Katholieke Universiteit Leuven
Research group on quantitative psychology and individual differences

Prof. Pieter Kroonenberg
Universiteit Leiden

will give a lecture on

Three-way data: What they are and how to analyse them

on Tuesday, October 18 at 12:15 pm in room 01.12
of the Mgr. Sencie Institute, Erasmusplein 2, 3000 Leuven

This talk is part of the PhD training program of the Faculty of Psychology and Educational Sciences.

You are cordially invited.

Iven Van Mechelen and Eva Ceulemans

Abstract:

Data matrices make up the basic information for many statistical exploratory analyses. The structure of the variables and the relationships between the subjects and the variables often form an important part of substantive research. When measurements are obtained under different conditions, the data become three-way data - subjects, variables, and conditions. Another type of three-way data are judgement data: A number of subjects judge a number of situations on a collection of rating scales, such as semantic differential scales. Similarity data for individual differences form yet another type of three-way data in which a number of persons have judged the pairwise similarity between a set of stimuli.
Above examples are typical for the social and behavioural sciences, but three-way data are also ubiquitous in many physical sciences, such as (analytical) chemistry, signal processing, visual recognition, and geology, to name but a few domains. Especially in chemistry three-way and multiway data are generated almost on a routine basis, including industrial applications. Typical areas are liquid chromatography, spectroscopy, batch processing, etc. Techniques to analyse three-way and multiway data are collectively known as three-mode and multimode analysis, and many standard multivariate techniques have their multiway counterpart, such as principal component analysis, cluster analysis, factor analysis, multidimensional scaling, etc.
In the seminar, first a presentation will be given of various types of three-way data including a couple of examples. This will be followed by the discussion of a number of three-mode techniques, in particular generalisations of standard principal component analysis, but a short review of some other methods is included as well. The last topic is a detailed analysis of data on various types of anger in different situations as collected and analysed by Realo, Van Mechelen and Allik. This data set will be used to illustrate the kind of choices that one has to make in order to make a useful analysis. It will turn out that it will not always be easy to make unequivocal decisions that are the best possible ones. Especially the substantive interest in the data should play an important role in these decisions.
Depending on the time and demand, a brief presentation of an example from analytical chemistry can be shown as well.