Full text available at: http://dx.doi.org/10.1561/0800000036

Foundations of Stated Preference Elicitation: Consumer Behavior and Choice-based Conjoint Analysis

Foundations of Stated Preference Elicitation: Consumer Behavior and Choice-based Conjoint Analysis

Moshe Ben-Akiva
Department of Civil and Environmental Engineering, MIT
Cambridge, MA 02139, USA

Daniel McFadden
Department of Economics, University of California
Berkeley, CA 94720-3880, USA
Department of Economics, University of Southern California
CA 90089-921, USA

Kenneth Train
Department of Economics, University of California
Berkeley, CA 94720-3880, USA

now
the essence of knowledge
Boston — Delft

Foundations and Trends® in Econometrics

Published, sold and distributed by:
now Publishers Inc.
PO Box 1024
Hanover, MA 02339
United States
Tel. +1-781-985-4510
www.nowpublishers.com
sales@nowpublishers.com

Outside North America:
now Publishers Inc.
PO Box 179
2600 AD Delft
The Netherlands
Tel. +31-6-51115274

The preferred citation for this publication is

M. Ben-Akiva, D. McFadden and K. Train. *Foundations of Stated Preference Elicitation: Consumer Behavior and Choice-based Conjoint Analysis*. Foundations and Trends® in Econometrics, vol. 10, no. 1-2, pp. 1–144, 2019.

ISBN: 978-1-68083-527-4

Foundations and Trends® in Econometrics
Volume 10, Issue 1-2, 2018

Editorial Board

Editorial Scope

Topics

Foundations and Trends® in Econometrics publishes survey and tutorial articles in the following topics:

- Econometric Models
- Simultaneous Equation Models
- Estimation Frameworks
- Biased Estimation
- Computational Problems
- Microeconometrics
- Treatment Modeling
- Discrete Choice Modeling
- Models for Count Data
- Duration Models
- Limited Dependent Variables
- Panel Data
- Time Series Analysis
- Latent Variable Models
- Qualitative Response Models
- Hypothesis Testing
- Econometric Theory
- Financial Econometrics
- Measurement Error in Survey Data
- Productivity Measurement and Analysis
- Semiparametric and Nonparametric Estimation
- Bootstrap Methods
- Nonstationary Time Series
- Robust Estimation

Information for Librarians

Foundations and Trends® in Econometrics, 2018, Volume 10, 4 issues. ISSN paper version 1551-3076. ISSN online version 1551-3084. Also available as a combined paper and online subscription.

Contents

Foundations of Stated Preference Elicitation: Consumer Behavior and Choice-based Conjoint Analysis

Moshe Ben-Akiva[1], Daniel McFadden[2,3] and Kenneth Train[2]

[1] *Department of Civil and Environmental Engineering, MIT Cambridge, MA 02139, USA*
[2] *Department of Economics, University of California, Berkeley, CA 94720-3880, USA*
[3] *Department of Economics, University of Southern California, CA 90089-921, USA*

ABSTRACT

Stated preference elicitation methods collect data on consumers by "just asking" about tastes, perceptions, valuations, attitudes, motivations, life satisfactions, and/or intended choices. Choice-Based Conjoint (CBC) analysis asks subjects to make choices from hypothetical menus in experiments that are designed to mimic market experiences. Stated preference methods are controversial in economics, particularly for valuation of non-market goods, but CBC analysis is accepted and used widely in marketing and policy analysis. The promise of stated preference experiments is that they can provide deeper and broader data on the structure of consumer preferences than is obtainable from revealed market observations, with experimental control of the choice environment that circumvents the feedback found in real market equilibria. The risk is that they give pictures of consumers that do not predict real market behavior. It

Moshe Ben-Akiva, Daniel McFadden and Kenneth Train (2019), "Foundations of Stated Preference Elicitation: Consumer Behavior and Choice-based Conjoint Analysis", Foundations and Trends® in Econometrics: Vol. 10, No. 1-2, pp 1–144. DOI: 10.1561/0800000036.

is important for both economists and non-economists to learn about the performance of stated preference elicitations and the conditions under which they can contribute to understanding consumer behavior and forecasting market demand. This monograph re-examines the discrete choice methods and stated preference elicitation procedures that are commonly used in CBC, and provides a guide to techniques for CBC data collection, model specification, estimation, and policy analysis. The aim is to clarify the domain of applicability and delineate the circumstances under which stated preference elicitations can provide reliable information on preferences.

Full text available at: http://dx.doi.org/10.1561/0800000036

Preface

Information on consumer preferences and choice behavior is needed to forecast market demand for new or modified products, estimate the effects of product changes on market equilibrium and consumer welfare, develop and test models of consumer behavior, and reveal determinants and correlates of tastes. Direct elicitation of stated preferences, perceptions, expectations, attitudes, motivations, choice intentions, and well-being, supplementing or substituting for information on revealed choices in markets is potentially a valuable source of data on consumer behavior, but can mislead if the information environments and decision-making processes invoked by direct elicitations differ from the settings for revealed choices in real markets.

The purpose of this monograph is to provide the reader with stated preference data collection methods, discrete choice models, and statistical analysis tools that can be used to forecast demand and assess welfare impacts for new or modified products or services in real markets, and summarize the conditions under which the reliability of these methods has been demonstrated or can be tested. One focus is the collection of preference and related data from consumer responses in hypothetical choice experiments, particularly choice-based conjoint analysis (CBC) methods that have proven useful in market research. Another is the economic theory and statistical analysis of choice behavior, revealed or stated, and an economic framework for forecasting market demand

and measuring consumer welfare. Stated choice data can be collected and combined with a broad spectrum of models of consumer behavior. This monograph will focus on the standard economic model of utility-maximizing consumers. Our treatment is informed by and benefits from experiments on perceptions and decision-making behavior in cognitive science and behavioral economics, and includes methods that can accommodate features of consumer choice that impact forecast reliability such as anchoring, adaptation to the status quo, and sensitivity to context. However, we will only touch on the implications of behavioral consumer theory for elicitation and analysis of stated preference data.

There are a number of good introductions to discrete choice analysis (Ben-Akiva and Lerman, 1985; Train, 1986; Train, 2009; McFadden, 1999; McFadden, 2001; McFadden, 2014b; Brownstone, 2001; Boyce and Williams, 2015), and to stated preference and conjoint analysis methods and market research applications (Louviere, 1988; Fischhoff and Manski, 1999; Louviere *et al.*, 2000; Wittink and Bergestuen, 2001; Hauser and Rao, 2002; Rossi *et al.*, 2005; Chandukala *et al.*, 2007; Raghavarao *et al.*, 2010; Rao, 1977; Rao, 2014; Green and Srinivasan, 1978; Green and Srinivasan, 1990). This monograph complements these introductions by filling in technical and behavioral backgrounds for these topics.

1

Some History of Stated Preference Elicitation

Stated preference methods date from the 1930s. The originator of empirical demand analysis, Henry Schultz, persuaded his University of Chicago colleague, the iconic psychologist Leon Thurstone (1931), to present a paper at the second meeting of the Econometric Society with this proposal for direct elicitation of indifference curves:

> "Perhaps the simplest experimental method that comes to mind is to ask a subject to fill in the blank space [to achieve indifference] in a series of choices of the following type:
>
> 'eight hats and eight pairs of shoes' versus 'six hats and_____pairs of shoes'
>
> One of the combinations such as eight hats and eight pairs of shoes is chosen as a standard and each of the other combinations is compared directly with it."

