

Problems of Movement in Space and Time: Refining Our Views of Impedance at the Level of the Individual

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Abstract

Living within the confines of a highly-differentiated landscape requires that a complex and dynamic pattern of individual movement develop that links residence sites with other locations supplying needed goods and services, places of work, recreation, etc. The traditional approach to the space-time analysis of these movements has been largely based upon the use of spatial, temporal and population aggregates as a means of simplifying the analytical domain. However these aggregations effectively disguise the significant differences that appear when specific population sub-groups are identified (e.g., the elderly, those who lack access to a motor vehicle, mobility-handicapped individuals, etc.).

A critical element of nearly all of the macro- and micro-models that have been constructed is the notion of *impedance* or the resistance to movement through some arbitrary unit of space (such as a grid cell or a link in a network model). This, coupled with information on the physical location of the elements of potential destination sets, has formed the basis for studies of the *accessability* to the individual or household of various goods and services, including health services.

Over the years impedance elements in macro-models have been estimated using a variety of measures including physical distance, travel time, economic cost, congestion, etc. However at the individual level the measurement of impedance has been largely neglected, except in terms of the level of energy expended in individual movement over natural terrain. Only too frequently this ignorance of the factors influencing impedance has expressed itself in overly simplistic planning assumptions (e.g., within one-half mile of an urban bus stop, measured as an airline distance, all household members will consider utilizing that stop; beyond that distance none of them will do so).

This presentation reviews what is currently known with respect to the measurement of individual movement impedances and suggests an approach to generating viable, operational measures that can be incorporated in space-time object models. These measures, it is hoped, will lead to more effective measures of accessability to health and other services by members of specific population sub-groups.