Ababa - 14 to Debra Markos - 21.

The diagonals begin to get filled in as the networks become more developed. Such is the case in the United States, where the structural inefficiency is .08. This means that the United States is over fifty percent more efficient than Group I and three-hundred percent more efficient than Group II.

There is, however, a possible source of bias that must be pointed out. It happens that Group I contains the two countries with the least nodes. Therefore, it is possible that the low inefficiencies of Group I are the result of having excluded the inefficient roads from the analysis, and that if more nodes had been used these roads would have been included. In this author's opinion this is not very likely.

The question now arises, "Is this index an indicator of a country's level of development?" In the sense that a more efficient network provides a greater potential for development, the answer is yes. But this does not imply that that potential is realized. To gauge that, flow analysis is needed.

Finally, when the term least developed nations is mentioned, people tend to think of a fairly homogeneous group. This appears to be far from the case. In fact, it is most likely the developed countries that form a homogeneous group. In all likelihood, the least developed fall into a number of different categories based on a number of different variables, accessibility being only one of these. The relationship between these categories and a country's development efforts is a major open question which this paper has by no means answered. However, the structuring of the approach contained in this paper is felt to be a step in the right direction.

STRESS RESEARCH USING THE TIME-SPACE GEOGRAPHIC FRAMEWORK

By Mick Godkin

A review of the recent social science literature concerning the origins of human behavior reveals the old dichotomy in perspective between the concepts of determinism and intentionality. In the deterministic tradition there is a basic division between man's behavior being firstly, of primordial origin and secondly, determined by his socio-cultural surroundings. It is in the former emphasis on primordial determination that the work of the Chicago human ecology school and the related social area analysis and factorial ecology lies. In psychology a similar emphasis is found in the work of Ardrey, Lorenz and Morris on territoriality and aggression. In respect to socio-cultural determination of behavior one can examine the work of the behaviorist school of psychology typified by B.F. Skinner or secondly, the symbolic interactionists, e.g., Scheff, Szasz, Becker and Mills or as traditionally interpreted, Marxists. In the intentionality tradition, the concept of man as a rational being determining his own destiny is seen in traditional economics with the assumption of a rational, economic profit-maximizing man, in geography with the assumption of voluntarist man, the decision-makers, (Wolpert and Harvey), in both psychology and geography in the cognition literature and in philosophy in phenomenology and exisistentialism.

Whilst accepting the idea that man is born with some innate drives, namely biogeric motives of oxygen, rest, hunger, thirst, sex, and adjustments to temperature and also differs one from another in his ability to be conditioned and capacity to retain various responses, it would appear that man's behavior is essentially a learned phenomena. Also, it would appear that the learning process is based on stimuli existing outside of the human organism namely in its environment, defined in the broadest sense. These stimuli in the environment provide reinforcements with degrees of positive to negative valences for certain types of behavior and man learns behavioral responses which he thinks will maximize his rewards and hence satisfaction in any given situation.

If one examines the stimuli that form the reward basis of the response patterns of individuals in the western industrial world, I would suggest that there are two basic types. Firstly, there are what could be called system rewarding stimuli, namely those which we learn to accept which automatically enhance the preservation of the capitalist system and its essential characteristics. Hence, during our socialization we learn and are rewarded for behaving in a rational manner, for automatically respecting the words and actions of those whom we are told are of high status, for maximizing means to ends rather than ends themselves, i.e., for maximizing exchange value in all our interactions, for competing, for producing and for consuming. In contrast to these rewarding stimuli we also learn to be rewarded by what could be termed self-rewarding stimuli. We find satisfaction in emotional expression, in autonomous behavior, in creativity, in the process as well as in the product, in cooperation and in passivity as well as activity. These rewards we learn in our relationships with our family (although of course system rewards

are also learned to be valued in this situation), friends, and on our own explorations.

Related to this it would appear that stressed behavior, physiologically defined, is largely a function of an imbalance in these two types of rewarding stimuli, such that I would maintain that the rewards that enhance the functioning of the capitalist system are all too pervasive in the learned behavioral response patterns of individuals.

In attempting to analyse and develop these postulates I will be visiting Lund University in Sweden from January 1975 and working with Professor Torsten Hägerstrand for approximately six months. The origins of this research venture lie in the desire of Sister Annette Buttimer and Professor Hägerstrand to constitute an exchange of students and professors between Clark and Lund and in Sister Annette's suggestion that the visit would be of value to my research interests. Two visits by Professor Hägerstrand to Clark and a visit by me to Lund in 1974 finalized the last details of the exchange.

The reason for staying at Lund lies in the possibility of applying the time-space geographic model of social organization developed by Hägerstrand to my specific research interests. This model, although essentially developed as a physical model could be used to examine the experience of an individual in a holistic manner, that is his total behavior in his daily environment since an individual's time-space budget represents his environmental setting. By suggesting that an individual has to meet various capability, coupling and authority constraints, Hägerstrand's model brings the environment to life unlike the majority of the mathematical models developed in the 1960's which considered the environment as a black box containing a sleeping population. At this stage, Hägerstrand's model has basically been used to delimit the accessible parts of a region's service supply, given the three constraints of individuals in the region. However, by using the time-space framework I will try to conceptualize the problem of stress from the perspective outlined briefly in this report. Possible hypotheses that I shall examine are:

1. A stressed individual has less flexibility and hence greater conflict in terms of his daily time-space activities and hence has less available time-space for leisure activities than individuals of sound mental health.

2. A stressed individual spends more of his time-space budget being rewarded by system stimuli than by self-enhancing stimuli.

RESEARCH PROJECT: THE LEAST-DEVELOPED NATIONS

By David Campbell

Introduction

In October 1973, a group of faculty and graduate students interested in international development and underdevelopment began to formulate ideas concerning the problems of the least developed of the developing nations. O.E.C.D. compiled in 1972,[1] a list of "the twenty-five least developed nations" which the research group used as a starting point for their discussions.

The choice of countries to be studied, the least developed of the developing countries, was made for the following reasons:

(i) commonalities exist among groups of the world's least developed nations sufficient to address their problems collectively, commonalities such as severe environmental constraints, harsh semi-arid high mountain environments, landlocked or isolated countries, no exploitable resource base or rudimentary national structure.

(ii) there has been a growing recognition that these impoverished, isolated but fully independent states require from the international community a new standard of care, concern, commitment and cooperation than has previously characterized the development effort.

(iii) conventional development theory, inadequate as it may be, is particularly inappropriate for the least developed. Development, if it is possible in the conventional sense, will involve a greater commitment to human betterment, ecological reality and ethnic or national tradition than is currently found in prevailing nations of economic and social development.

(iv) much of what is needed to be known to construct a development strategy is already known but it has not been focused on the problems of the least developed nations as a distinct entity requiring distinctive approaches.

Research Strategy

The research strategy was developed in an attempt to meet some of the above considerations. We aim to:

(a) Build up a network of scientists designed to be a catalyst in the collating of available information. This effort is not founded in any particular constitution but aims to facilitate interchange between scientists working in developed and developing countries.

(b) Consider the interests of local communities in relation to this environment, that is their complex biological, physical, cultural, social and economic matrix.

(c) Devise a research process which itself leads to strengthening of the research capabilities of the developing countries concerned.

(d) Proposal: A proposal to study the fundamental problems of the least developed nations[2] was submitted to the Rockefeller Foundation who provided initial funding for the project.

Progress to Date

1. Definition of groups of Least Developed Nations:

Using the OECD Report[1] as a basis we proceeded to deliminate groups of least developed countries based upon analysis of their social, economic, environmental and political characteristics. At the conclusion of this study[3] we had identified 37 least developed countries which were grouped into the following sets of nations:

West African Sahelian
West African Coastal
East African Coastal
Asian Mountain States
Landlocked States in East and Southern Africa
Islands

2. Identification of Fundamental Problems of Groups of Least Developed Nations:

Once the groups had been defined an analysis was begun of problems fundamental to the development of thr specific groups. Work on the problems of the Sahelian countries is ongoing at Clark University[4] on the Asian Mountain States at the Universities of New Delhi and Katmandu and the East African countries at the University of Warsaw.

3. General Problems of the Least Developed Nations:

While analysis of particular groups is ongoing, other people associated with the research project are exploring more general problems of development as they apply specifically to the L.D.N.'s. Areas under consideration are - Nomadism, Health, Water Resources, Education, Transportation, International Economics, Environmental Information, and Natural Hazards.

As part of the process of formulating alternative strategies for development in the L.D.N.'s a conference involving a number of graduate students from L.D.N.'s who are currently studying in the US was held at Clark University in January 1975. The conference considered themes such as:

1. Invisible College
2. Alternative Strategies to Development
3. Role of rural Development within a Macro-Political
4. System that Supports Urban Planning
5. Agricultural Techniques

The work goes on.....

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RECONSTRUCTION FOLLOWING DISASTER

There has been very little research of any kind dealing with community-wide post-disaster issues that arise during the restoration and reconstruction periods. Most of the research has focused on the post-impact emergency phase of recovery from a sociological perspective. Table I which identifies the research findings in each of the time-disaster phases -- emergency, relief and restoration, and reconstruction -- shows that twelve percent of the total research effort was devoted to reconstruction and community recovery. Consequently, there is limited knowledge of reconstruction issues, the processes involved in resolving them, and the impact for the community of planning decisions.

Reconstruction planning and policy remain fixed in a vacuum; policy decisions usually are taken without reference to previous experiences. There is no mechanism whereby local and state officials facing restoration and reconstruction policy issues can make more informed decisions -- decisions whose consequences will affect significantly the speed and cost of recovery and the future vulnerability of the community to natural hazards.

The importance of the group research rests with the objective to fill this gap. Work has begun in this direction under a recent NSF grant project, coordinated and directed by Professor R. Kates at Clark University and by Professor E. Haas at the University of Colorado. Dr. M. Bowden and D. Amaral have been actively engaged in the research.

The research involving the recovery experiences of a number of cities -- Managua, San Fransicso, Rapid City and Anchorage -- was designed to answer the following questions:

1. What is the range of significant and common community-relevant policy issues following a large-scale disaster?

2. With each issue (e.g., what types of structures will be permitted in 'high risk' damaged areas? Should a time limit be placed on temporary housing at the onset?), how do the timing, stability, irreversibility, and locational aspects of decisions affect: (a) the economic costs of recovery, (b) the speed of recovery, and (c) the level of hazard vulnerability?

3. How does the pattern of reconstruction change the functional zonation, social stratification and access to public urban amenities such as housing, education, sanitation? What is the effect of emergency action on subsequent reconstruction priorities?

4. What is the effect of reconstruction on future damage potential. Is the reconstructed city 'safer' than the pre-disaster city? (Involves analysis of disaster preparedness planning, code enforcement, compatible 'risk area' development and relocation.) Is there a loss of

the environment familiar in reconstructed cities?

5. What are the critical constraints, influences, decisions which govern the reconstruction process?

Knowledge of recovery efforts and consequences can provide needed perspective and guidance in recovery planning. Broad policy decisions often are made early after disaster strikes, decisions which are not coordinated and have not been encountered previously. For example, the location of temporary housing may have an impact on employment or on future growth patterns. Should emigration out of the damaged community be encouraged? What policies should be developed for lending institutions for development in 'high risk' areas?

TABLE I

PERCENTAGE LISTING OF FINDINGS BY SYSTEM LEVEL AND THREE TIME PHASES*

System Level	Time-Disaster Phase: Post-impact Short-term Actions	Relief and Restoration	Reconstruction and Aftermath	Total Percentages
Individual	32.6 / 66.3	27.6 / 23.0	26.7 / 10.6	30.6 (217)
Group	13.6 / 65.9	7.7 / 15.4	19.8 / 18.7	12.8 (91)
Organization	23.1 / 70.3	18.2 / 22.8	11.6 / 6.9	20.5 (145)
Community	24.4 / 50.2	42.0 / 35.3	36.0 / 14.4	30.3 (215)
Society	6.1 / 67.5	4.4 / 20.0	5.8 / 12.5	5.6 (40)
International	0 / 0	0 / 0	0 / 0	0 (0)
Total Percentages	62.3 (441)	25.6 (181)	12.1 (86)	100 (708)

*Figures listed above diagonal correspond to percentage across columns, below diagonal, among rows. (From Drabek, T. and Haas, J., System Shock: Response and Recovery.)

Reconstruction as Disaster Recovery

Case Study of San Francisco

K. Gelman, G. Roboff

San Francisco underwent a distinctly laissez-faire reconstruction after the earthquake of 1906. With a special awareness of the socio-spatial characteristics of this early 20th century city, we have developed a research design which will analyze in detail those processes at work immediately before and for a seven-year period following the catastrophe. The analysis should provide insight into the way in which processes affecting urban life might operate in other, similar post-disaster situations.