Thurstone postulated that responses would obey Fechner's law, a common psychophysical regularity in the sensation produced by a stimulus. This turns out to be equivalent to postulating that respondents maximize a log-linear utility function. He collected experimental data on hats

vs. shoes, hats vs. overcoats, and shoes vs. overcoats, fit the parameters of the log-linear utility function to data from each comparison, treating responses as bounds on the underlying indifference curves, and tested the consistency of his fits across the three comparisons.

At the time of Thurstone's presentation, empirical demand analysis was in its early days. Pioneering studies of market demand for a single commodity (sugar) had been published by Frisch (1926), Schultz (1925), and Schultz (1928), but there were no empirical studies of multi-product demands. Least-squares estimation was new to economics, and required tedious hand calculation. Consolidation of the neoclassical theory of demand for multiple commodities by Hicks (1939) and Samuelson (1947) was still in the future. Given this setting, Thurstone's approach was path-breaking. Nevertheless, his estimates were rudimentary, and he failed to make a connection between his fitted indifference curves and market demand forecasts.[1] Most critically, he did not examine whether the cognitive tasks of stating indifferent quantities in his experiment and of choosing best bundles subject to a budget constraint in real markets were sufficiently congruent so that responses with respect to the first would be predictive for the second.

According to Moscati (2007), Thurstone's presentation was criticized from the floor by Harold Hotelling and Ragnar Frisch. First, they objected that Thurstone's indifference curves as constructed were insufficient to forecast market demand response to price changes; this objection failed to recognize that extending Thurstone's comparisons to include residual expenditure could have solved the problem. Second, they pointed out that the knife-edge of indifference is not well determined

[1] In retrospect, these two flaws were correctable: Denote by H, S, C, respectively, the numbers of hats, pairs of shoes, and coats consumed, let M denote the money remaining for all other goods and services after paying for the haberdashery, and let Y denote total income. Suppose Thurstone had asked subjects for the amounts M that made a comparison bundle (H, S, C, M) indifferent to a standard bundle (H_0, S_0, C_0, M_0). Then, he could have estimated the parameters of the log-linear utility function $u = \log M + \theta_H \log H + \theta_S \log S + \theta_C \log C$ by least squares regression of $\log(M/M_0)$ on $\log(H_0/H)$, $\log(S_0/S)$, and $\log(C_0/C)$. From this, he could have forecast demands, e.g., hat demand at price p_H and income Y would have been given by the formula $H = \theta_H Y/p_H(1+\theta_H+\theta_S+\theta_C)$ that comes from utility maximization subject to the budget constraint.

in comparisons of bundles of discrete commodities.[2] Beyond these objections, Frisch and Hotelling were generally skeptical that stated indifference points, or non-market responses more generally, could be used to predict market behavior. The orthodoxy of that era, formed partly as a reaction to the casual introspections of Bentham and the utilitarians, was that empirical economics should rely solely on revealed market data; in the words of Irving Fisher (1892), *"To fix the idea of utility, the economist should go no further than is serviceable in explaining economic facts. It is not his province to build a theory of psychology."* Wallis and Friedman (1942) summarized this attitude in an attack that forcefully dismissed Thurstone's method or any other attempt to use experimental data for market demand analysis, pointing out difficulties in designing experiments that mimic the environment of real market choices: *"[Thurstone's] fundamental shortcomings probably cannot be overcome in any experiment involving economic stimuli and human beings."*

For 40 years following Thurstone's paper, consumer experiments were mostly limited to testing axioms for choice under uncertainty, and there was no systematic attempt to incorporate stated preference (SP) methods in demand analysis. There was some reason for this lack of interest. The language of economic analysis, then and now, is prediction of market demand and assessment of market failures in terms of dollars of equivalent lost income. Any measurement method that uses experimental data on preferences has to produce convincing results in this language by showing that stated preferences collected outside the market have the same predictive power for market behavior as implied preferences reconstructed from market data. With the advent of behavioral economics, we have learned that people are often not relentless utility maximizers, either in markets or in experiments, undermining the tight links neoclassical consumer theory postulates between consumer utility and demand behavior. This has led to calls for less focus on

[2] Additional objections could have been raised about the applicability of Fechner's law and the restrictiveness and realism of the log linear utility specification, lack of accounting for heterogeneity across consumers, and lack of explicit treatment of consumer response errors. Decades later, when this demand system was fitted to revealed preference (RP) data, these issues did arise.

assessment of consumer welfare in dollars of lost income deduced from market demand behavior, and more research on benchmarking stated satisfaction to psychological or neurological measures of well-being. This approach may eventually succeed, but at present market prediction and valuation remain the yardsticks against which any method for eliciting consumer preferences and inferring consumer welfare has to be judged.

The first sustained use of stated preference methods came out of the theory of conjoint measurement pioneered by Luce and Tukey (1964) and Luce and Suppes (1965), and developed as *conjoint analysis* by market researchers like Green (1974), Johnson (1974, 1999), Huber (1975, 1987), Srinivasan (1988) and Louviere (1988) and applied to the study of consumer preferences among familiar market products (e.g., carbonated beverages, automobiles). Good introductions to conjoint experiments, data, and analysis methods are Louviere *et al.* (2000) and Rossi *et al.* (2005). A central feature of conjoint analysis is the use of experimental designs that allow at least a limited mapping of the preferences of each subject, and multiple measurements that allow estimates of preferences to be tested for consistency and refined when necessary.

Early conjoint analysis experiments described hypothetical products in terms of price and levels of attributes in various dimensions, and asked subjects to rank attributes in importance, and rate attribute levels. These measurements were used by market researchers to classify and segment buyers, and target advertising, but they were not reliable tools for predicting market demand. However, Louviere and Woodworth (1983) and Hensher and Louviere (1983) introduced choice-based conjoint (CBC) elicitations that directly mimicked market choice tasks, and McFadden *et al.* (1986) and McFadden (1986) showed how these elicitations could be analyzed using the tools of discrete choice analysis and the theory of random utility maximization (RUM).[3] Subjects would

[3]The term "CBC" is used in marketing to include stated choice elicitations without an underlying framework of utility-maximizing discrete choice. More explicit terminology for the approach discussed in this monograph would be "CBC/RUM", or as suggested by Carson and Louviere (2011), "discrete choice experiments" (DCE). However, we will continue to use the umbrella term "CBC", leaving it to the reader to distinguish our economic approach from other forms of conjoint analysis.

be presented with a series of menus of products. Each product offered in each menu would be described in terms of price and levels of attributes. Subjects would be asked to choose their most preferred product in each menu. For example, subjects would be offered a menu of paper towels, with each product described in terms of price, number of towel sheets, a measure of the absorption capacity, a measure of strength when wet, and brand name. Choice data from these menus, within and across subjects, could then be handled in the same way as the real market choice data. Choice-based conjoint (CBC) surveys analyzed using discrete choice methods have become widely used and accepted in market research to predict the demand for consumer products, with a sufficient track record so that it is possible to identify some of the necessary conditions for successful prediction; see McFadden *et al.* (1988) and Green *et al.* (2001), Cameron and DeShazo (2013), and McFadden (2014, 2017).

