

## **IN REMEMBRANCE OF ANGELO ZANELLA**

In December 2015, Professor Angelo Zanella passed away. He was a retired full professor of Statistics at the Economics Faculty of the Catholic University of the Sacred Heart of Milan.

Angelo Zanella was born in February 1932 to a Milanese middle-class family who instilled in him an interest in the visual arts, in particular painting and drawing; forms that he practiced with success during his early years.

He first graduated in Mathematics and Physics in 1954 from the State University of Milan, and in 1958 he took another degree in Political Science at the Catholic University of the Sacred Heart of Milan. The subject of his former thesis was ‘Successive linearization in a recent relativistic unifying theory’. He used to say that from his studies he acquired principles that defined his life; for example, that human behaviour should be constrained by ethical values and guided by rationality. He also used to highlight that his studies, and in particular his graduation thesis, strengthened his desire to achieve synthesis and standard forms in research, in the belief that a complete picture often makes it possible to point out glaring problems and paths for development.

He did not initially start working as an academic: after his degrees he found work with the company Sicedison Chemical Applied Research Laboratories, a joint venture between the Edison Co. and the American company Monsanto. This experience allowed him to grasp the problems related to the application of statistical methods to experimental research and to the control of industrial processes. At that time, the joint company had an agreement with the University of Padua and the young Zanella could work side by side with his mentor, Professor Uggè, a renowned statistician, and with professors of chemistry. A manager of the company asked Professor Uggè to recommend a statistician to flank the company’s technicians in the optimisation of the production lines of polymers, including the well-known polyvinyl chloride. This gave Angelo Zanella the opportunity to shine at the chemical laboratories of both Porto Marghera and Mantova and in the U.S.

In the early sixties, he left the company and gained the chair of Sampling Theory and Statistics at the University of Padua.

In 1969 he married Liliana Alborghetti to whom, being tied in love, he dedicated much attention in his last years, as though begging to be forgiven – as he used to say – for all the time he had taken away from her to pursue his academic dreams.

In 1977 he was called to the chair of Statistics at the Faculty of Economics and Commerce (now the Faculty of Economics) at the Catholic University of the Sacred Heart of Milan. He also acted as director of the Institute of Statistics continuously from 1977 to 2002. The Institute had existed under different names in the athenaeum since 1947, and was previously chaired by renowned scientists such as Marcello Boldrini, Albino Uggè and Giampiero Landenna; to this list can be added Luigi Faleschini, professor of Statistics at the Faculty of Political Sciences. At the same time, Angelo Zanella acted as director of the School of Statistics at the Faculty of Economics and Commerce.

Alongside his academic career, he excelled as chair or reporter at both national and international scientific meetings, as a member of the council of the AICQ (Associazione Italiana Cultura della Qualità), as coordinator of the working group on 'Statistics for Technology and Production' of the Italian Statistical Society, as a founder of the ASA – Association for Applied Statistics and of the related journal 'Statistica Applicata – Italian Journal of Applied Statistics', and finally as a member of the Istituto Lombardo, Accademia di Scienze e Lettere.

Angelo Zanella was a great teacher to several generations of students, as he was gifted with the rare ability to make complex concepts seem easy. His scientific production was vast and eclectic, ranging from the methodology of mathematical statistics, particularly the design of experiments, statistical estimation and hypothesis testing, to the analysis of stochastic processes related to time series modelling for production control and for quality control of goods and services within the framework of total quality theory.

After reading the book *Time Series Analysis: Forecasting and Control* by Box and Jenkins, he started a new research stream within the so-called univariate discrete feedback stochastic control that avoided the use of the traditional Shewhart control charts thanks to the advantages offered by the predictive outcome typical of stochastic control. We must also mention his suggestion of a dynamic control design that, for a random characteristic to be controlled, has to ensure a required mean value and a variance that is as small as possible.

In the last years of his academic life, he focused on a new approach for controlling production systems and distribution chains, synthetically termed TQM (Total Quality Management). Angelo Zanella carried out accurate research in the field of statistical models to analyse customer satisfaction and related psychometric issues, as well as in the use of structural equation models with latent variables.

Finally, it should be said that Angelo Zanella conducted research on statistical measures of association for unordered categorical variables. He obtained results that allowed the comparison of association indices for couples of categorical

variables in terms of sensitivity in assessing small changes, with respect to extreme situations of stochastic independence and/or functional relationship between the variables.

Angelo Zanella was able to realise research alongside his intense didactic and organisational activities, dedicating much of his energy to promoting and managing multidisciplinary undertakings, involving in his initiatives both scientists from the academy and applied researchers from the industry: mathematicians, engineers, computer scientists, economists, businessmen and, obviously, statisticians.

We cannot forget his zeal for organising and actively taking part in courses for doctorate (PhD) programmes in Statistics that involved the universities of Padua, Trento and Bicocca of Milan, where advanced seminars on time series analysis are still being held and to which Angelo Zanella contributed as a lecturer.

Angelo Zanella taught in prestigious academic bodies such as the Faculty of Statistical Demographic and Actuarial Sciences at the ancient University of Padua, and in the Faculty of Mathematics, Physics and Natural Sciences at the University of the Sacred Heart of Milan. In 1992, he was also involved in the founding of the Statistical and Economic Sciences course at the Faculty of Economics of the latter university, in which he, being the coordinator, offered constant human help together with scientific support.

He also strongly supported the instigation of a master's degree on 'Quantitative Methods and Management of Quality Systems', aimed at refining the preparation of bachelors in Statistical and Economic Sciences in order to become experts in quality control, with a particular competence in quantitative methods and quality systems management.

The scientific community of statisticians loses with him an esteemed colleague, a rigorous, devoted and engaged researcher, a superior teacher and a perfect gentleman. Those who had the privilege to know him intimately have also lost a sincere friend.

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