

A PURPLE PAPER

The Bayesian Techniques:

Their Place in Marketing Research

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Market researchers have typically relied on classical statistics for advanced analytics. However, in recent years, Bayesian statistical techniques have gained the interest of marketing managers, brand managers, and marketing research professionals. In recent history, Bayesian statistical applications have been confined, more or less, to a few academics and a handful of practitioners; yet, advances in computing power and increased efforts in software availability have allowed Bayesian techniques to begin to have a wider audience. While by no means a panacea for all the analytical ills in marketing research, Bayesian techniques have a place in marketing research that will continue increase in the future.

Bayesian Techniques: What are they?

Both classical and Bayesian statistics utilize probabilities to assess mathematical outcomes. Bayesian statistics differ from classical statistics by how probabilities are estimated. Specifically, Bayesian statistics incorporate both individual and group probabilities into the analysis, while classical statistics rely only on group probabilities. This means that classical statistics treat all individuals as part of a group, thereby applying less focus on individual difference and broader statistical generalizations.

Bayesian statistics have typically involved a class of techniques that utilize Hierarchical Bayes (HB) estimation when estimating probabilities of occurrence. It is called 'hierarchical' because the analysis is nested, or has more than one level. At a higher level, individuals are described by the normal group probability distribution, but respondents at an individual level have their own personal probabilities of achieving some outcome like a product purchase or rating a brand a certain way. The HB estimation produces individual level probabilities for certain events and also borrows information from the probabilities associated with the group to refine the overall statistical prediction.

Unlike most classical statistical analyses, HB estimation requires massive computing power to perform. This is because of a kind of re-sampling technique involved in the HB estimation process; HB estimation produces a huge number of reproductions of each respondent's estimated scores until stability across all individuals is achieved. For this reason, HB estimation was largely impractical until the last couple of years. The same computing problems will still be a limitation, but this impracticality will cease to exist entirely in the coming years.

Bayesian Techniques: What are the applications?

Predictive Models. Bayesian techniques have some application for predictive scenarios, where the goal is to predict some overall outcome based on a number of causal variables. The trouble with using classical statistics to understand these scenarios is that individual differences associated with the respondents are subsumed in their entirety by the analysis and/or assumed away as factors of influence. In many instances, this may not be a problem. However, if the goal of the research is to understand the problem in greater depth, such as by market segments, than HB estimation can surpass classical statistical analysis.

For example, consider a case where we are trying to predict cheeseburger taste satisfaction from a study where consumers consider a number of different burgers and then rate each on a desirability scale. A predictive model is designed to assess affinity based on the influence of pickle inclusion - whether the burger had pickles (or not). Using classical statistics, results show the pickles have no influence on affinity. Thus, we report that pickles have no effect on cheeseburger desirability. Yet, classical statistics cannot detect the difference between those consumers that like pickles and those that hate pickles (a factor which could have great influence on our predictive model). The analysis has ignored this critical difference and given the results for an “average” consumer, which of course results in a specious conclusion. HB statistics deal with this problem better by incorporating information from respondents when computing individual scores. The advantage with using HB statistics is that now we are now using individual

Choice Modeling. Perhaps the most exciting application for Bayesian techniques is in the area of choice modeling. Choice modeling has grown in popularity over the past several years because many researchers prefer the realism of the techniques and the applicability of the research outcomes.

However, in discrete choice modeling the nature of the underlying technique can yield little about the magnitude of difference associated with a choice, rather what we learn is that consumer X either would choose a product profile or not. There are also problems associated with models differentiating different options that are not discernibly different in reality (preferring a yellow taxi to a green taxi) due to design restrictions.

Some classical techniques were developed to deal with these limits, but gave up the individual level analysis in order to do so. Hierarchical Bayes estimation application to choice data lets analysts solve these problems, while capturing complex effects and producing market simulations. This is done with data that are analyzed at the individual level. These models are often very complex and costly to produce, but HB estimation does provide a way for very refined and stable modeling.

HB estimation also has great promise for aiding the precision and validity in hybrid conjoint models, where individual variable preference data are combined with full profile desirability or purchase intent data. The ability to “borrow” information at the respondent level can be applied in hybrid conjoint to improve the quality of the individual estimates as well as overall predictions and market simulations.

Conclusion

Bayesian techniques are an up and coming class of statistical techniques that provide valuable insights that classical statistics may not have the ability to uncover. The outcomes Bayesian techniques produce can offer more refined results.

ABOUT THE PERT GROUP

Our goal is simple: to help our clients grow their businesses and their brands. How? By establishing business decision clarity.

We are The Pert Group, a top research-based consulting firm for business leaders who require straightforward, meaningful results that lead to clear, significant decision making.

We begin with fact-based evidence integrating attitudinal and behavioral research, which allows us to create clear strategies for business growth based on fact-based insights, and our team of **market-focused experts** works closely with our clients to consistently relate our work back to their goals and strategies.

Using a balance of creativity, forward thinking and pragmatism, we **completely immerse** ourselves in our clients' businesses and apply strategic methods to help them increase business and brand performance, differentiate their companies from the competition and take advantage of all opportunities in the market space.

The result? Clarity established.