Early in the project, a set of three hypotheses of reconstruction was developed to be investigated in each of the four test cities. Most important was the hypothesis that trends ongoing before the disaster will accelerate afterwards. In San Francisco, we look for at least three manifestations of the speed-up: A) increased population growth and areal expansion of the city and some of its districts, with an overall decline in density; B) increased service functions and declining industrial functions; and C) greater areal and class segregation and specialization of all types--functional, economic class, racial and ethnic.

The second hypothesis--that the inequality of gains and losses from disaster reflects to a greater extent the pre-disaster societal position of the group or individual--is measured by several indices. The third hypothesis, which will be the hardest to document because of data limitations, is the hierarchical sequence of location/return/reconstruction by economic function and by economic class. To document the sequence of return in detail, data which can show the process in a time span of a few months are essential; this detail is simply not attainable with our primary sources. Nevertheless, we can rely on secondary reports to provide a general account of these fast-paced processes.

One major concern in the formation of the research design was our determination to develop a sensitivity to the greatly-reduced spatial scale that so characterized turn-of-the-century American cities. In practical terms, the scale parameters required that we be equipped to differentiate discrete spatial areas that comprised no more than a few square blocks. Such differentiation requires a sample size somewhat larger than what might otherwise prove acceptable, and our sample size reflects these considerations.

The large sample size of 1:40 from city directories (approximately 4,200 individuals and businesses) made hand tabulations impossible. No direct ethnic background information was available to us. Occupational data was generally available from the directories, but information on work place was available no more than 20% of the time. The only census material published reflects aggregate data. Moreover, the directories themselves simply do not include large groups of the poor and socially outcast. For example, no more than three Chinese appeared in the San Francisco directories for any one year during the study period.

Since no existing program could satisfy our computation requirements, one is now being prepared locally. In preparing our sample data, it was necessary for us to assign an ethnic identity on the basis of: 1) an individual's surname, 2) in questionable cases, an individual's business associates who might be more easily identified, and 3) in highly questionable instances, if an individual resided in a tight ethnic nucleation, he might be assigned to that ethnic group. Occupational data was grouped into a schema which, in reality, is a modified version of the socio-economic categories first defined by the census statistician A. Edwards in the early 1930's and used by most researchers in studies of this type. It should be noted that some job classifications within the schema seem to have been made at least partially on the basis of status; therefore, these classes do not reflect exactly a wage-earned or property-owned scale. Recognizing these problems, we nevertheless decided that the resultant categories would be as valuable as any others, and the value of comparability possible within this system made it adoption desirable. We expect that our directory sample is biased toward the white middle and upper classes, and we know of no way to compensate for the total omission of some ethnic groups which we know in fact, are not included. We will simply call the attention of our potential readers to this omission and supplement the results drawn from the sample with information (generalizations) from other sources which more accurately reflected the real world situation that existed.

On the basis of his directory address, each individual in the sample was assigned to a single cell within our 87 by 107 grid which covered the entire city of San Francisco. For each year where information exists, an individual is assigned a socio-economic class, and his place of business is recorded. His ethnic identify, naturally, remains constant through the study period. All of our output, then, is developed on the basis of four pieces of information potentially available for each year: 1) residential address, 2) business address, 3) socio-economic class, and 4) ethnic identity.

Businesses, too, are coded in much the same manner. Here, however, in place of a socio-economic or ethnic classification, a business code is substituted. This is a two-digit, two-tiered code, allowing us to generalize at more than one level

The program will yield the following output in yearly form:

I. Maps of residential location. These maps will appear in varying degrees of aggregation and will show residence by ethnic group (13 groups) socio-economic class (5 groups + widows + students), total population (everyone in yearly sample), and for the larger ethnic groups (with a sample size of at least 80), social class within the ethnic group.

II. Space-time analysis. As part of our attempt to trace the effects of the disaster on individuals and groups alike, a large-scale space-time analysis was made an integral part of the research design. Space-time analysis on an individual will: 1) show how the individual moved in each year following 1905 as a path from his pre-earthquake address, and 2) show his cumulative movement, compiled each year as the sum distance of all moves from the pre-disaster address. This same information can be compiled for groups, and the groups themselves can be defined by neighborhood, socio-economic class, or any combination of these variables (dimensions).

III. Journey to work. Journey to work data will be computed for each ethnic group; socio-economic group, for socio-economic groups within the larger ethnic groups, for any locational cell, or for any group of locational cells (neighborhood).

IV. Economic mobility. The program will generate, in tabular form, the percentage of any group whose socio-economic rank went up, stayed the same, or declined. A similar measurement of average socio-economic class is used to define the changing status of individual neighborhoods. The program will also generate maps of the location of all "class 1" jobs, "class 2" jobs, etc. for each year.

V. Measures of group location and segregation within the city. A) The index of dissimilarity will measure the degree to which one group (ethnic or socio-economic) is segregated from another. B) The orthogonal median measures the changing center of gravity for each group over time.

VI. Persistence. For each ethnic group, socio-economic class and areal unit, the program will compute what percent of the sample:

1. changed address relative to 1905 (each year);
2. changed address at all (each year);
3. were still living within San Francisco (each year);
4. moved to other Bay Area town (identified) (1908, 1909, 1911); and
5. lived within "X" distance of 1905 address (X is a variable supplied by us).

VII. Business output. The program will generate yearly maps of business location by sector as defined by business code centrality indexes, and migratory (space-time) information.

Case Study of Anchorage, Alaska. K. David Pijawka

A major concern in the examination of Anchorage's recovery effort following the 1964 Alaskan earthquake is an attempt to describe the speed of the reconstruction process and to identify the factors and policies affecting the pace of the reconstruction effort. A three-phase time activity model of the post-disaster situation is presented, broken down into:

a. the emergency period
b. the restoration period
c. the reconstruction period.

Each period is defined by a set of functional activities distinct for that specific period. The emergency phase of community re-establishment is characterized by a set of activities to cope with the immediate breakdown of the community due to the direct impact of the disaster.

Communities vary in their ability to respond to the emergency situation. Anchorage's emergency period was controlled and stabilized one week after impact. The emergency period in the recent Honduras and Balgladesh disasters persisted for relatively long periods of time.

Sample indicators marking the end of the emergency phase can be identified: the completion of emergency shelter and feeding; the return of the normal policy-making functions of local government.

The restoration period is characterized by the restoration of essential utilities to a functional operative status and the capital stock that is capable of being restored to functional operation by patching. The period finds the economic and social activities of the community returning to equilibrium and normalcy. It is difficult to draw the boundary where the emergency period ends and restorative work begins; the phases often blend.

The completion of the reconstruction phase may be demarcated by the return of community activities, social and economic and the rebuilding of capital stock to pre-disaster levels. The reconstruction period may persist long after pre-disaster levels have been met, especially around construction of renewal projects.

The time activity of the three periods are shown graphically in Figure 1. The coping effort appears log normally distributed (the time scale is logrithmic). Details of the Anchorage recovery follow.

The Emergency Period

Immediately after impact, on March 27, 1964, both rescue and relief activities and restoration of essential services on a temporary basis commenced. Within a few days, the situation was characterized as stable and under control. Within two days, for example, debris was removed to make communication possible, and emergency water, sewer and sanitation systems were constructed. By April 5, little food was necessary on emergency bases, and shelters were made unnecessary. Utilities were operative after five days. By April 10, 1964, with debris cleared and businesses reopened, the Federal Reconstruction and Development Commission of Alaska took over coordination from the Civil Defense. The FRDCA report on that day, that the "Office of Emergency Planning has met the immediate emergency needs" marks the completion of the emergency period. The normal policy-making functions of the government did not resume until one month after the emergency period, however.

The Restoration Period

This phase begins during the first week with the repair and restoration of utilities. By the second week, restoration activity was intense: SBA offices were established and plans were initiated for permanent replacement. Seventy-five percent of the water system was restored and the port repaired by this time. By the end of June, 1964, the restoration of the Municipal Light and Power utility was completed.

The Reconstruction Period

The completion of reconstruction, excluding specified urban renewal projects, is marked by October, 1966, the end of the interval required to replace in absolute terms the destroyed and heavily damaged residential structures. Earlier, by April, 1966, the number of commercial establishments destroyed in 1964 had been replaced. The "planned reconstruction project" completion of the 4th Avenue project is scheduled for December 1975. It was not until 1967 that new development was formally and legally permitted in the Turnagain area. Planning for recovery of destroyed areas commenced even in the emergency period.

The model of the timing of reconstruction describes and defines two distinct recovery rates. The evidence points to a relatively rapid recovery of the city in terms of restoration of public capital and utilities as well as in the replacement time of severely damaged residential and commercial structures. The recovery rate of the planned reconstruction of the damaged 4th Avenue slide area was considerably prolonged and delayed.

In examining the overlapping restoration and reconstruction periods, a number of factors are particularly important in accounting for the exceptional speed of return to normalcy in the case of Anchorage. A major thrust of the research effort is to identify these variables to compare the Anchorage recovery experience with other examples of reconstruction.

"ON-GOING RESEARCH IN MAN-MADE ENVIRONMENTAL HAZARDS: PROJECT RARE"

By James Wood

Professors Kasperson and Kates of the Clark Geography Department are leading a three nation, cross disciplinary study analyzing the process of risk assessment of high consequence-low probability events associated with the man-made environmental hazard of large scale, commercial nuclear energy generation. Dr. Ian Burton of the University of Toronto, and Dr. Anne Kirkby of the University College, London, are conducting complimentary research in Canada and the United Kingdom, respectively. Dr. Christopher Hohenemser of the Department of Physics, and Messers Pijawka, Sharaf, and Wood of the Clark Graduate School of Geography are active participants studying the decision making process in the United States.

The production of electricity from nuclear reactors poses a variety of potentially catastrophic environmental risks at various stages of the nuclear fuel cycle. Among these risks are the failure, under stress, of such reactor protective systems as the Emergency Core Cooling System; accidents occurring during the transport, or re-processing of nuclear fuel; the diversion of toxic radioactive materials for clandestine purposes; and the storage of dangerous, long-lasting nuclear waste products. This research project is examining the nature of the assessment of these risks by the public agencies, private corporations, and responsible citizens organizations concerned with the implementation of nuclear power generation programs. Further, it is our aim to analyze the role which risk assessment and the problem of high consequence-low probability events occupy both in the decision to initiate a policy of commercial nuclear power generation, and in the locational decision of siting individual power plants.

Drawing upon fifteen years of research experience dealing with decision making policy and societal adjustment to natural hazards, and the experience of thirty years of research investigating risk assessment in general, this international team hopes to elucidate the manner by which risk assessments of man-made catastrophic events are formulated, how they enter into national nuclear policy decisions, and the way they are implemented at local reactor sites, in each of the three nations. Of great interest to us is the determination of whether national variations in the treatment of this important problem lead to differential outcomes of risk assessment and risk reduction; or are the end results similar despite national differences in policy making style and specific technologies.

Although experience in researching natural hazards provides a sound basis for the investigation of the process by which societies cope with man-made environmental hazards, this project endeavours to discern if the nature of society's adjustment potential catastrophe from man-made environmental hazards differs from the process of adjustment to dangerous natural events. Thus, the degree to which scientific research substitutes of cumulative, societal experience in decisions concerning rare, man-made events; the role of crisis and actual catastrophe; and the ability of decision makers to cope with an ever lengthening list of potential hazards of man's own making, are other poorly understood problems upon which we hope to shed some light.

Within each of these three countries, the United States, Canada, and Great Britain, the research teams are attempting to reconstruct the role played by the scientific assessment of risk of rare events with high con-

sequences in an array of decisions crucial to the implementation of commercial nuclear electricity generation. This is currently being undertaken at both the national governmental and corporate, and local, community levels. Those of us working on the project consider ourselves fortunate, with the help of the Ford Foundation, to have the opportunity to contribute to our understanding of the process of a modern, industrialized society's adjustment to the catastrophic potential of the peaceful atom.

NOTES ON A REVIEW OF REGIONAL WASTEWATER MANAGEMENT STUDIES

By Judith M. Dworkin

Under the direction of Harry E. Schwarz and Maria R. Eigerman three graduate students, Judith M. Dworkin, Esther Rolnitzky, and Eliot J. Wessler worked on a report for the U. S. Army Corps of Engineers reviewing six pilot regional wastewater management studies conducted by the Army Corps of Engineers from 1971 to 1975. These studies represented an early attempt to develop regional wastewater plans which would meet the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500).