Environmental economists developed independently a simple stated preference method termed *contingent valuation* (CV), and applied it to valuing environmental damage. This method traces its beginnings to a proposal by Ciriacy-Wantrup (1947) and a PhD thesis by Davis (1963a, 1963b) on the use-value of Maine woods. Its first published applications for values of environmental public goods seem to have been Brookshire *et al.* (1976), Bishop and Heberlein (1979), and Brookshire *et al.* (1980). CV can be viewed as a truncated form of conjoint analysis with two important differences. First, it does not have the experimental design features of conjoint analysis that allow extensive tests for the structure and consistency of stated preferences. Second, because of its applications, it usually does not have predictive accuracy in markets as a direct yardstick for reliability. Instead, it relies indirectly on the links between preferences, market demands, and valuations that hold when neoclassical consumer theory is valid, on analogies with stated preference studies of consumer goods in markets, and on limited internal consistency checks. The particular challenges of using contingent valuation for natural resource valuation are discussed by Carson *et al.* (2001), Carson (2012), Hausman (2012), and Kling *et al.* (2012). Its reliability in relation to stated preference elicitation for market goods is discussed by McFadden (2017).

Other elicitation methods for stated preferences, termed *focus groups*, *vignette analysis*, and measurement of *subjective well-being*, are popular among some applied economists and political scientists, see Rossi (1979), King *et al.* (2004), Caro *et al.* (2012), and Kahneman and Krueger (2013). Focus group methods are directed open-end discussions of products and their features in small samples of consumers. Focus groups do not provide direct data for market demand forecasts, but they can be quite useful in designing CBC experiments because of the insights they provide on product perceptions, levels of consumer knowledge, experience, and understanding, and the attributes consumers consider in forming their preferences. Vignette analysis uses detailed story descriptions of alternatives, often visual. Vignette presentations of alternatives can be used within conjoint analysis experiments, and may improve subject attention and understanding of alternatives. Subjective well-being methods elicit overall self-assessments of welfare, often on Likert or rating scales similar to those used in the early days of conjoint analysis. In the instances where vignette and subjective well-being methods have been tested, they prove to be strongly influenced by context and anchoring effects, see Deaton (2012). These effects compromise forecast accuracy in market demand forecasting applications. Psychometrics has developed an array of additional methods for measuring perceptions, attitudes, and motivations. Their usefulness for economic demand forecasting has not been demonstrated, but at least for perceptions and intentions it is clear that further development is potentially quite valuable for economic applications.

The focus of this monograph is market demand forecasting for new or modified products; we do not attempt here any overall assessment of the reliability of contingent valuation, vignette analysis, or subjective well-being methods in their primary uses. We urge readers to not casually pre-judge the use of stated preference methods in economic applications, but rather to acquire the tools needed to conduct and critique CBC studies, investigate how well these methods work under various conditions, and make a reasoned scientific judgement on when their use advances our understanding of consumer behavior and well-being.

References

Abramowitz, M. and L. Stegum (1964). *Handbook of Mathematical Functions*. National Bureau of Standards, 24.4.

Acito, F. and A. Jain (1980). "Evaluation of Conjoint Analysis Results: A Comparison of Methods". *Journal of Marketing Research*. 17: 106–112.

Akaah, I. and P. Korgaonkar (1983). "An Empirical Comparison of the Predictive Validity of Self-explicated, Huber-hybrid, Traditional Conjoint, and Hybrid Conjoint Models". *Journal of Marketing Research*. 20: 187–197.

Akinc, A. and M. Vanderbroek (2018). "Bayesian Estimation of Mixed Logit Models: Selecting an Appropriate Prior for the Covariance Matrix". *Journal of Choice Modeling*. 29: 133–151.

Albert, J. and S. Chib (1996). "Computation in Bayesian Econometrics: An Introduction to Markov Chain Monte Carlo". In: *Bayesian Computational Methods and Applications*. Ed. by C. Hill. London: JAI Press. 3–24.

Allais, M. (1953). "Le Comportement de l'Homme Rationnel Devant Le Risque: Critique Des Postulats Et Axiomes de l'école Américaine". *Econometrica*. 21: 503–546.

Allenby, G. (1997). "An Introduction to Hierarchical Bayesian Modeling". Tutorial Notes, Advanced Research Techniques Forum, American Marketing Association.

Allenby, G. and P. Lenk (1994). "Modeling Household Purchase Behavior with Logistic Normal Regressions". *Journal of the American Statistical Association*. 89: 1218–1231.

Allenby, G. and P. Rossi (1993). "A Bayesian Approach to Estimating Household Parameters". *Journal of Marketing Research*. 30: 171–182.

Allenby, G. and P. Rossi (2006). "Hierarchial Bayes Models: A Practitioner's Guide". In: *The Handbook of Marketing Research*. Ed. by R. Grover and M. Vriens. Los Angeles: Sage Publications.

Andrews, R., A. Ansari, and I. Currim (2002). "Hierarchical Bayes versus Finite Mixture Conjoint Analysis Models: A Comparison of Fit, Prediction, and Partworth Recovery". *Journal of Marketing Research*. 39: 87–98.

Ariely, D., G. Lowenstein, and D. Prelec (2006). "Tom Sawyer and the Construction of Value". *Journal of Economic Behavior and Organization*. 60: 1–10.

Arrow, K. (1971). "Exposition of the Theory of Choice Under Uncertainty". In: *Theory of Risk-Bearing*. Ed. by K. Arrow. Chicago: Markham. 44–89.

Azizzadeh, F. and S. Rezakhah (2014). "The CUSUM Test for Detecting Structural Changes in Strong Mixing Processes". *Communications in Statistics*. 43(17): 3733–3750.

Bąk, A. and T. Bartłomowicz (2012). "Conjoint Analysis Method and Its Implementation in Conjoint R Package". Working paper, Wroclaw University.

Balcombe, K. and I. Fraser (2009). "Dichotomous-choice Contingent Valuation with 'Don't Know' Responses and Misreporting". *Journal of Applied Econometrics*. 24.7.

Bateson, J., D. Reibstein, and W. Boulding (1987). "Conjoint Analysis Reliability and Validity: A Framework for Future Research". In: *Review of Marketing*. Ed. by M. Houston. 451–481.

Becker, F., M. Danaf, B. A. X. Song, and M. Ben-Akiva (2018). "Hierarchical Bayes Estimator for Logit Mixtures with Inter- and Intra-consumer Heterogeneity". *Transportation Research Part B: Methodological*. 117(A): 1–17.

Becker, G., M. DeGroot, and J. Marschak (1964). "Measuring Utility by a Single-response Sequential Method". *Behavioral Science*. 9: 226–32.

Ben-Akiva, M. and D. Bolduc (1996). "Multinomial Probit with a Logit Kernel and a General Parametric Specification of the Covariance Structure". Working paper, Department of Civil Engineering, MIT.

Ben-Akiva, M., D. Bolduc, and M. Bradley (1993). "Estimation of Travel Model Choice Models with Randomly Distributed Values of Time". *Transportation Research Record*. 1413: 88–97.

Ben-Akiva, M. and S. Lerman (1985). *Discrete Choice Analysis: Theory and Application to Travel Demand*. Cambridge: MIT Press.

Ben-Akiva, M. and T. Morikawa (1990). "Estimation of Switching Models from Revealed Preferences and Stated Intentions". *Transportation Research A*. 24: 485–495.

Berndt, E., B. Hall, R. Hall, and J. Hausman (1974). "Estimation and Inference in Nonlinear Structural Models". *Annals of Economic and Social Measurement*. 3(4): 653–665.

Berry, S., J. Levinsohn, and A. Pakes (1995). "Automobile Prices in Market Equilibrium". *Econometrica*. 63(4): 841–890.

Berry, S., J. Levinsohn, and A. Pakes (1998). "Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market". Working paper, Yale University.

Berry, S., J. Levinsohn, and A. Pakes (2004). "Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market". *Journal of Political Economy*. 112: 68–105.

