

Perspectives on Paul E. Green

by

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April 2010

Paul Green's Contributions to Conjoint Analysis – Early Years

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Sage Publications, forthcoming.

In 1967 Linda Ronstadt and the Stone Poneys recorded an anthem of the new generation. They described Paul Green perfectly; he has always marched to a different drummer. As an assistant professor I recall arriving at the first MSI conference on “Analytic Approaches to Product and Marketing Planning” and being impressed that MSI would spring for live entertainment. After all we were all just quants. But those of you who know Paul know the punch line. The piano player was Paul, an accomplished pianist who effortlessly improvised while talking about Eckart-Young decomposition, centroids, and Monanova. I had never met anyone so relaxed. To Paul stress was just something to be minimized using any Minkowski p -metric in M-D-SCAL V.

I recall first meeting Paul when I was a graduate student. I had studied the requisite psychometrics which included choice axioms in a 1971 text by David Krantz, Duncan Luce, Patrick Suppes, and Amos Tversky (*Foundations of Measurement*). The buzz in quantitative models of consumer behavior was the great debates among luminaries such as Frank Bass, Andrew Ehrenberg, Jerry Hurner (the Entropy Model), and Hendrodynamics (later decoded by Manu Kalwani and Don Morrison). These analytic consumer-behavior models were exciting and challenging, but they were descriptive. Researchers were struggling to add control variables.

Paul visited MIT while Glen Urban and I were struggling with how to measure consumer preferences for the great healthcare debate – the design of a new MIT HMO. Naturally we asked Paul for his perspective. We had read carefully the seminal books that all quants had on their shelves—both written by Paul: *Applied Multidimensional Scaling* (with Vithala Rao) and *Multiaattribute Decisions in Marketing* (with Jerry Wind). Surely they must contain the answer.

Paul knew the axioms, could talk theoretical statistics, but, most importantly, saw himself as an engineer. Paul really wanted to develop and apply methods that would be used by manag-

ers to make important decisions. I'll say it again. Paul was an engineer and proud of it. Paul had extensive experience in product development from his days at Du Pont. He knew how managers used information on consumer preferences and perceptions and he was developing methods that would fit into a manager's decision calculus. (See also John Little's 1970 paper.)

Conjoint theory is highly mathematical and details how axioms such as connectedness, transitivity, mutual independence, and Archimedean axioms enable a researcher to decompose preference into its component parts. Conjoint analysis is making appropriate tradeoffs so that real consumers in real applications can answer informative questions from which we derive insight for managerial decisions. This was (and is) Paul's genius.

Paul's seminal paper (with Vithala Rao) has over 300 citations in ISI's Web of Science and almost 600 citations on Google Scholar, but that does not even begin to represent the tremendous impact that Paul's work on conjoint analysis has had on the field of marketing. Literally hundreds of scholars have extended Paul's insight with advanced statistics, machine learning, web-based representations, adaptive questioning, non-additive models, and so many applications (each year) that it is almost impossible to count. Many of these papers and many of Paul's own papers have hundreds of citations—the citation tree is enormous. Paul's own paper with Seenu Srinivasan in this volume has almost 750 citations in ISI—and another 1990 paper over 400 citations. And if we look to applications, there are multiple surveys that highlight conjoint analysis as the most-used quantitative method in marketing and second overall (to focus groups). This just boggles the mind.

But this volume is about “the early years” when conjoint analysis was still being developed. Looking back from the 21st century it is hard to believe that the reviewers of the 1971 article were apprehensive about Paul's approach. The editor at the time, Ralph Day, had to step in, overrule the reviewers, and take the risk to publish something as radical as an attempt to decomposed the preferences of individual consumers into component parts.

As we read through the papers in this volume we begin to see Paul's vision. Some of the articles are new methods and mathematical, but others seek to explain conjoint analysis to a broad audience. The articles provide a perspective on how conjoint analysis evolved to address new challenges (factorial designs to make it easier on respondents), new applications (product design optimizers), new domains (benefit bundles and item collections), improved models of consumer decision making (interactions, componential segmentation), and a focus on practicality

(hybrid conjoint analysis). The articles demonstrate definitively that Paul was never one to rest on his laurels, but rather a curious researcher with a passion for application, science, and engineering.

Paul's passion for new ideas infuses everything he does. (I've never skied with Paul, but I could just image his analytic approach to every ski hill he has ever encountered.) I remember once when Paul and I were opposing experts on a copyright infringement case. The issue was whether Seenu Srinivasan's Casemap could provide accurate estimates of damages should the plaintiffs prevail. This was serious stuff; the case had consumed the attorneys on both sides. Paul walked in and we immediately fell into talking about his latest research on conjoint analysis and how he thought it would be of interest to both academics and managers. The attorneys were aghast. How could we oppose one another on a scientific issue yet discuss the basic concepts abstractly with an eye toward future research? But this was (and is) Paul. He cares about the research, deeply. He cares about the science, deeply. And he cares about application. The case was decided on other matters (although I am told it did make the law school texts), but what I remember most about that case was Paul's enthusiasm for the basic issues and his desire to explore new directions. He always saw beyond the problem at hand. He is a true researcher and a true engineer.