Each graduate student analyzed two of the following studies: Merrimack, MA, Codorous, PA, Cleveland, OH, Detroit, MI, Chicago, IL, and San Francisco, CA. The analysis consisted of evaluating the studies from four dimensions: technical dimension, participation dimension, impact measurement and evaluation dimension, and implementation dimension. Along these dimensions the studies were measured against 1) laws and guidelines in existence at the time the studies began and 2) the requirements and goals of P.L. 92-500.

The purpose of the study was to see what could be learned from this experience in terms of planning and management and to draw conclusions from these studies that could be useful for future water quality management studies under P.L. 92-500. Each graduate student assisted in the preparation of summaries and conclusions for the final report. The overall project which was completed in March 1975 will be published as a report by the U. S. Army Corps of Engineers.

FRIEDRICH RATZEL: A TRANSLATOR'S NOTE

By Michael J. Enders

Introduction

It is highly doubtful that there exist in this world many geographers to whom the name Friedrich Ratzel is unknown. But beyond this level of recognition, the actual knowledge that geographers possess as to the nature and significance of Ratzel's work varies greatly. Ratzel is perhaps best known as being the father of political geography, yet few geographers have read his works on this subject. To a large extent, this is due, as Kasperson and Minghi note, to the fact that most geographers are "either unequipped or unwilling to apply themselves to a direct examination of Ratzel's work."[1]

For American geographers, an increasing number of whom do not possess even reading ability in a second language, the language problem poses a formidable barrier to an appreciation of the works of foreign geographers. The myth that all important works will be translated into English remains only a myth without any foundation in reality. Even a geographer of Ratzel's stature has had few of his works translated into English.[2] Up until very recently, the translated works of Ratzel regarding political geography were few and were published in difficult to locate books and journals.[3]

This situation now, however, appears to be changing. Ratzel's important article, "The Laws of the Spatial Growth of States," was recently translated by Bolin and published in Kasperson's and Minghi's book.[4] In addition, a project is currently underway by Minghi and others to translate Ratzel's major work, Political Geography.[5]

The Article

As a small contribution to political geography and to a better understanding of Friedrich Ratzel, the translation of yet another of his articles has been carried out by this author. The article, entitled "The Earth, Society and the State," is often overlooked by political geographers because it was published in French in Emile Durkheim's periodical, L'Année Sociologique. Addressed as it was, to sociologists, the article presents Ratzel's ideas concerning the growth of states in a different perspective than that found in the work translated by Bolin. The emphasis here, is on how a society interacts with the land and the state. As such, it provides an interesting complement to the other of Ratzel's translated works.

With the exception of a brief article on the geography of Corsica,[6] "The Earth, Society and the State" was the only work by Ratzel published in French. This fact gives the article additional significance, because it has represented for many French geographers their only direct knowledge of Ratzel's work and, in particular, of his concepts of political geography. This piece is, therefore, important to an understanding of the French school of geography's distaste of political geography. No serious discussion of political geography by French geographers (the

number of such works being exceedingly small) has failed to cite this article.[7]

Despite having been written over 75 years ago, this article by Ratzel shows little of its age. The criticisms, directed at sociologists for studying man without reference to the environment in which he lives, have certainly lost little of their force through the years. Many of the concepts contained in the article were only much later expanded upon by other political geographers. The raison d'etrê of Hartshorne,[8] the law-landscape relationships of Whittlesey,[9] and the political field of Jones,[10] are all hinted of in this article.

To be certain the article has its drawbacks, especially with regard to some of Ratzel's sweeping conclusions about the development of societies and states. These faults (common to much of his work), however, are a reflection of the era in which Ratzel lived and have been competently discussed in various studies of Ratzel.[11] They should not be allowed to overshadow the valuable aspects of Ratzel's work, as has so often been the case in the past.

The Translation

Ellen Churchill Semple, when she attempted to translate Ratzel's Anthropographie, found the task virtually impossible and instead went on to write her own book which incorporated and modified the ideas contained in Anthropographie. Her actions can be readily understood by anyone who has engaged in translation work.

In doing a translation, a conflict always arises over the choice between a literal or a free translation. Literal translations have the advantage of remaining faithful to the original work in terms of structure and wording, but the disadvantages of awkward constructions and of not necessarily conveying the same meaning. Free translations allow for a highly readable work which contains the spirit of the original piece, but they also entail the risk of misinterpretation and the possible loss of minor, yet often significant points.

This translation has attempted to bridge the two approaches. Whenever it has been possible to produce a literal translation without any loss in clarity, this has been done. In cases where a literal translation would confuse or mislead the reader, a freer approach has been used. It is hoped that this compromise approach will result in both a more readable and more accurate rendering of the article.

Even in French, Ratzel's work contains long complex sentences and extremely long paragraphs. In order to improve the article's readability in English, this translation has reduced the compound sentences into shorter ones and has divided many of the paragraphs. This structural change, in itself, should not cause any loss in meaning from the original work.

A last point should be made regarding the translation of certain words. Ratzel often applied a broader meaning to words such as law, soil and organism than can be conveyed in their English language equivalents. This characteristic of his writing has resulted in numerous misinterpretations and has presented translators with innumerable problems.

In "The Earth, Society and the State," two words pose particular problems. The first one, which is contained in the title, is the French word "sol." A literal translation of this word to English would be "soil." Unfortunately, the English word has a much more restrictive sense than the French word which can also mean "ground," "earth" and "land." Therefore, the word "sol," as used in this article, has been variously translated as "earth," "land," "soil"or "ground," depending upon the context of the particular sentence in which it is found.

The second translation problem is the French word "progrès," whose literal meaning in English is "progress." Ratzel uses the term when talking about the evolution of societies and states. In this context, "progrès" would perhaps be more accurately translated as "development." This is the term usually employed in the translation instead of the word "progress."

With these warnings in mind, the translation should present no problem to the reader. Although no translation can replace the original work, this translation of Ratzel's "The Earth, Society and the State" does represent an honest effort to faithfully render into English a valuable article by one of the more important figures in the development of modern geography.

[1]Roger Kasperson and Julian Minghi, eds., The Structure of Political Geography (Chicago: Aldine, 1969), p. 6.

[2]Of the 24 books and over 540 articles that Ratzel wrote, only one book (The History of Mankind, 3 vol.) and 4 articles appeared in English before 1969.

[3]These works are: "The Territorial Growth of States," Scottish Geographical Magazine, v.12 n.7 (july 1896), pp. 351-361;"Studies in Political Areas I," American Journal of Sociology, v.3 n.3 (November 1897), pp. 297-313; "Studies in Political Areas II," American Journal of Sociology, v.3 n.4 (January 1898), pp. 449-463; and, "Man as a Life Phenomenon on the Earth's Surface," Chapter 3 of H. F. Helmolt, The History of the World (London: William Heinemann, 1901), pp. 61-106.

[4]Friedrich Ratzel, "The Laws of the Spatial Growth of States" (translated by Ronald Bolin) in Kasperson and Minghi, op. cit., pp. 17-28.

[5]Dennis Rumley et al., "The Content of Ratzel's Politische Geographie," Professional Geographer, v.25 n.3 (August 1973), pp. 271-277.

[6]Friedrich Ratzel, "La Corse: Etude Anthropogeographique," (translated by M. Zimmermann) Annales de Geographie, v.8 n.40 (July 1899), pp. 304-329.

[7]For examples of recent French thought on political geography see: R. Clozier, "La Geographie Politique," L'Information Geographique, v.35 n.4 (September-October 1971), pp. 159-162; and, Maurice Dumont, "Geographie Politique at Geopolitique," L'Information Geographique, v.19 n.4 (July-August 1955), pp. 151-158.

[8]Richard Hartshorne, "The Concepts of Raison d'Etre and Maturity of States." Annals AAG, v.30 n.1 (March 1940), pp. 59-60.

[9]Derwent Whittlesey, "The Impress of Effective Central Authority Upon the Landscape," Annals AAG, v.25 n.2 (June 1935), pp. 85-97.

[10]Stephen B. Jones, "A Unified Field Theory of Political Geography," Annals AAG, v.44 n.2 (June 1954), pp. 111-123.

[11]See for example: Harriet Wanklyn, Friedrich Ratzel: A Biographical Memoir and Bibliography (Cambridge: University Press, 1961); and, Marvin W. Mikesell, "Friedrich Ratzel," International Encyclopedia of the Social Sciences (New York: MacMillan, 1968), v.13, pp. 327-329.

THE EARTH, SOCIETY AND THE STATE[1]

by

Friedrich Ratzel
(translated by Michael J. Enders)

I. The Earth and Society

Since the state is not conceivable without territory or borders, it has rather quickly become the essence of political geography. Although the political sciences in general have often lost sight of the importance of the spatial factor, the location, et cetera, it nevertheless is considered as unquestionable that the state cannot occur without territory. To disregard this factor in a theory of the state is a futile effort which has never been successfully accomplished.

On the other hand, there have been many theories of society which have remained completely alien to any geographic considerations. Spatial factors occupy so small a place in modern sociology that it is quite exceptional to come upon a work in which they play any role. The majority of sociologists study man as if he was formed in the air, without ties to the earth. The error of this concept is obvious, certainly, for all that which concerns the subordinate forms of society, because their extreme simplicity makes them resemble the most elementary forms of the state. But then, if the most elementary forms of the state are not representable without a territory which appertains to them, this must also be so for the simplest types of societies; the conclusion is self-evident.

In both cases, the dependence vis-a-vis the earth is the result of all kinds of actions which tie man to the land. Undoubtedly, the role of the earth has appeared with more obviousness in the history of states than in the history of societies. This would be only because of the greater space of the state. The laws of geographic evolution are less easy to perceive in the development of the family and of society than in the development of the state, but this is precisely because they are more deeply rooted in the earth and change less easily.

This even is one of the more important facts of history: the strength with which the society remains fixed to the land even though the state has been detached from it. When the Roman Empire died, the Roman people outlived it under the form of all kinds of social groups. Through the medium of these groups, a multitude of characteristics which the people acquired in and through the state, have been transmitted to posterity.

Thus whether man is considered in isolation or in a group (family, tribe, or state), wherever he is observed, some morsel of land is found which contains both the individual and the group of which he is a part. As regards the state, political geography has long been accustomed to take into account the size of the territory along with the population size. Even groups, like the tribe, the family and the commune which do not have autonomous political units, are only possible upon a piece of ground, and their development can only be understood with regard to this

land. Likewise, the development of the state is unintelligible if it is not put into relationship with the development of the political domain.

In all these cases, there are present organisms which enter into a more or less lasting intercourse with the land. During the flow of this intercourse all kinds of actions and reactions are exchanged between the organisms and the land. It is ridiculous to assume that in the land of a growing people the importance of the earth is not obvious, when it can be noticed at the moment of decay and dissolution. It is impossible to understand what happens in such a case, if the land is not considered. A people regress in so much as they lose ground. They can count less citizens and still hold rather firmly to the territory wherein reside the sources of their vitality, but when their territory contracts, it is, in a general way, the beginning of the end.

II. Housing and Food

Beneath its many variations, the relationship between society and the land always remains conditioned by a double necessity: that of housing and that of food. The need for shelter is so basic that it has resulted in a relationship between man and the earth which has remained nearly invariable through time. Modern dwellings are, for the most part, less ephemeral than those of primitive peoples, but the inhabitant of the large cities constructs an artificial shelter out of cut stone which is not always as spacious as a stone age cave. Likewise, many African and Polynesian villages are composed of more comfortable huts than many a European village. In our capitals, the representatives of the highest civilization that ever existed provide less space for their dwellings than do the backward inhabitants of a hottentot kraal.

The types of dwellings between which there is the greatest difference are, on one hand, those of nomadic shepherds with their extreme mobility that the continual migrations of pastoral life necessitate, and on the other hand, the apartments crowded together in the huge buildings of our large cities. And yet, the nomads themselves, are tied to the land, although the bonds which tie them there are looser than those where society leads a sedentary life. They have need of more space in which to move, but they periodically return to occupy the same sites. It is not, therefore, justifiable to contrast the nomads to all other sedentary people, taken as a whole, merely because of the fact that after a sojourn of several months, the nomad takes down his tent and transports it on the back of his camel to some other place of pasture. This difference is not at all significant; it is not even as important as the difference resulting from the nomads great mobility and need of space, a consequence of pastoral life.

The nomads, likewise, have been depicted as being completely bereft of any political organization in the sense of the ancient maxim: "Sacae nomades sunt, civitatem non habent." It has been wondered whether or not nomads possess the land they occupy and, consequently, whether or not they fix boundaries to it. But today, the fact is without doubt: the territory of Mongolia is as delimited and divided as is that of Arabia. Mountains, soil fertility, water courses and even artificially constructed piles of stones, describe the frontiers of tribes, down to the smallest divisions that are encompassed by the borders. As for the ability of these same people to establish states, its magnitude can be seen in the history of sedentary societies which find themselves surrounded by nomadic

tribes. When these states fall into ruin, it is precisely the nomadic neighbors who introduce a new vitality which results in new states.