Betancourt, M. and M. Girolami (2013). "Hamilton Monte Carlo for Hierarchical Models". Working paper, arXiv:1312.0906.

Bhat, C. (2001). "Quasi-random Maximum Simulated Likelihood Estimation of the Mixed Multinomial Logit Model". *Transportation Research B*. 35: 677–693.

Bhat, C., S. Astroza, R. Sidharthan, and P. Bhat (2014). "A Multivariate Hurdle Count Data Model with an Endogenous Multiple Discrete-continuous Selection System". *Transportation Research B: Methodological*. 63: 77–97.

Bishop, R. and T. Heberlein (1979). "Measuring Values of Extramarket Goods: Are Indirect Measures Biased?" *American Journal of Agricultural Economics*. 61(5): 926–930.

Blass, A., S. Lach, and C. Manski (2010). "Using Elicited Choice Probabilities to Estimate Random Utility Models for Electricity Reliability". *International Economic Review*. 51: 421–440.

Bleimer, M. and J. Rose (2009). "Designing Stated Choice Experiments: The State of the Art". In: *The Expanding Sphere of Travel Behaviour Research*. Ed. by R. Kitamura, T. Yoshi, and T. Yamamoto. Bingley, West Yorkshire: Emerald Group Publishing, Ch. 25. 499–538.

Bohm, P. (1972). "Estimating the Demand for Public Goods: An Experiment". *European Economic Review*. 3: 111–130.

Bohm, P., J. Linden, and J. Sonnegard (1997). "Eliciting Reservation Prices: Becker DeGroot-Marschak Mechanisms vs. Markets". *The Economic Journal*. 107: 1079–1089.

Boyce, D. and H. Williams (2015). *Forecasting Urban Travel Demand*. Cheltenham: Edward Elgar.

Brookshire, D., B. Ives, and W. Schmitz (1976). "The Value of Aesthetic Preferences". *Journal of Environmental Economics and Measurement*. 3(4): 325–346.

Brookshire, D., A. Randall, and J. Stoll (1980). "Valuing Increments and Decrements in Natural Resource Service Flows". *American Journal of Agricultural Economics*. 62(3): 478–488.

Brownstone, D. (2001). "Discrete Choice Modeling for Transportation". In: *Travel Behavior Research: The Leading Edge*. Ed. by D. Hensher. Oxford: Elsevier. 97–124.

Brownstone, D., D. Bunch, and K. Train (2000). "Joint Mixed Logit Models of Stated and Revealed Preferences for Alternative-fuel Vehicles". *Transportation Research, Part B*. 34: 315–338.

Brownstone, D. and K. Train (1999). "Forecasting New Product Penetration with Flexible Substitution Patterns". *Journal of Econometrics*. 89: 109–129.

Burda, M., M. Harding, and J. Hausman (2012). "A Poisson Mixture Model of Discrete Choice". *Journal of Econometrics*. 166(2): 184–203.

Camerer, C. and R. Hogarth (1999). "The Effects of Financial Incentives in Experiments: A Review and Capital-labor-production Framework". *Journal of Risk and Uncertainty*. 19: 7–42.

Cameron, T. and J. DeShazo (2013). "Demand for Health Risk Reductions". *Journal of Environmental Economics and Management*. 65(1): 87–109.

Carmone, F., P. Green, and A. K. Jain (1978). "Robustness of Conjoint Analysis: Some Monte Carlo Results". *Journal of Marketing Research*. 15: 300–303.

Caro, F., T. Ho, D. McFadden, A. Gottleib, C. Yee, T. Chan, and J. Winter (2012). "Using the Internet to Administer more Realistic Vignette Experiments". *Social Science Computer Review*. 30: 184–201.

Carpenter, B., A. Gelman, M. Hoffman, D. Lee, B. Goodrich, M. Betancourt, M. Brubaker, J. Guo, P. Li, and A. Riddell (2017). "STAN: A Probabilistic Programming Language". *Journal of Statistical Software*. 76(1).

Carson, R. (2012). "Contingent Valuation: A Practical Alternative When Prices Aren't Available". *Journal of Economic Perspectives*. 26(4): 27–42.

Carson, R. T., J. J. Louviere, D. A. Anderson, P. Arabie, D. S. Bunch, D. A. Hensher, R. M. Johnson, W. F. Kuhfeld, D. Steinberg, J. Swait, H. Timmermans, and J. B. Wiley (1994). "Experimental Analysis of Choice". *Marketing Letters*. 5(4): 351–368.

Carson, R. and M. Czajkowski (2013). "A New Baseline Model for Estimating Willingness to Pay from Discrete Choice Models". Working paper, University of California, San Diego.

Carson, R., N. Flores, and N. Meade (2001). "Contingent Valuation: Controversies and Evidence". *Environmental and Resource Economics*. 19: 173–210.

Carson, R. and J. Louviere (2011). "A Common Nomenclature for Stated Preference Elicitation Approaches". *Environmental and Resource Economics*. 49(4): 539–559.

Chandukala, S., J. Kim, T. Otter, P. Rossi, and G. Allenby (2007). "Choice Models in Marketing: Economic Assumptions, Challenges, and Trends". *Foundations and Trends in Marketing*. 2(2): 97–184.

Chapman, R. and R. Staelin (1982). "Exploiting Rank Ordered Choice Set Data within the Stochastic Utility Model". *Journal of Marketing Research*. 14: 288–301.

Chen, R. (2017). "Models of Count with Endogenous Choices". *Transportation Research Procedia*. 23C: 460–479.

Chesher, A. and J. Santos-Silva (2002). "Taste Variation in Discrete Choice Models". *Review of Economic Studies*. 69: 62–78.

Chib, S. and E. Greenberg (1996). "Markov Chain Monte Carlo Simulation Methods in Econometrics". *Econometric Theory*. 12(3): 409–431.

Chipman, J. and J. Moore (1980). "Compensating Variation, Consumer's Surplus, and Welfare". *American Economic Review*. 70: 933–348.

Chipman, J. and J. Moore (1990). "Acceptable Indicators of Welfare Change, Consumer's Surplus Analysis, and the Gorman Polar Form". In: *Preferences, Uncertainty, and Optimality: Essays in Honor of Leonid Hurwicz*. Ed. by D. McFadden and M. Richter. New York: Westview Press. 68–120.

Ciriacy-Wantrup, S. (1947). "Capital Returns from Soil-conservation Practices". *Journal of Farm Economics*. 29: 1181–1202.

Corradi, V., N. Swanson, and H. White (2000). "Testing for Stationarity-ergodicity and for Comovements between Nonlinear Discrete Time Markov Processes". *Journal of Econometrics*. 96: 39–73.

Daly, A., S. Hess, and K. Train (2012). "Assuring Finite Moments for Willingness to Pay in Random Coefficient Models". *Transportation*. 39(1): 19–31.

Danaf, M., B. Atasoy, and M. Ben-Akiva (2018). "Logit Mixture with Inter and Intra-consumer Heterogeneity and Flexible Mixing Distributions". Working paper, MIT.

Davis, R. (1963a). "Recreation Planning as an Economic Problem". *Natural Resources*. 3: 239–249.

Davis, R. (1963b). *The Value of Outdoor Recreation: An Economic Study of the Maine Woods*. PhD Dissertation, Harvard University.

Deaton, A. (2012). "The Financial Crisis and the Well-being of America". In: *Investigations in the Economics of Aging*. Ed. by D. Wise. Chicago: University of Chicago Press. 343–376.

