

Repeated Measures

Geert Molenberghs

I-BioStat, Universiteit Hasselt & Katholieke Universiteit Leuven, Belgium.

Repeated measures are obtained whenever a specific response is measured repeatedly in a set of units. Examples are hearing thresholds measured on both ears of a set of subjects, birth weights of all litter members in a toxicological animal experiment, or weekly blood pressure measurements in a group of treated patients. The last example is different from the first two examples in the sense that the time dimension puts a strict ordering on the obtained measurements within subjects. The resulting data are therefore often called longitudinal data. Obviously, a correct statistical analysis of repeated measures or longitudinal data can only be based on models which explicitly take into account the clustered nature of the data. More specifically, valid models should account for the fact that repeated measures within subjects are allowed to be correlated. For this reason, classical (generalized) linear regression models are not applicable in this context. An additional complication arises from the highly unbalanced structure of many data sets encountered in practice. Indeed, the number of available measurements per unit is often very different between units, and, in the case of longitudinal data, measurements may have been taken at arbitrary time points, or subjects may have left the study prematurely, for a number of reasons (sometimes known but mostly unknown). A large number of models have been proposed in the statistical literature, during the last few decades. Overviews are given in Verbeke and Molenberghs (2000) and Molenberghs and Verbeke (2005).

References

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

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

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