Furthermore, it is not in the lands of the nomadic shepherds that the attachment to the soil is at its minimum because they always return to the same pastures. The attachment is much weaker in the lands of the shifting agriculturalists of tropical Africa and America, who, approximately every two years, leave their fields of millet or manioc, never more to return there. It is even less in the lands of those who, out of fear of other peoples who threaten their existence, do not dare to tie themselves too strongly to the land. Nevertheless, a superficial classification does not rank such societies among the nomads.

If peoples are classified according to the rigor with which they adhere to the land, it is necessary to place at the very bottom, the small tribes of hunters of Central Africa and Southwest Asia, as well as those groups found wandering in all types of societies without a definite land that might have affected their characteristics (for example, the Bohemians of Europe and the Fettahs of Japan). The Australian aborigines, the inhabitants of Tierra del Fuego, and the Eskimoes, who for their hunts and their root gathering, always seek certain localities, and, who delimit their hunting territories, are at a higher level. Above them are found the nomadic farmers of the tropical lands; then, the pastoral peoples who, in various parts of Asia, have remained on the same land for centuries. It is only then that come the sedentary farmers established in permanent villages, and, the civilized nations, equally sedentary, whose symbol is the city.

Food is the most pressing need for both individuals and the community; therefore, the needs that it imposes upon both individuals and groups surpass all others. The degree to which man seeks his food from hunting, fishing or the fruits of the earth, always depends on the nature of the food, the place of habitation and the extent of the area which produces the food. The duration of settlements in the same place likewise varies according to the degree to which the food sources flow in a steady manner or are exhausted after a time.

Hunting by preference employs the men, while the gathering of fruits is rather the occupation of women and children. The more hunting and fishing are productive, the more the women and children are available for domestic tasks; and as a result, the more the house can be solidly constructed and properly laid out. Finally, the more agriculture is in a position to assure satisfaction of the need for food, the more it also becomes possible to settle down within a limited area. There are, therefore, a multitude of social phenomena which have their cause in the primitive and pressing need for food. And for an explanation of this fact, it is not necessary to resort to the theory of "urgency" of which Lacombe speaks, and according to which the most primitive and fundamental institutions would be those which respond to the most urgent needs.

When a society only exploits the land in a transitory manner, it also is only fleetingly settled there. The more tightly the needs of housing and food tie the society to the land, the more pressing is the need to maintain itself there. It is from this need that the state derives its best strengths. The task of the state, in matters concerning the land, always remains the same in principle: the state protects the territory from exterior attacks which threaten to reduce it. At the

highest level of political evolution, the defense of the borders is not alone in serving this objective; trade and the development of all the resources that are contained in the land, in other words all that which can increase the power of the state, are equally directed towards this goal. The defense of the country is the utmost goal which must be pursued by all means. This same need for defense is also the motivating force of the most remarkable development that presents the history of the relationships of the state with the earth, namely, the territorial growth of the state. Peaceful trade is able to prepare for this growth because it finally tends to strengthen the state and to make neighboring states retreat. Regardless of whether a society is small or large, before all else it seeks to maintain, as an integral unit, the land upon which and by which it lives. When a society comes to undertake this task, it then transforms itself into a state.

It is necessary to observe the simplest types of societies in order to really understand this relationship. If the relationship of the society with the land, and the necessity to protect the land, which is the raison d'etre of the state, are closely examined, it can be observed that of all the social groups, the one which exhibits the greatest cohesion is the household whose members live together, confined in a very closed space, and united in the same corner of the earth.

The inhabitants of a village or a city are also for the same reason strongly tied to each other. Even when these latter types of societies take on political forms, they still retain some attributes of the family in the manner in which they are set up, but the state is not yet visible because it blends with the family. The domestic character of the association hides the political character. It is only when the family has become fragmented that the social arrangements required for defense, separate themselves from the rest. The appearance of the state then can be seen, in so far as the powers taken from these various family groups have been placed in common within the special goal of protecting the land. The idea that the soil has a sacred aspect because the ancestors are buried there, contributes to this outcome because the attachment to the land, which is the consequence, created between distinct and separate societies, a commonality of interest which is a step towards the formation of the state.

III. The Earth and The Family

From both the economic and the political viewpoint, the simplest type of relationship that a society can maintain with the earth is the type that is observed in the case of the monogamous family. By this term is meant the group composed of a couple and their descendents, who, starting from a common hut, radiate over a limited space which they exploit through hunting or fishing in order to obtain their food. If the family grows through natural increase, then the area necessary for their subsistence also grows. In the simplest case, this expansion is done without any sense of direction; that is to say, the exploited domain expands all around the family's house.

By growing, the monogamous family can become the compound family, or clan, which, as in North America and Oceania, continues to live together under the same roof, in the same clan house. Naturally, this can occur only where the land is particularly productive, such as close to the North American rivers which are well-stocked with fish, or better

yet, in regions where agriculture has reached a rather high degree of development. This type of family or clan takes the place of the state. But when the family group divides itself in order to assure the newcomers of a definite part of the land, immediately the new inhabitants appear and each of them is the seat of a new domestic society. At that moment, the effects of the unequal value of these lands begins to be felt. The lands are near or distant; they do not have same type of location or the same fertility, and all these differences have an effect upon the development of families.

Kinsmen can form economic groups closed off from one another, but the tie which unites them by virtue of their common origin, sustains itself and binds together several settlements, villages and clan houses. Thus, the state is born. This time the separation of the economic and political units is an accomplished fact. At this stage of development, the state still coincides with the clan, but is has, in essence, become a territory larger than that occupied by the family unit. The latter is, and remains, a monocellular organism; the state, on the other hand, always draws into its action space a greater number of these elementary organisms and completely overwhelms them. The difference in scale between these two groups, therefore, is a profound and crucial one.

IV. The Earth and The State

Beyond the clan, all societal growth is in reality the growth of the state. If several clans contract a defensive or offensive alliance, the confederation that they form by their union is still not a state. The state, therefore, becomes successively disengaged from the economic group, then the familial group, the domain and the exterior. At that point, the phase has been reached where the state is the sole unit which can entertain a continual territorial expansion. It is in this way that states increasingly enlargen themselves until they form empires which nearly fill the continents; and, the extreme limit of this development has not yet been reached.

Likewise, since the economic units, composed of a dwelling along with the hunting, fishing and agricultural territories upon which is depends, represent primitive forms of the state, they also are the first to lose all the traits of these forms. But they quickly develop in other ways, and if the state to which they appertain, dissolves, these units are ready to resume their former roles as soon as it is useful. This is because, like the state, they are comprised of a territory and a population. The kinship unit only contains a population, it does not have its origins in the land; therefore, it disappears between the village and state levels of organization, as soon as the state supercedes the clan.

Although the tendency towards territorial expansion is innate in the very nature of states, under certain conditions, the state in order to survive must renounce its expansion. But when a state thus assigns limits to its size, the natural growth of the population necessarily makes it very densely populated, if political and social forces don't intervene to place obstacles to this compaction. If this intervention was not produced, the relationship of men with the land would have had to have been modified everywhere in the same way; men would have continually become more numerous, whereas the amount of land occupied by each one would have been continuing to diminish.

The state which has a firm hold on its land and which does not want to leave the security of its isolation, therefore, is obligated to engage in a fight against the society. It impedes natural growth by inducing migration. However, as long as man has not yet passed the barbaric stage, there are simpler and more rapidly effective methods which are preferably employed. All practices which have the effect of artificially reducing the number of human lives, and to which the society is required to conform, from the exposure of new-borns to cannibalism, vendettas and wars, combine to produce this result. The necessity of this reduction is evident wherever people occupy a domain clearly circumscribed by nature, such as oases and islands. This is what Malthus has already perceived. It is not as visible in the small states of primitive people, not because nature so radically separates them from the rest of the world, but more because of the willingness of men to remain isolated.

One of the most pressing needs of sociology is to finally explain in a systematic manner the methods by which controls have been placed on population growth, methods whose practice is sometimes conscious, sometimes unconscious. The way in which societies languish and die when they are placed in contact with peoples of a higher civilization has been described in numerous monographs. Nevertheless, this phenomenon has played a far lesser role in the history of mankind than the tendency of social groups to concentrate themselves in restricted spaces and to isolate themselves from one another, a tendency to which billions and billions of peoples, small and large, have sacrificed the powers which might have permitted them to increase.

The progress of mankind, which is only possible thanks to contact and competition between peoples, necessarily becomes highly shackled by practices of this type. In the closed, homogeneous system of the familial state, no eccentric personalities could be incorporated and innovations were impossible. This, in fact, implies that early differentiation was not produced from within the society, and, furthermore, that the type of relationships which are established between societies can provide a mutual stimulation for their development.

Comte expressed this same idea when he said that outside of the milieu, there was a force, contained within the increasing population density, the simultaneously increasing need for food and the resulting division and coordination of labor, capable of either hastening or retarding progress. If Comte had set up an appropriately geographic concept, if he had understood that both this force and the milieu have their basis in the land and cannot be separated from it because space is equally indispensable for them, then at that moment, he would have thoroughly investigated and simplified the notion that it was caused by the milieu.

Society is the medium through which the state is united to the earth. It follows that the society's relationships with the land affect the nature of the state at whatever phase of its development is being considered. When the economic activity is not very developed while the territory has expanded and, consequently, is easily alienated, there results a lack of consistency and stability in the composition of the state.

A sparse population which has need of very much space, even though it might be enclosed within an area of clearly defined borders, produces the nomadic state whose distinctive trait is a strong military organization, rendered necessary by the need to defend vast expanses of land with a small number of people. If, through the practice of agriculture, a society is more closely united to the land, it imprints upon the whole state an ensemble of characteristics which depend on the way in which land is divided between families. First, the state is more firmly established in a very populated land where it can draw more human powers for its defense and a greater variety of all sorts of resources than it could if the population was sparse. The strength of a state does not need to be estimated simply by its territorial size; a better measure is the relationship that the society maintains with the territory. Furthermore, this same relationship also acts upon the internal composition of the state. When the land is equally divided, the society is homogenous and inclines towards democracy; on the other hand, an unequal division is an obstacle to any social organization which would give political preponderance to the landless and prevent the formation of some kind of oligarchy. The latter attains its maximum development in societies which have at their bottom, a population of slaves without property and nearly without legal rights.

Land ownership patterns create a major distinction between two types of states: in one, the society lives exclusively from the land that it inhabits (through agriculture or livestock raising, it doesn't matter), and the domain of each tribe, commune and family tends to form a state within the state; in the other, men are obligated to resort to different lands, often very distant from those where they are settled. Where population density is greatest, only a small portion of the population lives solely from the land; the majority depart to obtain in a foreign land, the food and clothing necessary for survival. In the most populous industrial districts, a good portion of the workers live far from their places of employment; they are a floating population, going wherever they are offered opportunities for work.

But those who do not live off the land that they inhabit, naturally have a need to be placed in contact with other lands. This is what will be trade. The task, however, to protect these connections from potential disruptions, is a function which devolves to the state. It is for this reason that the state extends its action-space by means of expansionary maneuvers, such as colonies, customs unions and trade agreements, which always have, at least to some degree, a political character. Therefore, even in the highest stages of social evolution, there is found the same division of work between the society, which dwells and subsists upon the land, and the state, which protects the land with the concentrated powers at its disposal.

Perhaps it will be protested that this concept depreciates the worth of people, and especially, of man and his intellectual abilities, because the concept requires that the land, without which a nation cannot exist, be taken into consideration. But the truth remains the truth. The role of the human element in politics cannot be accurately appreciated if the conditions which govern man's political actions are not recognized. "The structure of a society closely depends upon the nature of its land and its location; hence, the knowledge of the physical characteristics

of the land and its advantages and disadvantages, is within the field of political history."

History shows, in a manner much more penetrating than the historian, the degree to which land is the real basis of politics. Truly practical politics always has its starting point in geography. In politics, as in history, the theory which disregards the land, mistakes the symptoms for the causes. How is it possible to at all understand the fruitlessness of a struggle in which political power is the only stake, and where, the victory of either side would still leave things in almost the same condition as they were beforehand? Treaties which do not result in a redistribution of power in accordance to the respective situations of states, are always only those of diplomatic expediency and without duration. On the other hand, the acquisition of new territory, by obliging nations to undertake new tasks and by expanding their intellectual horizon, exerts a truly liberating effect on them. This is what brings about the renaissance of nations which, after a successful war, may have been enriched with new lands, the prizes of their victory. This is the cause of revival and rejuvenation that learned historians, like Mommsen, wholly attribute to political expansion.