Deaton, A. and J. Muellbauer (1980). *Economics and Consumer Behavior*. Cambridge: Cambridge University Press.

Delavande, A. and C. Manski (2015). "Using Elicited Choice Probabilities in Hypothetical Elections to Study Decisions to Vote". *Electoral Studies*. 38: 28–37.

Delgado, M. (2005). "Sign Tests for Long-memory Time Series". *Journal of Econometrics*. 128(2): 215–251.

Desarbo, W., V. Ramaswamy, and S. Cohen (1995). "Market Segmentation with Choice-based Conjoint Analysis". *Marketing Letters*. 6: 137–147.

Domowitz, I. and M. El-Gamal (1993). "A Consistent Test of Stationarity-ergodicity". *Econometric Theory*. 9(4): 589–601.

Dong, S., M. Ding, and J. Huber (2010). "A Simple Mechanism to Incentive-align Conjoint Experiments". *International Journal of Research in Marketing*. 27: 25–32.

Elrod, T., J. Louviere, and K. Davey (1992). "An Empirical Comparison of Ratings-based and Choice-based Conjoint Models". *Journal of Marketing Research*. 29: 368–377.

Fink, D. (1997). "A Compendium of Conjugate Priors". Working paper, Montana State University.

Fischhoff, B. and C. Manski (1999). *Elicitation of Preferences*. Kluwer: Boston.

Fisher, I. (1892). *Mathematical Investigations in the Theory of Value and Prices*. New Haven: Yale.

Fleurbaey, M. and F. Maniquet (2011). *A Theory of Fairness and Social Welfare*. Cambridge: Cambridge University Press.

Fosgerau, M., D. McFadden, and M. Bierlaire (2013). "Choice Probability Generating Functions". *Journal of Choice Modelling*. 8: 1–18.

Frisch, R. (1926). "Sur Un Probleme of Economie Pure. *Norsk Matematisk Forenings Sskrifter*, 16, 1–40. Translation". In: *Preferences, Utility, and Demand*. Ed. by J. Chipman, L. Hurwicz, M. Richter, and H. Sonnenschein. New York: Harcourt.

Gelman, A., J. Carlin, H. Stern, and D. Rubin (2004). *Bayesian Data Analysis* (2nd edition). Boca Raton, FL: Chapman & Hall/CRC.

Geweke, J. (1997). *Posterior Simulators in Econometrics*. Econometric Society Monographs 28. New York: Cambridge University Press.

Glasgow, G. and S. Butler (2017). "The Value of Non-personally Identifiable Information to Consumers of Online Services: Evidence from a Discrete Choice Experiment". *Applied Economics Letters*. 24(6): 392–395.

Gorman, W. (1953). "Community Preference Fields". *Econometrica*. 21: 63–80.

Gorman, W. (1961). "On a Class of Preference Fields". *Metroeconomica*. 13: 53–56.

Green, D., K. Jacowitz, D. Kahneman, and D. McFadden (1998). "Referendum Contingent Valuation, Anchoring, and Willingness to Pay for Public Goods". *Resource and Energy Economics*. 20: 85–116.

Green, P. (1974). "On the Design of Choice Experiments Involving Multifactor Alternatives". *Journal of Consumer Research*. 1: 61–8.

Green, P., A. Krieger, and Y. Wind (2001). "Thirty Years of Conjoint Analysis: Reflections and Prospects". *Interfaces*. 31: S56–S73.

Green, P. and V. Srinivasan (1978). "Conjoint Analysis in Consumer Research: Issues and Outlook". *Journal of Consumer Research*. 5: 103–123.

Green, P. and V. Srinivasan (1990). "Conjoint Analysis in Marketing: New Developments with Implications for Research and Practice". *Journal of Marketing*. 54: 3–19.

Hajivassiliou, V. and D. McFadden (1998). "The Method of Simulated Scores for the Estimation of LDV Models". *Econometrica*. 66: 863–896.

Hajivassiliou, V. and P. Ruud (1994). "Classical Estimation Methods for LDV Models Using Simulation". In: *Handbook of Econometrics*. Ed. by R. Engle and D. McFadden. Amsterdam: North-Holland. 2383–2441.

Hammond, P. (1981). "Ex-ante and Ex-post Welfare Optimality Under Uncertainty". *Economica*. 48: 235–250.

Hanemann, M., J. Loomis, and B. Kanninen (1991). "Statistical Efficiency of Double-bounded Dichotomous Choice Contingent Valuation". *American Journal of Agricultural Economics*. 73: 1255–1263.

Hauser, J. and V. Rao (2002). "Conjoint Analysis, Related Modelling, and Applications". In: *Advances in Marketing Research: Progress and Prospects*. Ed. by Y. Wind and P. Green. New York: Springer. 141–168.

Hauser, J. and G. Urban (1979). "Assessment of Attribute Importances and Consumer Utility Functions: von Neumann-Morgenstern Theory Applied to Consumer Behavior". *Journal of Consumer Research*. 5: 251–262.

Hausman, J. (2012). "Contingent Valuation: From Dubious to Hopeless". *Journal of Economic Perspectives*. 26(4): 43–56.

Heckman, J. (1981). "The Initial Parameters Problem and the Problem of Initial Conditions in Estimating a Discrete Time-discrete Data Stochastic Process". In: *Structural Analysis of Discrete Data*. Ed. by C. Manski and D. McFadden. Cambridge: MIT Press. 179–195.

Hensher, D. and M. Bradley (1993). "Using Stated Response Data to Enrich Revealed Preference Discrete Choice Models". *Marketing Letters*. 4: 39–152.

Hensher, D. and W. Greene (2002). "Specification and Estimation of Nested Logit Model". *Transportation Research Part B*. 36: 1–17.

Hensher, D. and W. Greene (2003). "The Mixed Logit Model: The State of Practice and Warnings for the Unwary". *Transportation*. 30: 133–176.

Hensher, D. and J. Louviere (1983). "Identifying Individual Preferences for International Air Travel: An Application of Functional Measurement Theory". *Journal of Transport Economics and Policy*. 17: 225–245.

Hensher, D., J. Rose, and A. Collins (2011). "Identifying Commuter Preferences for Existing Modes and a Proposed Metro in Sydney, Australia, with Special Reference to Crowding". *Public Transport*. 3: 109–147.

Hess, S. and J. Rose (2009). "Allowing for Intra-respondent Variations in Coefficients Estimated on Repeated Choice Data". *Transportation Research, Part B*. 43(6): 708–719.

Hess, S. and K. Train (2011). "Recovery of Inter- and Intra-personal Heterogeneity Using Mixed Logit Models". *Transportation Research, Part B*. 45(7): 973–990.

Hicks, J. (1939). *Value and Capital*. Oxford: Clarendon Press.

Hoffman, M. and A. Gelman (2014). "The No-U-Turn sampler: Adaptively Setting Path Lengths in Hamiltonian Monte Carlo". *Journal of Machine Learning Research*. 15: 1351–1381.

Hofstede, F. T., Y. Kim, and M. Wedel (2002). "Bayesian Prediction in Hybrid Conjoint Analysis". *Journal of Marketing Research*. 36: 253–261.

Hong, H. and B. Preston (2012). "Bayesian Averaging, Prediction, and Nonnested Model Selection". *Journal of Econometrics*. 167(2): 358–369.

Huber, J. (1975). "Predicting Preferences on Experimental Bundles of Attributes: A Comparison of Models". *Journal of Marketing Research*. 12: 290–297.

Huber, J. (1987). "Conjoint Analysis: How We Got Here and Where We Are". In: *Proceedings of the Sawtooth Software Conference on Perceptual Mapping, Conjoint Analysis, and Computer Interviewing*. 237–252.

