

The main points to be made are that first, studies of residential site selection must be based upon the proper behavioral unit -- in this case the household, a good example here is the model posed by Herbert and Stevens (1960). Second, it seems logical to posit that accessibility is a significant factor in residential site selection decisions but that despite recent work on household travel behavior we are still a long way from being able to make firm statements about either its relative role in the site selection process or the manner in which households evaluate accessibility. An interesting area of investigation which might also serve to pull these two topics a bit closer together would be that of the manner in which a household in a new residential site gathers information and establishes an equilibrium set of movement patterns. Investigations in this area, as well as that of household to household varieties in the perception of space and distance relations, would enable future researchers to construct better models of the residential site selection process.

References

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C. Residential Location Forecasting: Some Points on Perspective

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It is always easier to criticize other ideas and theories than to invent concepts. Moverover, giving advice on how to succeed beyond the admonition to do one's best and work hard is usually best practiced by those who are not active in the particular field of endeavor. Nevertheless, when one approaches the task of constructing a residential location model, there are many decisions to make before one begins programming. I will comment briefly on three of these important questions.

For What purpose is the model being assembled?

Will the output of the model be used for estimating future travel demand and hence in the design of new transportation facilities? Perhaps the model will keep tract of the structural condition of dwellings and be operated to provide estimates of housing construction and the fiscal split between renewal, rehabilitation, and public and private construction. The model may incorporate racial-ethnic factors and be used to anticipate potential future conflict in the demand for housing.

To the extent that we fully understand man's behavior with respect to location, we might consider a generalized residential location model that provides answers to these questions and almost any others one might ask. But such an

approach runs the risk of overrunning the bounds of understanding man's behavior, not to mention the capabilities of computational devices. And in our desire to generalize, we may very well devise a technique which answers all questions poorly but no questions with the accuracy necessary for a major decision.

In the case of transportation planning, we need to know for finite areas (traffic analysis zones) the probable residents at some future point in time and have some rough estimate of their trip making potential. Detailed characteristics such as race, sex, age, religion, occupation-industry, level of educational achievement, migration characteristics, political affiliation, leisure time interests, etc. may bear on the amount of travel and direction of travel. Geographic differences in such factors are often non-existent or quite small and may tend to shift through time. Their effect on design decisions for major travel corridors might not be measurable. To attempt to juggle all of these variables in a residential location model, whose output is to be used in transportation planning is tantamount to a death wish for the model builder.

Behavior Unit

Since we are concerned with residential location and since the bulk of people live in household (family) units, the obvious unit to study is the household. But since we are most often dealing with urban areas with hundreds of thousands of households, some grouping is obviously in order.

Clearly, the ideal group consists of those households whose behavior is homogeneous with respect to some aspect of the urban phenomenon being studied. The difficulty here, however, is what aspect to use in grouping. In the case of travel, we might define this as the frequency of trips per household. This would allow us to get by with perhaps 50 or 60 classes (very few households make more than 50 trips). But does a family which makes six trips on Monday make six trips on Tuesday, Wednesday, Thursday and Friday? Can we count on them to continue to make these same trips indefinitely? Are all of these trips of the same category? One household has two work trips and four school trips, while another household may have four work trips and two trips to the grocery store. If we examine factors such as trip purpose, time of day, land use, etc., we approach a situation in which each household is unique in much the same way as no two individuals have identical fingerprints.

This is an extremely significant and difficult problem. The aggregation of households having common geography but differing levels of car ownership will provide groups which are completely unsuitable to the analysis of travel with respect to utilization of public transportation. The error of such a grouping results from the fact that transit utilization is inversely and non-linearly associated with car ownership. The aggregation of this behavior assumes a linear relationship and thereby prevents any possibility of measuring the relationship of transit usage and car ownership. Yet such aggregation is no stranger to some projects which have attempted to study this relationship.

At the other extreme, however, we have the analyst who in his desire to develop homogeneous sets finds himself with the same number of groups as he has households. In such pursuit for exact explanation of individual behavior, we

run the risk of missing group patterns. Only a fool, a gambler, or a witch would attempt to forecast the outcome of each cast of the die. Yet the long term pattern of results is a regular frequency distribution which even grade-school children are asked to identify. Similarly the forecasting of individual trip interchanges is a fruitless venture but the use of a probability measure to describe the pattern of trip interchanges is quite rewarding.

There can be no argument that the household is a basic unit for study and analysis. I merely want to emphasize that I believe there is such a thing as group behavior and that group behavior is critical to problem solution. Disaggregation (a term which apparently results from long years of exposure to secondary data sources) has no inherent magic.

Sensitivity Analysis

One of our concerns in our work in New York is the sensitivity of our planning process to variations in parameters in the various models and sub-models that we use. How important are the variations in trip density by different levels of geography ranging from parcel, to block, to traffic analysis zone, to district? How accurate should zonal interchange calculations be? At what point do refinements in measuring speed, highway capacity, signal timings, land area, etc. fail to improve our estimates of urban traffic flow?

We are conducting tests to determine the sensitivity of our process to such various factors. We must constantly guard against the possibility that we have dropped below the threshold of significant differences and are simply investigating noise level in the form of sampling variability, random or extraneous disturbances, and errors in measurement. We must keep our objective of regional system planning in sharp focus and avoid trivial or irrelevant investigations, but at the same time, we must not let the way we have organized our approach to a problem blind us to the actual phenomenon which we wish to observe and explain.

III. Some Notes on Conceptual Approaches: Retail Trade

Britton Harris, Chairman

The following substantive discussion by Dr. Berry and myself will be introduced by a few brief remarks. Retail trade is a particularly interesting area of investigation in which to examine the relationship between theory and models. There are two reasons for this. In the first place, the location of retail trade does not result, as does the location of residential activity, in a smooth or nearly smooth density surface in the metropolitan area. On the contrary, retail trade distribution is peaked in fairly well defined centers. In the final analysis this means that most simple models involving correlations and linear or log-linear relationships do not suffice to explain the complete pattern of retail location. Much more subtle models are necessary. Secondly, as we will hear from Dr. Berry, there is a long and useful record of research and theory building in the location of retail trade and services, central place theory. This theory owes its development to the unflagging interest of the geographers and to the fact that it deals with arrangements of activities and places for which a great deal of data has been continually available. In the discussions which