Multinomial Processing Tree Models in R

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Multinomial processing tree models are a class of statistical models for categorical data with latent parameters. These parameters are the link probabilities of a tree-like graph and represent the cognitive processing steps executed to arrive at observable response categories (Batchelder & Riefer, 1999; Erdfelder et al., 2009; Riefer & Batchelder, 1988).

In this presentation, the **mpt** package (Wickelmaier, 2011) in R is introduced which provides functions for fitting and testing such models. The model structure is represented symbolically using a simple formula interface. Parameter estimation is carried out by the expectation-maximization algorithm described in Hu and Batchelder (1994). The statistical procedures are illustrated using examples from cognitive psychology and memory research.



References

- Batchelder, W. H. & Riefer, D. M. (1999). Theoretical and empirical review of multinomial process tree modeling. *Psychonomic Bulletin & Review*, 6, 57–86.
- Erdfelder, E., Auer, T., Hilbig, B. E., Aßfalg, A., Moshagen, M., & Nadarevic, L. (2009). Multinomial processing tree models: A review of the literature. *Zeitschrift für Psychologie*, 217, 108–124.
- Hu, X. & Batchelder, W. H. (1994). The statistical analysis of general processing tree models with the EM algorithm. *Psychometrika*, 59, 21–47.
- Riefer, D. & Batchelder, W. H. (1988). Multinomial modeling and the measurement of cognitive processes. *Psychological Review*, 95, 318–339.
- Wickelmaier, F. (2011). **mpt:** Multinomial processing tree (MPT) models. *R* package version 0.3-0. http://CRAN.R-project.org/package=mpt