Huber, J. and K. Train (2001). "On the Similarity of Classical and Bayesian Estimates of Individual Mean Partworths". *Marketing Letters*. 12: 259–269.

Huber, J., D. Wittink, J. Fiedler, and R. Miller (1993). "The Effectiveness of Alternative Preference Elicitation Procedures in Predicting Choice". *Journal of Marketing Research*. 30: 105–114.

Huber, J. and K. Zwerina (1996). "The Importance of Utility Balance in Efficient Choice Designs". *Journal of Marketing Research*. 33: 307–317.

Hudomiet, P., M. Hurd, and S. Rohwedder (2018). "The Causal Effects of Economic Incentives, Health, and Job Characteristics on Retirement: Estimates Based on Subjective Conditional Probabilities". RAND working paper.

Hurd, M. and D. McFadden (1998). "Consumption and Savings Balances of the Elderly: Experimental Evidence on Survey Response Bias". In: *Frontiers in the Economics of Aging*. Ed. by D. Wise. Chicago: University of Chicago Press. 353–387.

Hurwicz, L. and H. Uzawa (1971). "On the Integrability of Demand Functions". In: *Preferences, Utility and Demand*. Ed. by J. Chipman, L. Hurwicz, M. Richter, and H. Sonnenschein. New York: Harcourt, Brace and Jovanovich. 114–148.

Ibragimov, I. and R. Has'minskii (1973). "On the Approximation of Statistical Estimators by Sums of Independent Variables". *Soviet Math. Dokl.* 14: 883–887.

Islam, T., J. J. Louviere, and P. F. Burke (2007). "Modeling the effects of vincluding/excluding attributes in choice experiments on systematic and randon components". *Intern. J. of Reserch in Markeing*. 24: 289–300.

Jain, A., F. Acito, N. Malhotra, and V. Mahajan (1979). "A Comparison of the Internal Validity of Alternative Parameter Estimation Methods in Decompositional Multiattribute Preference Models". *Journal of Marketing Research*. 16: 313–322.

Joe, H. (1997). *Multivariate Models and Dependence Concepts*. London: Chapman & Hall.

Johnson, R. (1974). "Trade-off Analysis of Consumer Values". *Journal of Marketing Research*. 11: 121–127.

Johnson, R. (1999). "The Joys and Sorrows of Implementing HB Methods for Conjoint Analysis". Working Paper, Sawtooth Software.

Johnson, R. and B. Orme (1996). "How Many Questions Should You Ask in Choice-based Conjoint Studies?" Sawtooth Software technical report.

Kahneman, D. and A. Krueger (2013). *Developments in the Measurement of Subjective Well-Being*. Cheltenham: Edward Elgar.

Kahneman, D. and A. Tversky (1979). "Prospect Theory: An Analysis of Decisions Under Risk". *Econometrica*. 47: 263–291.

Kahneman, D. and A. Tversky (2000). *Choices, Values, and Frames*. Cambridge: Cambridge University Press.

Kaplow, L. and S. Shavell (2002). *Fairness and Welfare*. Cambridge: Harvard University Press.

King, G., C. Murray, J. Salomon, and A. Tandon (2004). "Enhancing the Validity and Cross-cultural Comparability of Measurement in Survey Research". *American Political Science Review*. 98: 191–207.

Kling, C., D. Phaneuf, and J. Zhao (2012). "From Exxon to BP: Has Some Number Become Better Than No Number?" *Journal of Economic Perspectives*. 26(4): 3–26.

Koop, G. (2003). *Bayesian Econometrics*. Chichester: John Wiley and Sons.

Krinsky, I. and L. Robb (1986). "On Approximating the Statistical Properties of Elasticities". *The Review of Economics and Statistics*. 68: 715–719.

Krinsky, I. and L. Robb (1990). "On Approximating the Statistical Properties of Elasticities: a Correction". *The Review of Economics and Statistics*. 72: 189–190.

Kuhfield, W., R. Tobias, and M. Garratt (1994). "Efficient Experimental Design with Marketing Research Applications". *Journal of Marketing Research*. 31: 545–557.

Lenk, P., W. DeSarbo, P. Green, and M. Young (1996). "Hierarchical Bayes Conjoint Analysis: Recovery of Partworth Heterogeneity from Reduced Experimental Designs". *Marketing Science*. 15: 173–191.

Lewandowski, D., D. Kurowicka, and H. Joe. (2009). "Generating Random Correlation Matrices Based on Vines and Extended Onion Method". *Journal of Multivariate Analysis*. 100: 1989–2001.

List, J. and C. Gallet (2001). "What Experimental Protocol Influences Disparities Between Actual and Hypothetical Stated Values?" *Environmental and Resource Economics*. 20(3): 241–254.

Ljung, G. and G. Box (1978). "On a Measure of a Lack of Fit in Time Series Models". *Biometrika*. 65(2): 297–303.

Lleras, J., Y. Masatlioglu, D. Nakajima, and E. Ozbay (2017). "When More is Less: Limited Consideration". *Journal of Economic Theory*. 170: 70–85.

Louviere, J. (1988). *Analyzing Decision Making: Metric Conjoint Analysis*. Newbury Park: Sage.

Louviere, J., T. Flynn, and R. Carson (2010). "Discrete Choice Experiments Are Not Conjoint Analysis". *Journal of Choice Modeling*. 3(3): 57–72.

Louviere, J., D. Hensher, and J. Swait (2000). *Stated Choice Methods: Analytics and Applications*. Cambridge: Cambridge University Press.

Louviere, J. and G. Woodworth (1983). "Design and Analysis of Simulated Consumer Choice or Allocation Experiments: An Approach Based on Aggregate Data". *Journal of Marketing Research*. 20: 350–367.

Luce, D. (1959). *Individual Choice Behavior*. Hoboken: John Wiley and Sons.

Luce, D. and P. Suppes (1965). "Preferences, Utility and Subjective Probability". In: *Handbook of Mathematical Psychology*. Ed. by R. Luce, R. Bush, and E. Galanter. Hoboken: John Wiley and Sons. 249–410.

Luce, D. and J. Tukey (1964). "Simultaneous Conjoint Measurement: A New Type of Fundamental Measurement". *Journal of Mathematical Psychology*. 1: 1–27.

Manski, C. (1999). "Analysis of Choice Expectations in Incomplete Scenarios". *Journal of Risk and Uncertainty*. 19: 49–66.

Manski, C. (2004). "Measuring Expectations". *Econometrica*. 72: 1329–1376.

Manski, C. (2007). "Minimax-regret Treatment Choice with Missing Outcome Data". *Journal of Econometrics*. 139: 105–115.

Marsaglia, G. (1972). "Choosing a Point from the Surface of a Sphere". *Annals of Mathematical Statistics*. 43(2): 645–646.

Marschak, J. (1960). "Binary Choice Constraints on Random Utility Indicators". In: *Stanford Symposium on Mathematical Methods in the Social Sciences*. Ed. by K. Arrow. Palo Alto: Stanford University Press.

McFadden, D. (1974). "Conditional Logit Analysis of Qualitative Choice Behavior". In: *Frontiers of Econometrics*. Ed. by P. Zarembka. New York: Academic Press. 105–142.

McFadden, D. (1981). "Econometric Models of Probabilistic Choice". In: *Structural Analysis of Discrete Data*. Ed. by C. Manski and D. McFadden. Cambridge: MIT Press. 198–272.