Russia has developed its power during the course of the same sorts of struggles that Western Europe supported during the Crusades. A great difference exists, however, between the history which sheds itself upon its native land and one which dissipates itself in distant expeditions. In Russia has been founded the great Christian empire of the East that the Crusades vainly sought to create elsewhere, without any territorial base. In the former case, a state drawing its strength from newly acquired lands, is growing uninterruptedly, while in the latter case, there was a rapid failure because the state was too far from the same sources of national vitality. The Crimean War, the Treaty of Paris in 1856 and its denunciation in 1871, are other examples of this phenomenon; geographic conditions have played the same role there.

The powerful effect of the earth, which manifests itself throughout every phase of history and in every aspect of present-day life, contains something mysterious which distresses the spirit because it appears to destroy man's seeming freedom. Indeed, in the land is seen the source of all servitude. Always the same, always situated at the same point in space, the land is a rigid framework for the changing temperment and aspirations of men. When men happen to forget this substratem, the earth makes its dominion felt and, through grave warnings, reminds them that the existence of the state has its orgins in the land. It regulates the destinies of nations with a blind brutality. A nation must live on the land it has received from destiny, it must die there, it must submit to the earth's laws. In short, the political egoism which makes the land the principal objective of public life, nourishes itself in the earth. It consists of forever preserving as is, the national territory, and doing everything to remain in sole possession of it, even though ties of blood and ethnic affinities would incline the emotions towards people and matters situated beyond the borders.

V. The Earth and Progress

It is completely natural that philosophy and history have always shown a preference to look for the geographical basis of historic events. In fact, sophisticated science differs in nature from other historical disciplines by its propensity and preference to investigate the prevailing and permanent causes. In the fixed nature of land, it finds an immutable foundation for the changing events of history. Biology, which is by definition, the history of all living things on the earth, also has always taken into consideration the land on which these beings are born, struggle, and die. Philosophy and history are superior to sociology because they utilize historical comparisons and because they have come to understand the importance of the land. Because it provides a fixed reference point in the midst of the incessant changes of vital expressions, the land always has, in and through itself, something constant. This is why philosophers quickly have come to recognize, better than the legitimately named historians, the role of the earth in history.

Montesquieu and Herder did not intend to resolve sociological or geographical problems when they were busy studying the relationships of peoples and states with their respective territories. But in order to understand man's role and destiny, they had to study man within the lands which are the setting for his activities and which, according to Herder and Ritter, have been so created as to permit man to develop himself there in keeping with the Creator's plan.

What is surprising is that the earth has been so little taken into account in the relative conditions of historical development. How very vague are those theories where progress is represented in the form of a straight line progression, or some sort of flow and ebb, or by a spiral movement! Let's discard these fantasies and stay with reality which compels man to be aware of the solid earth beneath his feet. Then, political and social evolution can be observed as it is reproduced in the heart of ever more extensive spaces. This evolution, obviously, also always rises to a higher level.

Because the grographic horizon is being expanded, the sciences, from astronomy to sociology, also expand in breadth and reach an ever higher degree of learning. As the territory of states becomes more extensive, their collective strength, wealth and influence increase along with the growth in the number of square kilometers. The human spirit thrives more and more as the roads traveled by human evolution on this earth continue to lengthen. This progress can, with satisfactory approximation, be represented by an ascending spiral, the radius of which becomes wider as it rises. But this image is so far from reality, that it is deprived of all utility. This is why it can be considered as sufficient to show in the progressive territorial growth of states, an essential quality, and at the same time, a powerful driving force of historical development.

FOOTNOTES

1. Originally published as "le Sol, La Societe et L'Etat," in L'Annee Sociologique v. 3 (1898-1899)

GRANÖ'S PURE GEOGRAPHY

By Jacob H. P. van der Vaart

> ...Granö appears to be the only geographer who has actually used his ears and nose in the field...[1]

In October 1974, when Professor Torsten Hägerstrand visited the Graduate School of Geography at Clark University he gave a guest lecture, that he devoted entirely to a discussion of J. G. Granö's book Reine Geographie ("Pure Geography"), published in 1929.[2] It was on this occasion that almost everyone in the audience heard for the first time about the ideas of Granö, a Finish-Estonian geographer. As Hägerstrand revealed Granö's many original ideas, he stated that his work in those days might be called controversial. Indeed, Granö's rejection of the notion that geography studies spatial distribution and instead is more concerned with interaction of man and environment, may sustain this point. Granö's idea is that environment is "environment as perceived by man." The fact that this theme underlies his whole view of the scope and method of geographical study characterizes him in those years as a geographer with controversial ideas. But the book and its contents went by almost unnoticed.

Today we might call this geographical philosophy modern. During the last decade we have seen in geography a growing interest in and application of "the environment as perceived." This concept is now deeply rooted in geographical methodology. But how many of us know that 45 years ago Johannes Granö seriously tried to introduce this concept in geography. There are three reasons for the lack in awareness: the first reason is that we usually never read the 'old geographers.' A second reason is that Granö's ideas did not really fit in into the geography of his time, so not much attention was paid to him then. The third reason is that many American geographers usually cannot read French or German.[3]

To introduce a wider public to Granö's work, the author of this article, in cooperation with the Clark Geography Department, is working on a translation of his book into English.

The objective of this article is an introduction to Granö's book, by means of a presentation of the main outline and base of his ideas. Mentioning the multitude of interesting new concepts and methodological details is not possible in such a short article; paying proper attention to each one in the right context might result in copying the book. Finally, a review is presented of reactions to Granö's book when it appeared in 1929 and of followers of his concepts.

The Major Concepts of Granö's 'Reine Geographie'

Granö states that the purpose of his treatise is to demonstrate that the study of man's environment is the fundamental objective of geography. Man's environment consists of the complex of phenomena and objects which he perceives with all his senses.

To study this environment it is at first necessary to have a sound

method of description, because this is a prerequisite to explanation. Not content with the existing methods of geographical description, Granö's first task was to develop a method of scientific description that "did not suffer from the ills of the usual broad descriptions without scope or objective." Granö considered of primary importance for an exact and accurate description, the establishment of an exact and systematic terminology and foundation and an equally exact carthographic representation of geographical phenomena.

The objectives, combined with his notion of "environment as perceived environment," and his logical development of this concept, makes this book very interesting in the row of geography's methodological works.

From the points of view of many methodologists in geography Granö concludes that the fundamental object of study in geography is the "areal unit that in one way or another can be considered a complex, whether it is called geographical individual, landscape, environment or milieu." In his opinion this complex that he denotes with the term Umgebung (environment) is not only the practical but also the fundamental object of study. Granö calls the study of this environment 'Reine Geographie,' 'Pure Geography.'

By this we may state that Granö's concept of geography is in the tradition of the "Landschaftg geographie,"[4] which dominated the German geography of the first four decennia of this century.

The concept of geography as landscape science was first presented by Otto Schlüter in 1906.[5] Schlüter recommended that geographers look first at the things on the surface of the earth that can be perceived through the senses and at the totality of such perception -- the landscape.[6] So Granö was not the first one who came up with "the environment as perceived," but it was he who used the notion as a base for geography.

Hartshorne states that it was Granö in particular who has attempted to develop Schlüter's concept logically by working backward from Hellpach's notion of the landscape sensation as a total-impression.[7] The German psychologist Hellpach defined 'landscape' as "the pure sensory total-impression, which is aroused in us by the perception through all our senses of a section of the earth's surface and the sky above it."[8]

Because Granö considers the environment as a total-impression, the description of the environment also has to be based on the various perceptions that create this impression. By this standard he selected all the phenomena of the environment that are responsible for impression. These are presented in the following system:

A. Topological Phenomena (Phenomena of the Being)

I. Qualitative Phenomena

a. General Phenomenon: Distribution (Grouping)
B. Special Phenomena:

1. Visual phenomena: light (light sources), colors, forms
2. Audial phenomena: sounds
3. Phenomena of smell: odors

4. Phenomena of feeling: temperature, humidity, wetness, pressure, friction, slope, carrying capacity.

II. Quantitative Phenomena

a. General Phenomenon: Space in between (distance in space)
b. Special Phenomena:

1. Size (extension in space)
2. Largeness (intensity)

B. Chronological Phenomena (Phenomena of the Happening)

I. Qualitative Phenomena

a. General Phenomenon: Rhythm (grouping in time)
b. Special Phenomena:

1. Movement
2. Change

II. Quantitative Phenomena

a. General Phenomenon: Period (distance in time)
b. Special Phenomena:

1. Duration (extension in time)
2. Speed

Granö bases this scheme on the fact that the environment as perceived in totality is formed by three kinds of impressions: what guides our geographical orientation and is most important in the whole and integrates the "visible complex" of the environment. The second is called "the media;" indicators are temperature, humidity, pressure, sounds and smells. The third part is the "substratum" or "base;" we develop this impression through indicators like wetness, friction, carrying capacity and slope.

Working this out Granö concludes that there are phenomena which effect our senses only if they are in our immediate vicinity. Therefore, says Granö, we have to make a distinction in our environment in:

(a) Nähe (= Proximity): the intimate world in which we perceive with all our senses

(b) Landschaft (= Landscape): the distant environment, that exists of earth and sky and is mainly perceived by sight.

The boundary of the Proximity is a zone at about 20 to 100 meters from the observer. The area that extends beyond this zone towards the horizon is the landscape.

This system is the basic outline for Granö's description of the environment. The application is shown on two scales: one is the description and mapping of environmental phenomena in Estonia; the second is the

application of this method on the small island of Valosaari, near the city of Mikkeli in southeastern Finland.

Reactions on Grano's "Reine Geographie"

An investigation of American, English, French, German and Dutch geographical journals from the years 1929 to 1933 resulted in the finding of two book reviews.

In the Geographical Review of 1930 Eugene Van Cleef[9] wrote in his review that Granö's Reine Geographie presented a number of stimulating new concepts. His discussion contains numerous fascinating details, many of which would not doubt arouse any group of geographers to a lively controversy. The rest of this review does not show any points of criticism; it is rather neutral.

A more critical review was written by Fritz Jaeger in Petermanns Mitteilungen of 1930.[10] Jaeger called Granö's book substantial and original. But he remarked that the first part, in which the basic terms are defined and where the philosophical and psychological foundation is explained, is hard to read because of its very general formulation. Besides that he criticized many new terms and the mapping of colors and sounds. Jaeger said: "In my opinion the carthographic representation gets out of hand and becomes a sort of play." On the whole it is clear that Jaeger did not agree with Granö's methodology.

Other references to Reine Geographie can be found in Hartshorne's treatise "The Nature of Geography."[11] Some of his remarks have already been mentioned. But one of Hartshorne's concluding statements on Granö's ideas is very interesting. He wrote: "Few, if any, have followed his strictly logical system, and it seems safe to assume that few will."[12] But later on Hartshorne states: "Broek's doctoral dissertation on the Santa Clara Valley is in some degree a product of Sauer's concepts, though it follows Granö also in considerable degree."[13]

Broek who also used Hellpach's definition of landscape, says that when using this landscape concept for a scientific presentation, certain selections must be made in dealing with these "impressions" so that one may differentiate between the essential and the non-essential.[14] In a footnote Broek remarks: "J. G. Granö has been the first one to deal systematically with the methodology implied in the study of landscape. It seems however, as if here the wish to develop a consequent system has led to a maze of detail which would blur the main features if actually incorporated in a description of the landscape."[15]

This publication is the only example that could be found as using Granö's ideas, though in a very modest way. So at least some of Granö's ideas had some influence, but probably never were recognized in American geography.

If we want to know more about the effects of Granö's geographical philosophy, a search through German geographical studies of the nineteen-thirties may possibly reveal more reactions to or perhaps modest applications of his ideas. At least through one geographer the ideas of Granö have been carried on, namely by Edgar Kant, now emeritus professor at Lund University, Sweden.[16]

FOOTNOTES

1. R. Hartshorne, The Nature of Geography, Annals of the Association of American Geographers, Vol. 29, No. 3-4 (1939), p. 197.

2. J. G. Granö, Reine Geographie: Eine methodologische Studie beleuchtet mit Beispielen aus Finnland und Estland, issued in: Acta Geographica, No. 3, Publication Series of the Finnish Geographical Society, Helsingfors (1929), 202 pages.

3. European geographers are usually capable to read German, French and English, plus their mative language if they are not from one of these three language areas. By this they can reach a broad range of geographical ideas, but not always is taken full advantage of this asset. If we look at their bibliographies of cited literature in books and articles, they however also cling too often to sources in their own language.

4. For a good review of the work of the "landscape geographers," see R. Hartshorne, op.cit., especially Chapter V: "Landschaft" and "Landscape," pp. 149-174.

