Book Reviews/Comptes rendus

JACQUES Q. HAGENAARS and ALLAN L. MCCUTCHEON (eds.), *Applied Latent Class Analysis*. Cambridge: Cambridge University Press. 2002. 476 pages, Index, $85 (U.S.) hardcover.

Applied Latent Class Analysis is a landmark book–all the major living authors who have contributed to the development of Laten Class Analysis (LCA) have contributed chapters. This book describes an emergent perspective constituting a unified paradigm. Appropriately, the dedication is to the late Clifford Clogg, an indefatigable participant in the development of the methodology.

Chapter One by Leo Goodman is a history of the development of the current paradigm for latent classes, a history in which Goodman himself figured prominently. It is clear but heavy going. McCutcheon's description of basic concepts and procedures in Chapter Two provides a better introduction and makes Goodman's chapter more accessible for an inexpert reader. This is not a book to be read in a day or two, or on a weekend at the beach.

Latent variables are variables that are not observed (sometimes not observable).

In the days of simple empiricism, they were taboo, but the scientific *weltgeist* has definitively shifted. Continuous latent variables are common in factor analysis and in structural equation modeling. LCA constructs unobserved variables that are categorical (dichotomies and polytomies} not necessarily ordered. For example, the mover-stayer model in political science looks at voting change adding the conceptual notion that there are two types of people: those who would never change (so-called stayers), and those who are susceptible to change but who might or might not (so-called movers). Using a cross-tabulation and some general equilibrium conceptions, it is possible to guess how many people in the population are in these two unmeasured groups.

In LCA, the aim is to explain (summarize) relationships among observed variables by imagining that there are a small number of unobserved types of individuals. Most analysis proceeds by working out what kind of mixture of these types would produce what we in fact observe. The technical principle is known as the Axiom of Local Independence (ALI) – it means that if we have a really accurate characterization of the types of

people, then there will be no relationships left to explain among the observed variables, just residual correlation. ALI allows the derivation of the expected values used to test LCA models.

Sociologists are an inventive lot and our authors add many bells and whistles to the basic model having only one dichotomous latent variable and only dichotomous observed variables. Some chapters in the book extend the model by looking at polytomies, and dealing with how order can be integrated into the basic model. Hagenaars' chapter extends the model to consider directed log-linear modeling with latent variables, a very important topic because we have had structural equation models for continuous variables but no reasonable solutions for causal modeling with categorical variables. The Winship, Mare, and Warren chapter shows how the method can be used to look at the influence of missing variables, not just MCAR (missing completely at random) and MAR (missing at random) variables but also NINR (non-ignorable non-response) variables. Other chapters extend the model by looking at Markov chains, longitudinal data, and Rasch models. The software described in Appendix C is now quite flexible portending greater use of the methodology.

Whatever the extensions, the basic integrating idea is to find out the number of types, and their characteristics, of the objects of in the universe of analysis. Most often we do not know in advance either how many types there are or what the measurement characteristics are – these are derived from the empirical analysis.

The most useful analyses will likely not be full-scale LCA models but two-stage models where the first stage explores subsets of more locally related variables, and the second stage explores the relationships among the subsets. That involves fewer assumptions and more robust analysis.

The book would probably be excellent as a textbook for an upper level PhD. course in Latent Class Analysis at a university that specializes in statistical methods. It will also be a valuable resource for those who are attempting to use LCA for specific research. If you are going to be involved in the nuts and bolts of practical causal analysis using categorical variables, there is going to be no substitute for an easy familiarity with the LCA structure. Everyone who writes about latent classes in the next decade will be including papers from this book in their references.

If you are very familiar with LISREL and factor analysis or if you have already read half a dozen of the articles on loglinear analysis by Goodman and Clogg, you will like this book. If you have not, this book may not be the place to start. Even the article by McCutcheon, very clear, readable, and starting from basics, requires a certain familiarity with the language of statistical modeling. Buy this book as a Christmas present for your methodologically inclined friend, and then get him or her to help you with your future statistical analyses.

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