McFadden, D. (1986). "The Choice Theory Approach to Market Research". *Marketing Science*. 5: 275–297.

McFadden, D. (1994). "Contingent Valuation and Social Choice". *American Journal of Agricultural Economics*. 76: 689–708.

McFadden, D. (1996). "Lectures on Simulation-assisted Statistical Inference". Conference Presentation, EC-squared Conference, Florence, Italy; and Working Paper, Department of Economics, University of California, Berkeley.

McFadden, D. (1999). "Rationality for Economists?" In: *Elicitation of Preferences*. Ed. by B. Fischoff and C. Manski. Boston: KAP. 73–106.

McFadden, D. (2001). "Disaggregate Behavioral Travel Demand's RUM Side: A Thirty Year Retrospective". In: *The Leading Edge of Travel Behavior Research*. Ed. by D. Hensher. Oxford: Pergamon Press.

McFadden, D. (2004). "Welfare Economics at the Extensive Margin: Giving Gorman Polar Consumers Some Latitude". Working Paper, University of California, Berkeley.

McFadden, D. (2006). "Revealed Stochastic Preference: A Synthesis". In: *Rationality and Equilibrium*. Ed. by C. Aliprantis, R. Matzkin, and D. McFadden. Berlin: Springer.

McFadden, D. (2012). "Economic Juries and Public Project Provision". *Journal of Econometrics*. 166(1): 116–126.

McFadden, D. (2014a). "An Economist's Perspective on Environmental Damages". *The Eighth Annual Advanced Conference on Litigating Natural Resource Damages*. Law Seminars International.

McFadden, D. (2014b). "The New Science of Pleasure: Consumer Behavior and the Measurement of Well-being". In: *Handbook of Choice Modelling*. Ed. by S. Hess and A. Daly. Cheltenham: Edward Elgar. 7–48.

McFadden, D. (2015). *A Primer on Bayes Method for Decision-making and Statistical Analysis*. Lecture notes, University of California, Berkeley.

McFadden, D. (2017). "Stated Preference Methods and their Use in Environmental Use and Non-use Valuation". In: *Contingent Valuation of Environmental Goods*. Ed. by D. McFadden and K. Train. Cheltenham: Edward Elgar. 153–187.

McFadden, D. (2018). "Parametric Approximations of Preference Fields". Working paper, University of California, Berkeley.

McFadden, D., M. Ben-Akiva, A. Goett, and D. Bolduc (1986). "The Choice Theory Approach to Analyze the Preferences and Choices of Electric Utility Consumers". EPRI Final Report RP2671–1.

McFadden, D., A. Goett, and C.-K. Woo (1988). "Estimating Household Value of Electric Service Reliability with Market Research Data". *Energy Journal: Special Electricity Reliability Issue*. 9: 105–120.

McFadden, D. and P. Ruud (1994). "Estimation by Simulation". *Review of Economics and Statistics*. 76: 591–608.

McFadden, D. and K. Train (2000). "Mixed MNL Models for Discrete Response". *Journal of Applied Econometrics*. 15: 447–470.

McFadden, D. and K. Train (2017). *Contingent Valuation of Environmental Goods: A Comprehensive Critique*. Cheltenham: Edward Elgar.

McFadden, D. and K. Train (2018). "Welfare Economics in Product Markets". Working paper, University of California, Berkeley.

Miller, K., R. Hofstetter, H. Krohmer, and J. Zhang (2011). "How Should Consumers' Willingness to Pay be Measured? An Empirical Comparison of State-of-the-art Approaches". *Journal of Marketing Research*. 48(1): 172–184.

Moore, W. (2004). "A Cross-validity Comparison of Rating-based and Choice-based Conjoint Analysis Models". *International Journal of Research in Marketing*. 21: 299–312.

Morikawa, T., M. Ben-Akiva, and D. McFadden (2002). "Discrete Choice Models Incorporating Revealed Preferences and Psychometric Data". In: *Econometric Models in Marketing*. Ed. by P. Franses and A. Montgomery. Amsterdam: Elsevier. 29–55.

Moscati, I. (2007). "Early Experiments in Consumer Demand Theory: 1930–1970". *History of Political Economy*. 39: 359–401.

Muller, M. E. (1959). "A Note on a Method for Generating Points Uniformly on N-dimensional Spheres". *Comm. Assoc. Comput. Mach.* 2: 19–20.

Natter, M. and M. Feurstein (2002). "Real World Performance of Choice-based Conjoint Models". *European Journal of Operations Research*. 117: 448–458.

Neal, R. (2011). "MCMC using Hamiltonian Dynamics". In: *Handbook of Markov Chain Monte Carlo*. Ed. by S. B. *et al.* Ch. 5. London: Chapman and Hall.

Neslin, S. (1981). "Linking Product Features to Perceptions: Self-stated versus Statistically Revealed Importance Weights". *Journal of Marketing Research*. 18: 80–86.

Orme, B. (1999). "ACA, CBC, or Both? Effective Strategies for Conjoint Research". Working paper, Sawtooth Software.

Pesaran, H. and M. Weeks (2001). "Non-nested Hypothesis Testing: An Overview". In: *A Companion to Theoretical Econometrics*. Ed. by B. Baltagi. Oxford: Blackwell. 277–309.

Pollard, D. (1984). *Convergence of Stochastic Processes*. New York: Springer.

Press, W., W. Vetterling, S. Teukolsky, and B. Flannery (2007). *Numerical Recipes: The Art of Scientific Computing*. Cambridge University Press.

Quarteroni, A., R. Sacco, and F. Saleri (2007). *Numerical Mathematics*. New York: Springer.

Raghavarao, D., J. Wiley, and P. Chitturi (2010). *Choice-Based Conjoint Analysis: Models and Designs*. Boca Raton: CRC Press.

Ramsey, F. (1931). "Truth and Probability". In: *The Foundations of Mathematics and Other Logical Essays*. Ed. by R. Braithwaite. London: Kegan, Paul, Trench, Trubner and Co. 156–98.

Rao, V. (1977). "Conjoint Measurement in Marketing Analysis". In: *Multivariate Methods for Market and Survey Research*. Ed. by J. Sheth. Chicago: American Marketing Association. 257–286.

Rao, V. (2014). *Applied Conjoint Analysis*. Berlin: Springer.

Rawls, J. (1971). *A Theory of Justice*. Cambridge: Harvard University Press.

Reibstein, D., J. Batesonm, and W. Boulding (1988). "Conjoint Analysis Reliability: Empirical Findings". *Marketing Science*. 7: 271–286.

Revelt, D. and K. Train (1998). "Mixed Logit with Repeated Choices: Households' Choices of Appliance Efficiency Level". *The Review of Economics and Statistics*. LXXX(4): 647–657.

Rose, J. and M. Bleimer (2009). "Constructing Efficient Stated Choice Experimental Designs". *Transport Reviews*. 29(5): 587–617.

Rose, J., S. Hess, M. Bliemer, and A. Daly (2015). "The Impact of Varying the Number of Repeated Choice Observations on the Mixed Multinomial Logit Model". Working paper, University of Leeds.

Rossi, P. (1979). "Vignette Analysis: Uncovering the Normative Structure of Complex Judgments". In: *Qualitative and Quantitative Social Research: Papers in Honor of Paul Lazarsfeld*. Ed. by R. Merton, J. Coleman, and P. Rossi. New York: Macmillan. 175–188.

Rossi, R., G. Allenby, and R. McCulloch (2005). *Bayesian Statistics and Marketing*. Hoboken: John Wiley & Sons Ltd.

