Abstract: The discrete-choice modeling framework is enhanced to explicitly represent the planning and action stages of the choice process. The basis behind this theory is that people plan before they act. Plans can be short term or tactical, such as a target lane that the driver wants to move to. They can be medium term, such as replacing an old car; and long term or strategic, such as a residential relocation. A plan can even be following a habit or the choice of not to plan, which is shown by impulsive behavior. A plan is essentially a strategy or a policy that is manifested by an action or a choice. Actions depend on the plan, e.g. changing lanes, purchasing a new car, or moving to a new home. However, plans are often unobserved. Therefore, we combine explicit models of the plan and the action stages, treating plans as latent variables.

By modeling the interactions between the planning and action stages, we are able to incorporate richer specifications in choice models with better predictive and policy analysis capabilities. The applications of this research in areas such as driving behavior, route choice, and mode choice demonstrate the advantages of the plan/action model in comparison to a one-stage or a “black box” choice model in terms of improved micro-simulations of behaviors that better represent real-life situations.

The choice process with planning is presented with supporting evidence from behavioral research. Then the development of a discrete-choice modeling framework with explicit planning and action sub-models is described. The plan/action choice model is formulated for both static and dynamic contexts; where the latter is based on the Hidden Markov Model. This is followed by three applications: driving behavior, route choice and mode choice, and finally, a conclusion.

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