5. Otto Schlüter, Die Ziele der Geographie des Menschen (Antrittsrede), Munich: R. Oldenburg, 1906.

6. Preston E. James, All Possible Worlds. A history of geographical ideas (1972), pp. 229-230.

7. R. Hartshorne, op.cit., p. 161.

8. W. Hellpach, Die Geopsychischen Erscheinungen, Leipzig (1923), p. 348.

9. Eugene Van Cleef, Bookreview of 'Reine Geographie' by J. G. Granö, Geographical Review (1930), pp. 171-172.

10. Fritz Jaeger, Bookreview of 'Reine Geographis' by J. G. Granö, Petermanns Mitteilungen (1930), pp. 67-68.

11. R. Hartshorne, op.cit.

12. R. Hartshorne, op.cit., p. 161.

13. R. Hartshorne, op.cit., p. 178.

14. J.O.M. Broek, The Santa Clara Valley: A Study in Landscape Change, Utrecht (1932), p. 8.

15. J.O.M. Broek, op.cit., p. 8.

16. Information provided by Professor Torsten Hägerstrand in his guest-lecture at Clark University, October 1974.

FIELD TRIP TO QUEBEC

By H. Renwick

As our red rented van drove north towards Québec City in May, 1974, the green tinges on the trees faded, and we found ourselves donning the jackets, tights, and turtlenecks we had discarded for the New England summer. The Canadian roads were cracked and rotting from frost heaves, and those in the rear of the student-driven van had a bouncy ride as we attempted to stay ahead of faculty leader Doug Johnson's VW bug, which was fully equipped with his wife and young daughter.

Housing types and materials and town layouts were immediately different, in rural Canada, but the approach to Québec City, consisting of grey swooping highway ramps and a well-developed suburbia with a hotel-shopping plaza-strip running down its center, made us feel initially that Québec City was little different from the United States. During the next week we were to discover from Université Laval faculty and students that this is a matter of great importance to them. They love the 300-year-old walled city core that perches on sheer cliffs over the St. Lawrence. Having to move from an ancient and intimate campus there to a gigantically-scaled, wind-swept, treeless location in the suburbs was a sad blow to them. The move somewhat symbolizes their feeling of being forced to participate in a USA-focussed English-speaking Canada that they dislike.

Each student in our 10-strong group was assigned a single room in one of the Laval dormitories, which is in the grand tradition of pastel-painted cinderblocks with wall-to-wall carpeting.

We stumbled on a system of tunnels that connect all of the campus's buildings by underground, so that students needn't fight the bitter winter winds. Graffitti dots the tunnel walls, and we learned many French anti-American slogans during our week of trotting to the student cafeteria and bank.

Our hosts, the Université Laval Département de Géographie had planned a very full week for us. They had prepared a four-page schedule, in French, that would occupy all of our days and several evenings with field trips and discussions of their ongoing research. We were rather awed by all of the time they were willing to spend with us, and at all of the effort they had put into planning. Doug Johnson somewhat reassured us that this scheduling was in the French scientific tradition of excursion and quite normal.

Thus, for the first two days of our stay, we drove through the countryside north and south of the city and Professors Trotier, Bélanger, and Bernier interpreted the landscapes for us, in excellent English. Their descriptions were mainly historical-cultural in content, and we soon learned the basic French farm-house types that had been brought to Québec, and how they had slowly been changed to weather a rougher climate. Cultural boundaries were explored.

Topography was brought in only where it impeded or directed cultural diffusion, or where it upset settlement stability, such as river-valley flooding. This lack of interest bothered the physical geographers, who wanted to learn more about the structure of the Québec landscape. At a very relaxed and pleasant "vin d'honneur" party attended by Laval geography

students and faculty, the Clark "dirt men" met a Laval geomorphologist, M. Richot, and with him and Professor Len Berry of Clark, who arrived mid-week, planned a Friday excursion all on their own. It was very kind of him to take on such a task with no notice.

Probably the most spectacular event of our stay was a day-long field-trip to the village of St. Edouard-de-Frampton, which is located an hour southeast of Québec City. This farming community is intriguing culturally because it was once a tight Irish community, English-speakers surrounded by French. It is slowly succumbing, linguistically and culturally; we were taken to the old Scots graveyard and abandoned Anglican church.

We then were divided into mini-expeditions and went hunting for caves, got to know the dairy industry, met an ancient and knowledgeable local woman, and viewed the plans with which Laval and the villagers hope to bring Frampton out of its economic doldrums. The most exciting of these plans is for a ski resort on a local hillside. We were treated to beer at the community house/golf course/recreation center,ate a delicious lunch at the new restaurant, and met a lot of articulate, eager people,

Always an undercurrent during our stay were the hints of Québec nationalism. The department hosted a dinner for us at a restaurant in the Old City; its name was Le Gaulois, and its theme is holding out to the last in the struggle to prevent the French being overrun by foreigners. Late in the evening, Clark students somehow found themselves in beer-chugging contests with the other customers, determined to win small gold medals that read, "j'ai venu, j'ai vu,j'ai bu" ("I came, I saw, I drank") and a card declaring them to be defenders of Old Québec against any intruders.

On any and all of our field-trips, our hosts constantly praised folk housing and values, and were visibly and vocally upset whenever we passed a shopping plaza or featureless subdivision. We spent a day being shown Québec City, old and new--as tourist, governmental, and shipping centers, and as a habitat

There are many, or else no, central places in Québec City. The wharves down on the rivers are growing busier daily with the growth in container traffic. The Old Québec becomes increasingly beautiful, but less lived in by all but tourists. The grand new majestic buildings that house the Québec provincial government, which rise just outside of the old walls, seem completely unrelated to the smaller scale city and suburbs that surround them.

At the foot of the cliffs, inland from the wharves, are busy shopping and commercial streets, with a brave new roofed-over mall that aims to keep people from leaving for the gargantuan suburban malls, one of which surpasses, for sheer confusion and variety, even the mall in Honolulu.

We all found ourselves trying out our more or less rusty French during the week. The French flowed easily after an hour of Canadian beer in one of the innumerable brasseries that dot the townscape. Our group favorite was in a tiny old stone-walled cellar, full of low arches and wooden tables, located at the foot of the cliffs in the area of town that is being restored to its original 300-year-old self. After a long day of driving and learning, we would drive in to the Old City, spend a while finding a parking space, and then wander off in smaller groups for a few hours: we all somehow ended up at the same place, eventually.

As this was our first visit as a group to the region, we are all very grateful to the Laval department for giving us such a complete, eye-opening show. The experience has set us to wondering how we could even approach their excellence if called upon to create a similar set of tours for the Worcester-Boston area.

THE KNOW AMERICA PROJECT

By Alan B. Sharaf
Stephen W. Sawyer

The Know America Project sponsored by the Graduate School of Geography and the Summer School is being offered for the fifth year this summer. The program is a 31 day cross country camping trip which exposes students to a wide range of problems in resource management, industrial growth, energy consumption, land use planning, and agriculture.

Several Clark graduate students will be taking a group of 20 college prefreshmen, freshmen, and sophomores on the program. The group will be travelling in 12 passenger vans and will camp in state and national parks throughout the country. The duel purpose of the program is outdoor summer recreation and an introduction to environmental problems. Seminars are planned at several universities, meetings with industry spokesmen, planners, public officials, U. S. National Park Service and Forest Service people, citizens groups, will provide a balanced presentation of land use planning problems.

Conflicts between economic growth, employment, urban problems, and environmental quality will be central issues. The classic confrontation between preservation and multiple use will face students throughout the program in the National Parks, Forests, and Wilderness areas. The academic format will consist of planned seminars with local resource people including university professors, discussion sessions and planning exercises within the group. An extensive library of materials dealing with locational conflict and land use decisions will be available.

This year the program was changed from six weeks to 31 days in order to keep the cost down and to be able to organize a second program in August if there is sufficient demand. The thrust this year will be to get "out west" quickly and focus on problems of energy development in the Great Plains. Strip mining, coal gasification, and oil shale development will be examined especially looking at the problems of rapid development in small rural communities. Another important issue to be explored will be the problem of water resource development in the west.

The Know America Project began in 1971 as a program designed for inner city high school students to give them an exposure to environmental issues and to a learning experience that was an alternative to a traditional classroom experience. It was funded by the Lend A Hand Society of Boston and a Federal Grant. Alan B. Sharaf and Gordon Hinzmann were instructors during the first year of the program. In 1972 and continuing to the present, the program has been offered for credit through the Graduate School of Geography and the Clark Summer School. Each year scholarship funds have been made available primarily for area students.

The 1975 program will be staffed by Alan B. Sharaf who has been with the program since its inception and Stephen W. Sawyer who joined the program last summer. Several other Clark Graduate Students who have participated in the program as full time staff members are Marc Eichen and Farron Vogel. Professor Duane Knos and Saul Cohen have been the principle faculty sponsors of the program. Clark Alums who have participated in the program for a day or so in the field include, Richard Jackson, Cliff Craig,

Robert Wright, John Sorenson, Denis Wood, and George McCleary.

The program begins with an orientation program on campus. Prof. William Koelsch, Duane Knos, Harry Schwarz and Martin Bowden have joined us at Clark. This year university stops are planned for Wayne State, Brigham Young, University of Utah, University of Kansas, University of Southern Illinois, Virginia Polytechnic Institute and State University, University of Kentucky and Berea College.

ABSTRACTS OF DISSERTATION PROPOSALS ACCEPTED 1974-75

The Impact of Territorial Size and Sovereignty on Utilization and Management of the Environment — Michael J. Enders

The purpose of this study is to determine the role national sovereignty, in the context of territorial size, plays in how the inhabitants of a nation use and manage their environment. It will examine whether or not the inhabitants of a ministate, because of their nation's limited territorial extent, develop a greater degree of identification with their environments and, consequently, a greater concern over how it is used than do residents of larger states. If inhabitants of ministates do have a greater concern over the use of their environment than do their counterparts in larger nations, then this difference should be reflected in their corporate behavior as witnessed in the types of laws and programs existing to protect the environment as well as in the support for, and compliance with, these laws and programs. Four case studies will be used: Two will be independent ministates (Andorra and Monaco), and the other two will be similar types of areas belonging to much larger sovereign political units (Menton, France and San Remo, Italy). Use of the four case studies will allow for a comparison of the impact of the territorial size of the nation upon its inhabitants' use of the environment and also provide a comparison of behavior between two political units of the same sovereign size.

Community Acceptance of Land Treatment — Judith M. Dworkin

Wastewater management planners are looking with increasing interest to land application of wastewater. While there is much literature on the technologic and economic aspects of land treatment little has been done to research problems relating to its acceptance by the public. Experience indicates that acceptability will likely be a major decision variable in wastewater management planning. This study will analyze the individual and community acceptance of land treatment in sites where the process has been proposed. The study will draw conclusions from data collected from primary and secondary sources that may aid planners in developing strategies which will encourage dispassionate evaluation of land application.

Socio-Cultural Dynamics and Urban Spatial Expression:
The Boston Jewish Community, 1850-1970 — Kenneth J.Gelman

The migratory patterns of a people within a city take on predictable time and space dimensions in accordance with socioeconomic forces, political-cultural constraints, and circulation channels. But the migration of a people--a collection of individuals with a unique cultural history and a unique set of aspirations--operates within spatio-temporal dimensions that general studies of intra-urban migration often fail to take into account adequately. In ethnically or racially heterogeneous cities, such dimensions, far from being treated as exceptions in the construction of general models of urban settlement and movement, should be considered as central building blocks.

The evolving pattern of Jewish settlement in Boston through more than a century has been subject to pressures both within and without which have revealed two major and persistent spatial themes. First, the thrust of movement has gone in definite directions, or corridors, outward from the city center. Secondly and paramount, continued clustering has marked the pattern of Jewish migration. Through an analysis of the changing function, location, and membership of the institutions which comprise so important a place in the Jew's daily life, this dissertation will attempt to portray the bonds that tie an individual to a community and regulate his decisions to move.

The Aberrant Alternative: Squatting in
the North American City, 1840 - 1900 — Gary S. Roboff

During the nineteenth century squatters inhabited large areas in rapidly growing North American cities. Sometimes on the periphery, sometimes crowded between the tall buildings of more developed sections, the squatters lived in a variety of circumstances that reflected their own individual backgrounds and the particular policies of their city. This dissertation will document the spatial pattern of squatter residence across major nineteenth century cities, and will investigate the social, economic, and political characteristics of key squatments in New York City. The New York data will be used to aid in the development of a dynamic model of squatter settlement in the nineteenth century North American city.

