



## Honorary speech John R. Hauser

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### The Marketing Science Revolution and Subsequent Evolution

*Remarks, by John R. Hauser*

Thank you Prof. dr. Stemersch, Rector Prof. dr. Pols, President Baele, and the Erasmus School of Economics for your kind words. It is a pleasure and an extraordinary honor to be here today on the 103<sup>rd</sup> Anniversary of Erasmus University. The Erasmus School of Economics and the Rotterdam School of Management, Erasmus University have each made seminal contributions to marketing science and will continue to do so far into the future. As far as I know, Erasmus is the only university in the world with two world-class marketing schools.

I've been fortunate to be part of the marketing science revolution, but it's been a forty-year journey. I began as a researcher in transportation. I was a bus expert. I was part of a team designing computer algorithms for a transportation system not unlike Uber Carpool. The system was called Dial-a-Ride and it was run by local communities. By today's standards, our computers weren't very powerful. Each line of code had to be extremely efficient. The MIT team, led by Nigel Wilson, had developed algorithms and was working with the US Department of Transportation and a local community to implement a pilot project. But few consumers were riding. As a junior researcher among engineering researchers, I was dispatched to talk to consumers and find out why. We did a survey and quickly found out that we did not understand what consumers really wanted. We changed a single line of code and the system improved. Ridership doubled. Understanding the voice of the customer was powerful. I was hooked.

In marketing, I was fortunate to find like-minded renegades from engineering and the hard sciences. They were beginning to apply quantitative methods to solve important problems. John Little was combining managerial intuition and statistics; Frank Bass was using ideas from statistical thermodynamics to model consumers, and Paul Green was playing with a new method to understand consumer preferences. It was an exciting time.

Our mindset was engineering. In fact, for a time, the field was nicknamed marketing engineering. We picked the right advertising message by finding the best way to measure consumer perceptions. We designed better products by understanding consumer preferences. And we evaluated marketing tactics by predicting how consumers would respond to "what-if" scenarios. The logit model, dynamic models, and



Bayesian models were all introduced in this era. Remember that Dan McFadden developed the logit model to model consumer response to a new San Francisco subway system.

Our goal was to find a problem, build a model of consumer response, and use operations research to find the best solution. We talked to managers, we talked to consumers, and we sought to improve marketing tactics. In this era, computers filled rooms and weren't very fast. You have today on your smartphone more computing power than the largest university computer of the time. Computation was expensive; I estimated my first Bayesian model by hand. Our models were parsimonious because we had no choice.

Then three forces came together to birth marketing science. First, computers got faster at exponential rates, and they were on our desktops. Second, hard-to-get aggregate data were replaced by automated data. Supermarket scanners were introduced and we suddenly went from data poor to data rich. In product development, manufacturers funded massive data collection. And, third, we noticed something interesting about our models.

I'll give you an example from my own experience, but I was not alone. My colleagues, Glen Urban and Al Silk, developed a simulated store to test consumer acceptance of new products. Their model, Assessor, cost \$30,000 and took 3 months, but it was just as accurate as test markets that cost \$1 million and took over a year. The world took notice.

My colleague, Steve Shugan, and I had access to the Assessor data. Applications were not what we expected. Most firms used Assessor on their competitor's products, not their own. They were defending their turf.

Steve and I developed an engineering model to defend markets, but it almost always gave the same basic recommendation. We looked deeper into the structure of defensive strategy to explain why and provide general guidelines. Four years later we published a paper on the theory of Defensive Marketing. Yes, four years. The paradigm at the time was engineering, not theory. But that was changing.

About that time I was asked to write a paper celebrating the 75<sup>th</sup> anniversary of the Harvard Business School. There weren't any reviewers so I could write whatever I wanted. I wrote a paper on the "Coming Revolution in Marketing Theory." Many scholars at the time thought I was crazy, but I was Departmental Editor of a marketing journal and I was beginning to see theory-based papers. I was also a student of the history of science. The pattern is clear. Paradigms change; new ideas are born, and scientists push deeper and deeper. For better or worse, this was going to happen in marketing. I was glad we had named our new journal *Marketing Science* not *Marketing Engineering*.



When I was editor, the floodgates opened. New theories abounded. Some survived and some did not. We now have a much deeper understanding of the underlying structures of marketplaces. The corpus is impressive.

Fortunately, marketing engineering never really went away. Throughout the 1990s, faster computers enabled more elaborate models. We had a number of wins. Marketing science was part of the total-quality revolution; marketing science enhanced theory-based forecasting. Our field became much better at modeling consumer heterogeneity, and at modeling consumers who looked into the future. Models began to account for the endogenous reaction of firms.

The next evolution was graphic-based, interconnected computers. With the virtual customer, we began to use virtual prototypes, realistic stimuli, and realistic situations. For example, with information acceleration we could simulate alternative futures. We forecast the sales of electric vehicles before the first modern EV was launched, and we identified hybrids as a promising market.

No more waiting. We could get responses overnight. Firms could get feedback for continuous improvement in product development. Easily accessible consumer panels enhanced external validity. In some of first applications of machine learning, we adapted our surveys on the fly to get more information with fewer questions. And theory advanced, becoming more sophisticated and more detailed.

And that brings us to today. Marketing science is evolving yet again. Machine learning is the next evolution. For example, Gui Liberali, Glen Urban and I use index-based machine learning methods to morph websites and morph banners so that they might be tailored to the needs of each individual consumer. One experiment involved a half million consumers. Morphing means a better experience on the web for consumers and more profit for firms.

We now use convolutional neural networks (aka, deep learning) to preprocess user-generated content – reviews, posts, blogs, tweets – to identify sentences rich in consumer needs. The new frontier combines machines and humans to get the clearest possible picture of what consumers want in new products.

Machine learning brings with it a subtle concept that is extremely important – complexity control. With big data, false models are easy to develop and easy to justify. But they don't predict well out of sample or to new contexts. Complexity control ensures that machine learning methods focus on that which really matters, not on that which does not. Complexity control and cross-validation provide valuable clues to develop the best models, sometimes automatically.

Most importantly, complexity control forces models to favor parsimony. We have come full circle. Despite big data and despite unprecedented computing power, the new insights will be simple and they will shift paradigms. I wish I could tell you today what



those paradigms are, but the next generation is working on that. The field is in good hands.

Thank you.