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Socio-dynamic discrete choice: Theory and application

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Part I

SETTING THE STAGE

Pioneered in the domain of travel demand by Ben-Akiva (1973), Lerman (1975), Domencich and McFadden (1975) and others, and generalized by McFadden (1978) in the context of modeling the choice of residential location, discrete choice analysis has become an industry standard in land use and transportation planning models. An outstanding methodological challenge remains however in the treatment of the interdependence of various decision makers' choices. At the same time, there is growing awareness and interest in the influence that social factors have on transportation and land use behaviors (Dugundji, Páez and Arentze 2008; Dugundji et al. 2011; Dugundji et al. 2012). In this context, a distinction can be made between identifiable versus aggregate interactions. We speak of interaction between "identifiable" decision makers when the links in the network are well-known and explicitly defined on an individual decision maker by decision maker basis. We speak of interaction between "aggregate" decision makers when interdependence is assumed to take place only at an aggregate level with links being defined by implicit networks, for example, more generally based on decision maker characteristics, by latent constructs or by studying behavior of abstract classes of networks. While there exists a substantial stream of research in identifiable intra-household interactions and explicit inter-household interactions in travel demand modeling such as coordination of individual daily activity patterns, joint participation in activities and travel, mechanisms for allocation of maintenance activities, and activity location and residential location choice behavior (Bhat and Pendyala 2005; Timmermans and Zhang 2009), the topic of aggregate social interactions between individuals in different households at a market level in travel demand has only recently begun to attract attention. Part I of this thesis briefly introduces social interactions in transportation, provides an overview of the thesis contents, reviews the necessary background in discrete choice analysis and establishes links with models in statistical physics.