Workers' Control: Guidelines for the
Reorientation of Community Development — Myrna Breitbart

The aim of this dissertation is to develop alternative guidelines for urban community development based upon work institutions that are owned, operated, and controlled by their workers. Research will (a) explore the effects of capitalist work structures on the activities and socioeconomic well-being of laborers within an urban environment, (b) determine the economic, social, and spatial ramifications of various forms of workers' control within the work-place and the larger communities in which these firms operate, and (c) employ this analysis to develop alternative conceptual guidelines for community development in the United States.

The First-Order Drainage Basin — Alan L. Marcus

An Investigation of the Systematic Relationships
Between Geomorphic Processes and Landscape Form

This study explores the relations between geomorphic processes and landscape form. Utilizing the first-order drainage basin as the basic field unit, data will be gathered to evaluate the relations between form and process. The proposed research hypothesis states: "Where physical and geometric measures of drainage basin properties can be combined into meaningful geomorphic relations, these relations serve as indicators of the pattern of nature of the systematic relationships between geomorphic processes and landscape form." To test this hypothesis, this study will first determine if systematic relations exist between two first-order drainage basin slope zones and, second, determine what is the geomorphic pattern of these relationships. A principle components factor analysis and a cluster grouping are utilized to delineate pattern variations among the measured physical and geometric indices. These analyses should establish factor groups of functional relations which indicate the patterns of intra-basin adjustment. The results from this investigation will increase our understanding of the internal adjustments associated with dynamic equilibrium among hillslope regions within first-order drainage basins.

Standing (l. to r.) Eliot Wessler, Duane Knos, Steve Feldman, Bill Koelsch, Saul Cohen, Larry Lewis

Sitting on bench-upper row (l. to r.) Nurit Kliot, David Seamon, Amram Pruginin, Hilary & Bill Renwick, Sisca Vierstra, Gary Roboff, Mike Enders, Steve Sawyer, Larry Polese, Cindi Katz, Judy Dworkin and David Pijawka

Sitting on bench-lower row (l. to r.) Karl Chang, Paul Oberg, Esther Rolnitzky, Courtice Rose, Richard Schlosberg, Forest Cason, Mark Mujwahuzi, Bob Kates, Ruth Rowles, Bob Wirtshafter, Laban Masimba.

Sitting on the ground (l. to r.) Ken Gelman, Alan Sharaf, Farron Vogel, David Campbell, Doug Johnson

FACULTY NEWS

LEN BERRY has been directing research on development problems. He will be Dean of the Graduate School at Clark University this coming year.

MARTYN BOWDEN's research includes Reconstruction following Disaster, where he worked on the recovery experiences of Managua and San Francisco. His work on the historical geography of New England continues.

SISTER ANN BUTTIMER is researching the relationship between geography and phenomenology, thinking about time-space, and investigating humanistic education. She is busy lecturing at the University of Vancouver, Simon Fraser, Victoria, Berkeley, and chaired a session at the AAAS Conference on the "Quality of Life in the Central City."

KANG-TSWNG CHANG joined the faculty this year and is teaching a number of cartography courses. The Canadian Cartographer published a paper of his, "An Instructional Computer Program on Statistical Class Intervals." His present research involves cartographic design in atlases.

SAUL B. COHEN has been busy as usual traveling to Israel where he is a Visiting Professor at Hebrew University, to Puerto Rico where, together with S. Wapner and B. Kaplan, he worked on developing a research model for studying the impacts of re-migration, to Chicago to give the keynote session at the NCGE meetings on "Trouble Spots in the World," and to Buffalo to give the August Rand Public Lecture. Back at Clark he organized with S. Wapner and B. Kaplan a methodologically-oriented Conference on Experiencing the Environment. He has a number of new publications in press including "A Framework for Analysis of World Trouble Spots: The Arab-Israeli Conflict As A Case," Journal of Geography and Experiencing the Environment, S. Wapner, S. Cohen, B. Kaplan, editors, Plenum Press.

STEPHEN L. FELDMAN has worked on a book on Urban Water Resources which is being published by the Rotterdam University Press. He spent part of last summer in Karlsrutie, Germany at the Regional Science Seminar where he presented two papers. Presently he is looking forward to the development of a project in Haiti with Lawrence Lewis.

DOUGLAS L. JOHNSON has a number of current and future research projects including Modernization of Pastoral Nomadism, Cultural Ecology of Early 19th Century New England Architecture, New England Culture Landscape, Worcester's ethnic structure, and a Historical Atlas of New England. He is also very busy giving talks to church groups in the area on World Hunger and the development of African communities.

ROGER KASPERSON is spending the second semester on sabbatical in Greece, Egypt, & Yugoslavia. He is coordinating a Ford Foundation Grant on Safety Policy on Nuclear Energy Production. He authored a C.C.G. monograph with Myrna Breitbart, Participation, Decentralization, and Advocacy Planning.

ROBERT KATES became a University Professor this year. His current research includes Disaster Reconstruction, Environmental Constraints on the Least Developed Countries, Risk Assessment of Environmental Hazards,

and Man-Environment Theory. He gave the mini-commencement adress at Clark and coordinated a Conference on Risk Assessment at Woods Hole, MA. Professor Kates has recently been appointed to the National Academy of Sciences.

WILLIAM A. KOELSCH continues as archivist of Clark, has been appointed to the Massachusetts Archives Advisory Commission, and is Chairman of an AAG Committee on Archives and Association history. A number of completed articles are in press and his current research includes a history of the Graduate School of Geography and a biography of Wallace Atwood.

LAURENCE A. LEWIS continues his research on slopes. Future research will hopefully include Soil Erosion and Agricultural Utilization in Haiti.

WILLIAM J. McCALL joined the staff of the Graduate School in February as Map Librarian for the Guy H. Burnham Map and Aerial Photograph Library. Presently reorganizing and redirecting Library policies and procedures for a more effective role in the department. Bill is also busy reclassifying and cataloging materials to provide a multi-approachable collection with a wide variety of map types represented.

GARY T. MOORE, an architect and environmental psychologist was hired this year as a Visiting Lecturer to teach a course in Environmental Perception, Cognition and Behavior. A book entitled Environmental Knowing: Theories, Perspectives, and Methods co-edited with R. G. Golledge is being published by Dawdeh, Hutchinson, and Ross and John Wiley, the preparation of which has consumed much of his time. Gary will be a Visiting Lecturer at the University of Sydney and New South Wales the Fall and Winter of 1975.

RICHARD PEET continues his research interest in Poverty and Inequality in the U.S. This year he has also started a new thrust in Marxism and Geography. He is pursuing this interest through courses, research, and a Marxist Geography conference which was attended by 60 people last November.

RUTH ANDERSON ROWLES joined the cartography lab this year as Director of the Laboratory and research cartography. She is teaching cartography techniques in which emphasis is placed on positive and negative artwork and basic photographic methods for modern map making.

HARRY E. SCHWARZ, Director of the new Environmental Affairs Program, completed a review of regional wastewater treatment plans for the U.S. Army, Corps of Engineers. He also gave a series of lectures on Water Resources Planning and Use of Systems Analyses to U.N. trainees from Yugoslavia. The Journal of the Hydraulic Division A.S.C.E. published "Trouble in Paradise," a paper which he co-authored with Maria R. Eigerman.

ALUMNI NEWS

ABRAHAMSON, SHERMAN (MA 1948, PhD 1949) is the director, Office of East-West Trade Development, Department of Commerce. He has recently travelled to all of the capitals of Eastern Europe and the USSR.

ADKINSON, BURTON (PhD 1942) is a private consultant and is the author of a book soon to be published, Science Information and the Federal Government 1942-72.

ALEXANDER, LEWIS (MA 1948, PhD 1949) is Chairman, Geography Department, and Director, Master of Marine Affairs Program, University of Rhode Island. he has recently published articles on the law of the sea, particularly the impact of the 200 mile economic zone on national interests in the ocean. Further research interests include multi-national regional arrangements on the use and control of the sea.

ALLEN, AGNES M. (MA 1934, PhD 1937), Emeritus. Professor Allen is doing research on the relations between Northern Arizona University and the Navajo. She still calls Flaggstaff her home but spends several weeks of winter in California and Illinois.

AMES, DAVID L. (PhD 1969) is Associate Dean, School of Community Services, Virginia Commonwealth University.

ANDERSON, ESTHER (PhD 1932) is professor emeritus, University of Nebraska and has undertaken consultant and research work in Urban and Regional Geography. Her biography is listed in "American Men and Women of Sciences -- Urban Community Sciences, 1974."

BAKER, SIMON (PhD 1965) has published an article on soil surveys and topographic maps and is interested in the use of remote sensing system in resources development.

BALTENSPERGER, BRAD (MA, PhD 1974), Assistant Professor of Geography, Department of Social Sciences, Michigan Technological University. Published reviews: The Suitcase Farming Frontier; future research: Environmental Assessments on the Great Plains.

BENEDICT, ELIZABETH GREGORY (AM 1930) has been travelling in Western Europe and visiting Oxford and Cambridge, England; Granada, Cordoba and Seville, Spain and the Channel Islands. She notes, "I am finding Western European living very stimulating as I watch the evolution of the Common Market at close quarters."

BERMAN, MILDRED (MA 1950, PhD 1963) is pursuing her research on sex discrimination within the profession of geography. She has been appointed to the Governor's Commission on the Status of Women, Massachusetts, and she was elected President of the Council for Women in Massachusetts Public Higher Education. Professor Berman is currently on the faculty of Salem State College, Massachusetts.

BIRCH, WILLIAM was a Visiting Professor at Clark 1960-1963. He is Head of the geography department, University of Leeds and Vice President of the Institute of British Geographers. Recent research involves an examination of information needs for land and water resource management.

BOWDEN, LEONARD W. (PhD 1964), Professor of the University of California, Riverside. He delivered the Keynote address at the 75th Anniversary meeting of the Rhodesian Scientific Association, and edited the Manual of Remote Sensing for the American Society of Photogrammetry.

BLOOMFIELD, CARL and GERTRUDE (MA's 1935), Carl has now retired and Gertrude is a teacher in Detroit.

BRANDON, DONALD (1946-47) is retired from Morgan St. College. He received an award for 25 years honored service, for work helping to establish geography with departmental status. Brandon has studied urban migration of Blacks in Baltimore.

BROWN, ROGER J.E. (PhD 1961), research officer -- National Research Council of Canada. He has taught at the University of Calgary, Department of Geology, and attended the 2nd International Conference on Permafrost in Yakutsk. He and his wife traveled through China and Mongolia, and in the Soviet Union.

BRUNNSCHWEILER, DICTER (Visiting Professor 1953-55) is at the Michigan State University. A recent monograph "Environment and Changing Land Use in the Llanos Orientales of Columbia" has been published. A special greeting to the 1953 Roamoke Field Camp Crew.

BUSH, EVERETT H. (MA 1947) is Professor of Geography at Wittenberg University, Springfield, Ohio. He writes: "In August 1974, I retired from the U.S. Army Reserve with the rank of Colonel, after 32 years of service."

CALDWELL, HARRY H. (AB 1941, PhD 1957) as a professor in the Department of Geography at the University of Idaho he is undertaking research on Post-Audit Land Use and Ecological History and has directed the 28th and 29th Borah Symposia.

CAPELLE, RUSSELL (MA 1971) is Assistant Professor of Geography, University of Rhode Island Research; undertaken involves "The Recreation Space Searching Process."

CHAMBERLIN, THOMAS W. (MA 1937, PhD 1946), Professor of Geography, University of Minnesota, Duluth.

CHEW, MARGARET S. (PhD 1960), Professor of Geography, University of Wisconsin, La Crosse. She took a geography study group to the Soviet Union and England last summer, and is planning a similar trip to Yucatan and Central America this coming summer.

CUMMINGS, HARRY (PhD 1975) is the Research Officer, Canadian Council on Rural Development. Recent research concerns problems of data reliability in the Third World.

CUNNINGHAM, FLOYD F. (MA 1928, PhD 1930) is Professor Emeritus of Geography at Southern Illinois University at Carbondale. Since his last book, 1001 Questions Answered About Water Resources (1967), he has continued with his research interests in Conservation, Resource Management, Pollution and Illinois.

DORNBACH, JOHN E. (PhD 1967) is presently technical assistant to the chief, Earth Observation Division, Johnson Space Center at NASA in Houston. He has recently presented papers in St. Louis and Washington at meetings of ASP/ACSM and at ERTS-1 Symposium in Washington, D.C.

DEAN, VEVA K (MA 1940, PhD 1949) although retired is actively pursuing research on the Middle East. She is on the Board of Directors of Concerned Citizens of Martha's Vineyard and the Vineyard Conservation Society. She reports she also has time to work on the restoration and maintenance of their 1690 Cape Cod farmhouse.