Rubinstein, R., G. Samorodnitsky, and M. Shaked (1985). "Antithetic Variates, Multivariate Dependence and Simulation of Stochastic Systems". *Management Science*. 31(1): 66–77.

Samuelson, P. (1947). *Foundations of Economic Analysis*. Cambridge: Harvard University Press, 1983.

Samuelson, P. (1950). "The Problem of Integrability in Utility Theory". *Economica*. 17: 355–385.

Savage, L. (1954). *The Foundations of Statistics*. Hoboken: John Wiley & Sons Ltd.

Scarpa, R., M. Thiene, and K. Train (2008). "Utility in Willingness to Pay Space: A Tool to Address Confounding Random Scale Effects in Destination Choice to the Alps". *American Journal of Agricultural Economics*. 90: 994–1010.

Schkade, D. and J. Payne (1993). "Where Do the Numbers Come From? How People Respond to Contingent Valuation Questions". In: *Contingent Valuation: A Critical Assessment*. Ed. by J. Hausman. Amsterdam: North-Holland. 271–293.

Schultz, H. (1925). "The Statistical Law of Demand as Illustrated by the Demand for Sugar". *Journal of Political Economy*. 33: 481–504.

Schultz, H. (1928). *Statistical Laws of Demand and Supply with Special Application to Sugar*. Chicago: University of Chicago Press.

Segal, M. (1982). "Reliability of Conjoint Analysis: Contrasting Data Collection Procedures". *Journal of Marketing Research*. 19: 139–143.

Song, X., F. Becker, M. Danaf, B. Atasoy, and M. Ben-Akiva (2018). "Enhancement of Hierarchical Bayes Procedure for Logit Mixture". Working paper, MIT.

Srinivasan, V. (1988). "A Conjunctive-compensatory Approach to the Self-explication of Multiattributed Preferences". *Decision Sciences*. 19: 295–305.

Strasser, H. (1975). "The Asymptotic Equivalence of Bayes and Maximum Likelihood Estimates". *Journal of Multivariate Analysis*. 5: 206–226.

Swait, J. and W. Adamowicz (2001). "The Influence of Task Complexity on Consumer Choice: A Latent Class Model of Decision Strategy Switching". *Journal of Consumer Research*. 28: 135–148.

Thurstone, L. (1927). "A Law of Comparative Judgment". *Psychological Review*. 34: 273–286.

Thurstone, L. (1931). "The Indifference Function". *Journal of Social Psychology*. 2: 139–167.

Tierney, L. (1994). "Markov Chains for Exploring Posterior Distributions". *Annals of Statistics*. 22: 1701–1728.

Train, K. (1986). *Qualitative Choice Analysis*. Cambridge: MIT Press.

Train, K. (1999). "Mixed Logit Models for Recreation Demand". In: *Valuing Recreation and the Environment*. Ed. by J. Herriges and C. Kling. Northampton: Edward Elgar.

Train, K. (2000). "Halton Sequences for Mixed Logit". Working paper, University of California, Berkeley. URL: https://eml.berkeley.edu/wp/train0899.pdf.

Train, K. (2001). "A Comparison of Hierarchical Bayes and Maximum Simulated Likelihood for Mixed Logit". Working paper, University of California, Berkeley. URL: https://eml.berkeley.edu/~train/compare.pdf.

Train, K. (2007). "A Recursive Estimator for Random Coefficient Models". Working paper, University of California, Berkeley. URL: http://eml.berkeley.edu/~train/re.pdf.

Train, K. (2009). *Discrete Choice Methods with Simulation* (2nd edition). Cambridge: Cambridge University Press.

Train, K. and G. Sonnier (2005). "Mixed Logit with Bounded Distributions of Correlated Partworths". In: *Applications of Simulation Methods in Environmental and Resource Economics*. Ed. by A. Alberini and R. Scarpa. Dordrecht: Springer. 117–134.

Train, K. and M. Weeks (2005). "Discrete Choice Models in Preference Space and Willingness-to-pay Space". In: *Applications of Simulation Methods in Environmental and Resource Economics*. Ed. by A. Alberini and R. Scarpa. Dordrecht: Springer. 1–17.

Tversky, A. (1972). "Elimination by Aspects". *Psychological Review*. 79(4): 281–299.

Urban, G., J. Hauser, W. Qualls, B. Weinberg, J. Bohlmann, and R. Chicos (1997). "Validation and Lessons from the Field: Applications of Information Acceleration". *Journal of Marketing Research*. 34(1): 143–153.

Urban, G., J. Hauser, and J. Roberts (1990). "Prelaunch Forecasting of New Automobiles: Models and Implementation". *Management Science*. 36: 401–421.

Walker, J. L., Y. Wang, M. Thorhauge, and M. Ben-Akiva (2018). "D-efficient or Deficient? A Robustness of SP Experimental Design in a VOT Estimation Context". *Theory and Decision*. 84(2): 215–238.

Walker, J., M. Ben-Akiva, and D. Bolduc (2007). "Identification of Parameters in Normal Error Component Logit-mixture (NECLM) Models". *Journal of Applied Econometrics*. 22: 1095–1125.

Wallis, A. and M. Friedman (1942). "The Empirical Derivation of Indifference Functions". In: *Studies in Mathematical Economics and Econometrics*. Ed. by O. Lange, F. McIntyre, T. Yntema, and H. Schuktz. Chicago: University of Chicago Press. 175–89.

Wittink, D. and T. Bergestuen (2001). "Forecasting with Conjoint Analysis". In: *Principles of Forecasting: A Handbook for Researchers and Practitioners*. Ed. by J. Armstrong. New York: Springer. 147–167.

Wittink, D. and D. Montgomery (2009). "Models of Job Preference for Stanford MBA's '78". Stanford University Graduate School of Business Research Paper No. 2018.

Wright, P. and M. Kriewall (1980). "State-of-mind Effects on Accuracy with Which Utility Functions Predict Marketplace Utility". *Journal of Marketing Research*. 17: 277–293.

Wu, M. and W. Fitzgerald (1996). "Bayesian Multimodal Evidence Computation by Adapti Tempering MCMC". In: *Maximum Entropy and Bayesian Methods*. Ed. by K. Hanson and R. Silver. Dordrecht: Springer.

Yadav, L. (2007). *Hypothetical Bias in Contingent Valuation*. Mountain View: Proquest.

Yanez, M., E. Cherchi, B. Heydecker, and J. Dios-Ortuzar (2011). "On the Treatment of Repeated Observations in Panel Data: Efficiency of Mixed Logit Parameter Estimates". *Networks and Spatial Economics*. 11(3): 393–418.

Yang, M. (2008). "Normal Log-normal Mixture: Leptokurtosis and Skewness". *Applied Economics Letters*. 15: 737–742.

Zellner, A. and P. Rossi (1984). "Bayesian Analysis of Dichotomous Quantal Response Models". *Journal of Econometrics*. 25: 365–394.

Web Sites

https://github.com/stan-dev/rstan/wiki/RStan-Getting-Started
http://mc-stan.org/
http://www.slideshare.net/surveyanalytics/how-to-run-a-conjoint-analysis-project-in-1-hour
http://artax.karlin.mff.cuni.cz/r-help/library/conjoint/html/00Index.html
http://cran.r-project.org/web/packages/conjoint/index.html
http://www.lawseminars.com/detail.php?SeminarCode=14NRDNM#agenda
https://eml.berkeley.edu/~train/foundations_R.txt
https://eml.berkeley.edu/~train/software.html
https://www.sheffield.ac.uk/economics/people/hole/stata