

## **Statistics in Practice: Longitudinal Data Analysis (13. March 2014)**

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### **Education for Statistics in Practice**

In 2010 the German Region of the IBS started a series of lectures called 'Education for Statistics in Practice'. The aim was to implement continuing education for researchers at all stages of their career. To reach a broad audience we integrated the series into the main program of the German Region's annual meetings, as part of the regular conference (not a pre or post conference workshop).

So far, 'Education for Statistics in Practice' has taken place four times and has been a great success; thus far, it has been extremely well received. Based on our excellent experiences we will continue to expand the series at the International Biometric Conference in Florence, Italy, in July 2014.

For this year's lecture, it is our pleasure that Geert Molenberghs is presenting the analysis of Longitudinal Data.

### **Longitudinal Data Analysis by Geert Molenberghs**

Starting from case studies, modelling of longitudinal data with introductory practical illustrations in statistical software is considered. A rationale for the use of random-effects models for longitudinal, multilevel, and otherwise hierarchical data is given. Such models are formulated for the various case studies. Estimation, inference, and interpretation is discussed. For continuous outcome, emphasis is placed on the linear mixed model. Attention is given to: the difference between marginal and hierarchical interpretation, empirical Bayes estimation of random effects, and implementation.

Both marginal and hierarchical extensions towards non-Gaussian outcomes, most prominently binary outcomes, are discussed. Precisely, the focus in this part is on generalized estimating equations and the generalized linear mixed model is touched upon.

Case studies are chosen to present the picture frame so as to cover major features of hierarchical data on the one hand, and various application areas on the other, including clustered data, epidemiological studies, preclinical experiments, case-control trials, and health surveys.

### **References**

Verbeke, G. and Molenberghs, G. (2000). *Linear Mixed Models for Longitudinal Data*. New York: Springer.

Molenberghs, G. and Verbeke, G. (2005). *Models for Discrete Longitudinal Data*. New York: Springer.

### **Geert Molenberghs**

Geert Molenberghs is Professor of Biostatistics at Universiteit Hasselt and Katholieke Universiteit Leuven in Belgium. He received B.S. in mathematics (1988) and Ph.D. in biostatistics (1993) from the Universiteit Antwerpen. Prof. Molenberghs published methodological work on surrogate markers in clinical trials, categorical data, longitudinal data analysis, and on the analysis of non-response in clinical and epidemiological studies. He served as Joint Editor for Applied Statistics (2001-2004), Co-editor for Biometrics (2007–2009) and as President of the International Biometric Society (2004-2005). He currently is Co-editor for Biostatistics (2010–2012). Prof. Molenberghs is editor and author of several books on the use of linear mixed models for the analysis of longitudinal data (Springer Lecture Notes 1997, Springer Series in Statistics 2000, Springer Series in Statistics 2005, Chapman Hall/CRC 2007). He has taught well over a hundred short and longer courses on the topic at universities as well as industry, in Europe, North America, Latin America and Australia and has received four Excellence in Continuing Education Awards from the American Statistical Association for short courses offered at Joint Statistical Meetings.

