Incorporating analyst uncertainty in model specification of respondent processing strategies into efficient designs for logit models

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Developments over the past two decades have resulted in substantial improvements in the theory and practice of conducting stated choice surveys. Of particular import, theory linking the econometric models applied to stated choice data to experimental design theory has resulted in significant advances in terms of the ability of researchers to retrieve statistical significant results for studies involving relatively small samples. Unfortunately, these advances have come at a cost. In particular, and of increasing concern to the field, is the need to assume priors for the parameter estimates in order to determine the overall efficiency of the design. Various assumptions about the specific values of the prior parameter estimates and how they are obtained have been made; some have assumed local priors under the null hypothesis, whilst others have assumed non-zero local priors. More recently, the use of priors drawn from Bayesian prior parameter distributions have been used. Independent of the type of prior and the value that it assumes, the standard approach to generating experimental designs for stated choice studies have one thing in common; all parameter priors enter into the asymptotic variance covariance matrix of the design, and hence influence the statistical efficiency measure derived. Further, recent empirical research in the field of stated choice has shown that in many cases, not all respondents process or attend to all of the attributes shown to them in an experiment. The current design generation methods that assume perfect logit like behavior of sampled respondents may not reflect the true data generation processes of respondents. To further compound the issue, in such cases, the theoretical efficiency of a design may not translate to the data collection and modeling process. This presentation will detail a method whereby the analyst is able to place a prior on an attribute in terms of its presence or absence within the utility specification of the model. This prior is in addition to any prior placed on the value of the parameter should it be assumed to be statistically significant and hence appears within the utility function of the model. By allowing a prior to be placed on one or more of the attributes, as well as potential interaction effects, we are able to reflect uncertainty as to which effects are likely to be present within a study using that design, beyond uncertainty as to the value the parameter will take.

Key words: attribute attendance, non-significant parameter estimates, experimental design