DIETTRICH, SIGISMOND de R. (PhD 1931), retired.

DONNELL, ROBERT (MA 1971) is Instructor in Geography, Framingham State College, Mass. He presented a paper in the urban session of the 1974 regional AAG meetings at West Point, N.Y.

ELLIOTT, FRANCIS E. (PhD 1952), retired.

FAIRCHILD, WILMA (MA 1937) is freelancing as an editor and enjoys it very much.

FLETCHER, ROY (PhD 1968) is Associate Professor, University of Lethbridge, Alberta, Canada. Research undertaken recently includes the Climatic Atlas of Arctic Canada.

FREILE, ALFONSO J. (PhD 1961), professor, University of Pittsburgh. Currently interested in perceptual aspects in Panama. Research undertaken on religion's influence in Cavablan politics.

FRENCH, BOB (MA 1972), Associate Professor of Geography, University of Maine, P.O.G.O.

FUCHS, DONALD (MA 1957, PhD 1959) is Professor and Chairman, Department of Geography, University of Hawaii. Recent publications, Geographical Perspectives in the Soviet Union.

GASSAWAY, ALEXANDER R. (PhD 1971), Associate Professor of Geography, Portland State University. Recent publications: "Medical Manpower in Oregon," Western Journal of Medicine, Sept. 1974; future research: interested in research on food supply study for N.E. Japan.

GEORGE, JOHN (MA 1956) is Chairman, Department of Geography, Salem State College. Recent publication: "Our Urbanizing Society" in Ecology in Action.

GIRGIS, MONIR SAAD (PhD 1957) is Professor of Geography, Department of Geography, Edinboro State College. He is writing a book about the Geography of North Africa.

GLEDHILL, THOMAS (MA 1967) is instructor of Earth Science in the Rhode Island school system and is currently working on an energy conservation program for elementary schools.

GOULD, LOREN (MA 1959) is the Director of Institutional Studies, Worcester

State College. Received award from the Age Center of Worcester for outstanding contribution to the Retired Senior Volunteer Program.

GREEN, HOWARD L. (BA 1947, MA 1949) is President, Howard L. Green & Associates, Inc. In conjunction with William Applebaum, he is studying the sequential development of retailing in Detroit, 1937-74.

GREVELING, HAROLD F (PhD 1951), retired from East Stroudsburg State College, Pa., in 1968. Professor of East Central State College, Oklahoma. Future interests: teaching geography to older people.

GRIFFIN, DONALD (PhD 1963), Director, Institute for Regional Rural and Community Studies and Professor of Geography, Western Illinois University. Recent publication: "West Central Illinois: A Regional Profile;" future research: Land Resource Inventory, Land Suitability Analysis for the Ten County Regions, Title V.

HANK, SISTER MARY URSULA (PhD 1958) has retired from college administration and is involved in a civic project on a volunteer basis.

HARRIS, ALAN (1951-1952) is Reader in Geography, The University of Hull. His interest in historical geography continues and recent publications have all been within this field of study.

HAYES, FREDERICK, spent the summers of 1940-42 at Clark.

HAWLEY, DOROTHIA BURTON (MA 1947, PhD 1949), retired (U.S. Defense Intelligency Agency). She has travelled in the Mediterranian-Middle East, South American areas since retirement.

HECHT, ALFRED (PhD 1972) is Assistant Professor, Wilfrid Laurier University and is the Director of a Research team investigating "Residential Location of Industrial Workers."

HECOCK, DICK (PhD 1966), Professor, Department of Geography, Oklahoma State University. Recent publications with J.F. Rooney, "Opportunities for Water Based Recreational Activities in Oklahoma, Oklahoma Water Resources Research Institute.

HODGES, FRANKLIN P.(MA 1966), Professor of Geography and Chairman of Geography-Anthropology, University of Maine. He has recently published "An Experimental Project on Modifying College Testing Situations," in the New England Reading Association Journal with A.A. Lacograta and S.J.W. Pendleton. Also he has developed a graduate course on the geography of poverty.

HIRST, MRS. ROY (MA 1928) is retired.

HONES, GERRY (MA 1953) is senior lecturer in Education at the University of Bath. He is still working on "The Geography of Education" and compiling a bibliography -- references welcome.

HOYT, JOSEPH B. (PhD 1954), Professor of Geography, Southern Connecticut State College. Research includes a study of the Urbanization of Westville (New Haven).

HUNTER, ESTHER KIRICH (MA 1940) is a homemaker. She has joined a soaring club and is learning to fly a sailplane.

JESSEMAN, JESSIE M (THORNTON) (MA 1941) is still enjoying her retirement.

KIRCHER, HARRY B. (PhD 1961) is Professor and Assistant Chairman, Department of Earth Sciences and Planning, South Illinois University. He is working on mid-Mississippi Valley Research and the fourth edition of Our Natural Resources.

KISTLER, ESTHER (MA 1938) is a retired school teacher.

LAINE, OLIVER (MA 1949, PhD 1953) is an aviation education specialist for the Federal Aviation Administration in Washington, D.C.

LEACH, ALAN (MA 1969) is a Captain in the U.S. Airforce, Arkansas.

LEMAIRE, MINNIE E. (MA 1932, PhD 1935) is retired. She attended the A.A.G. meeting in Seattle and the Conference of Latin Americanist Geographers at Florida Atlantic University in Boca Raton.

LEMAIRE, SALLY (MA 1974) is director of the Center for Racial Justice, YWCA of Greater Bridgeport.

LEWIS, TOM (BA 1967, PhD, pending) is Assistant Professor at Manchester Community College, Connecticut. Currently consulting with Connecticut Association of Legislators, has published "Keeping the Place in the Past" and presented a paper at A.A.G., October 1974.

LIARD, THEODORE J. (MA 1948) is currently Chief of the Geographic Names Division of the Defense Mapping Agency Topographic Center in Washington, D.C.

LLOYD, TREVOR (PhD 1940), Professor of Human Geography; Director, Centre of Northern Studies, McGhill University. Future research involves Arctic development around the world.

LOCKHART, RICHARD and MIRIAM (AM 1957) are currently a city planner in Cambridge, Mass., and an English teacher.

LOGAN, RICHARD F. (BA 1936, MA 1937), Professor of Geography, University of California, Los Angeles. Recent publications: "The Utilization of the Namib Desert Ch. 23" in "Coastal Deserts", edited by Amiran and Wilson. Also is Chairman of Commission of the South West Africa Legislature, charged with a land use plan for Kuiseb River.

LOWE, JOHN C. (PhD 1969), Associate Professor, Department of Geography, George Washington University. Recent research publication includes: Movement in Human Geography and "Structure of Urban Delivery Systems."

MAIER, EMANUAL (PhD 1961) is Chairman of the Department of Earth Sciences and Geography at Bridgewater State College. His interest in human territorial behavior continues. He writes, "living in Lincoln, gardening. Son, Barney at UCLA, daughter Rachel at Brandeis." He

presented a paper at the A.A.G. Conference in Seattle.

McINTYRE, WALLACE (PhD 1951) is employed by the U.S. Government and has become a grandfather in November 1974.

McLUTCHEON, HENRY R. (MA 1966, PhD 1970), Senior Planner, Water Planning and Management Branch, Inland Water Directorate, Enviornment, Canada. Presently he is working on the preparation of guidelines and standards for comprehensive river basin planning.

MELEEN, MATHAN (MA 1964) is an Assistant Professor at Oral Roberts University, Tulsa, Oklahoma. Professor Meleen recently settled his thesis outline with Dr. Berry and is now ready to begin writing. His research deals with the effects of surface coal mining on runoff, sediment yield, and water quality.

MENSOIAN, MICHAEL G. (BA 1969).

MERRIAM, FREDERICK S. (AB 1939, MA 1946), sales representative for Waddell and Reed, Inc.

MILLER, DAVID (MA 1972) teaches at Taunton School, Somerset, England.

MILSTEAD, HARLEY P. (MA 1926, PhD 1933) is retired.

MOBERG, WENSEL W. (BA 1939, MA 1942), died November 13, 1974 in Portland, Maine. A memorial scholarship is being established at the University of Maine, Gorham Campus where Wensel taught for 16 years before retiring because of his health.

MONIER, CLAIRA P. (MA 1963, PhD 1965), Special Assistant to the Governor of New Hampshire. Recent publications: "R.R. Right of Way Acquisition."

MORRILL, ROBERT W. (PhD 1973), employed at the Virginia Polytechnical Institute and State University. Research: Simulation of Geographic Phenomenon for Instructional Purposes. Revision of HSGP: Political Geography Unit Activity. Publications: Polities, Politics; School Redistricting, co-authored with Roberta Smilnak and R. Wright.

MOULTON, B. (BA 1939) is Professor and Chairman, Department of Geography and Geology, Indiana State University. His research involves "Alaska's Role in the Pacific World."

MOULTON, JOHN M. (1 year 1958-59) is a Professor of Geography and Geology. Presented a paper on Historical Geology of the High Plains of Nebraska and Kansas and its Economic Implications.

MUNCASTER, RUSSELL W. (MA 1968, PhD 1972) is Associate Professor and Chairman of the Department of Geography at Wilfrid Laurier University, Waterloo, Ontario. He has completed a paper which will appear in Census Data: Geographic Significance and Classroom Utility edited by Borden Dent. A paper entitled "The Canadian Urban System" was recently prepared for the C.A.G. Canadian Studies Project. Last summer was spend teaching summer school in Durham, England and travelling around Great Britain with his family.

NELSON, HERMAN L. (PhD 1954) is Professor of Geography, University of Wisconsin, La Crosse.

PARSON, RUBEN L. (MA 1934, PhD 1943), Professor Emeritus, Saint Cloud College, St. Cloud, Minnesota, is currently writing a book dealing with his grandfather's homesteading in Otter Trail County, Minnesota in 1869. He and his wife toured Scandinavia this past August where they visited both his grandfather's and his mother's original homes.

PEARCY, G. ETZEL (MA 1932, PhD 1940), a free lance writer, lists among his recent publications A 38-State USA. His research interests include a study of U.S. counties and county administration and world patterns of sovereignty. He recently circumnavigated South America, through the Strait of Magellan.

PERRY, ROBERT F. (PhD 1957) is Chairman, Department of Geography, Worcester State College. Research includes Land Use Changes in South Africa.

PIKE, RICHARD J. (MA 1963) is a geologist for the U.S. Geological Society. Recent publications include work on lunar craters appearing in Earth and Planetary Science Letters, Geophysical Research Letters and Sky and Telescope. A book review and a brief philosophical article on extra terrestial geography were published in The Professional Geographer. Present research involves terrestial landscape morphometry and the geometry of terrestial volcanoes. He writes, "June is spending a year at the Geological Survey on a post-doctoral grant. Work seems to have pre-empted all our travel time, save for a quick visit to Northern Arizona."

PICO, RAFAEL (MA 1934, PhD 1938, LLD (Hon.) 1962), Vice Chairman of Board of Directors, Banco Popular de Puerto Rico. He has written The Geography of Puerto Rico and served on the panel on "Field Study in Latin America" during the Annual Conference of Latin Americanist Geographers.

PRESTON, JAMES E. (PhD 1923, LLD, 1968) is Maxwell Professor Emeritus, Syracuse University and Adjunct Professor, Florida Atlantic University. He was awarded an LLD in 1974 from the University of Michigan. His future research interests include: the History of the A.A.G. and the Development of Geographical Ideas in America.

PRESTON, RICHARD (PhD 1964) is Professor of Geography, University of Waterloo. Recent research includes the role of cities in regional economic development in the Pacific Northwest.

PRIDDLE, GEORGE (MA 1964, PhD 1972) is Associate Professor, University of Waterloo. He has been made Chairman of a newly appointed Provincial Parks Advisory Council. He is working on a book on recreation geography and is finishing monograph on Urban Field study for secondary schools.

PRINCE, HUGH was a visiting professor at Clark, 1971 and is with the Department of Geography, University College, London. Recent publication concerns the historical geography of England.

WOODLAND, MARY VOGT (MA 1943) is village trustee, Homewood, Illinois. Among her many interests she is editing a paper on the structural geology of Central Vermont and assisting on field studies in the Black Hills.

WRIGHT, JOSEPH A. (PhD 1951), former Chief Geographer, National Ocean Survey; Chairman, U.S. Board on Geographic Names. Research includes: U.S. External Boundaries and Maryland Geographic Names.

ZUBER, LEO spent 1948-49 at Clark. He is Assistant Regional Administrator for Community Planning and Management, HUD, Atlanta, Georgia. Recently he lectured at the University of Pernambuco in Brazil.

MYATT, W.G. (PhD) passed away in August 1974.