VUmc

Bayesian Exploratory and Confirmatory Factor Analysis
Perspectives on Constrained-Model Selection

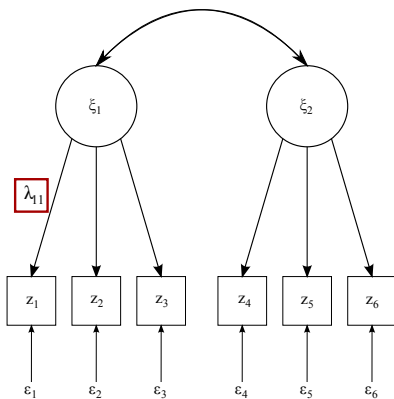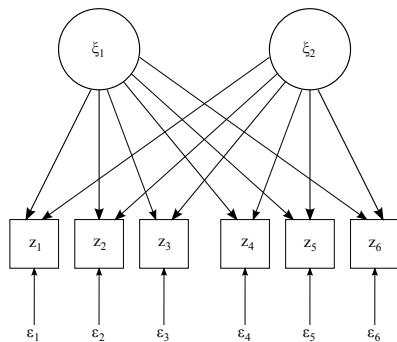Carel F.W. Peeters

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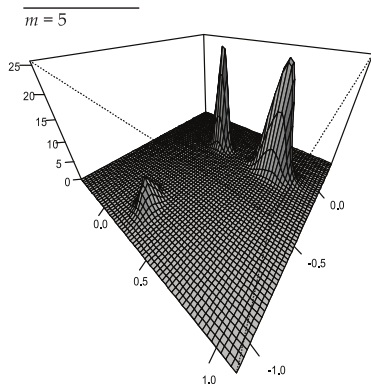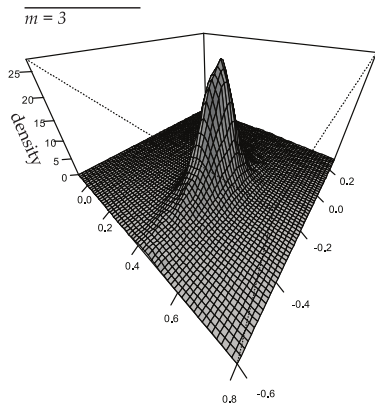Toronto, Canada
August 7, 2015
Session 2140

Shortest summary: A layer cake

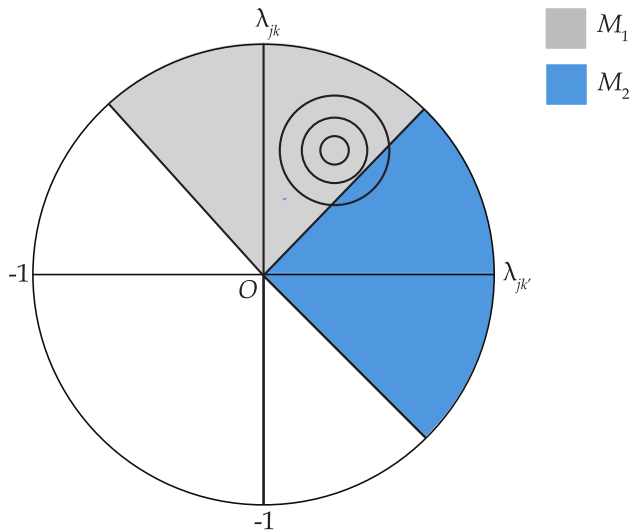# Recap: Factor analysis

EFA: Geometry of latent dimension selection

CFA: Traditional approach

$$\boldsymbol{\Lambda} = \begin{bmatrix} \lambda_{11} & 0 \\ \lambda_{21} & 0 \\ \lambda_{31} & 0 \\ 0 & \lambda_{42} \\ 0 & \lambda_{52} \\ 0 & \lambda_{62} \end{bmatrix} \begin{matrix} \text{item 1} \\ \text{item 2} \\ \text{item 3} \\ \text{item 4} \\ \text{item 5} \\ \text{item 6} \end{matrix} .$$

CFA: Geometry of inequality-constrained-model selection

CFA: Inequality-constrained-model selection

$$\mathbf{\Lambda}_1 = \begin{bmatrix} \lambda_{11} & > & |\lambda_{12}| \\ \lambda_{21} > 0 & & \lambda_{22} = 0 \\ \lambda_{31} < -.3 & & \lambda_{32} > .3 \\ \lambda_{41} & > & |\lambda_{42}| \\ \lambda_{51} & > & |\lambda_{52}| \\ \lambda_{61} = 0 & & \lambda_{62} > 0 \end{bmatrix} \begin{matrix} \text{item 1} \\ \text{item 2} \\ \text{item 3} \\ \text{item 4} \\ \text{item 5} \\ \text{item 6} \end{matrix},$$

vs.

$$\mathbf{\Lambda}_2 = \begin{bmatrix} |\lambda_{11}| & < & -\lambda_{12} \\ \lambda_{21} > 0 & & \lambda_{22} = 0 \\ |\lambda_{31}| & < & \lambda_{32} \\ |\lambda_{41}| & < & -\lambda_{42} \\ \lambda_{51} & > & -\lambda_{52} \\ \lambda_{61} = 0 & & \lambda_{62} > 0 \end{bmatrix} \begin{matrix} \text{item 1} \\ \text{item 2} \\ \text{item 3} \\ \text{item 4} \\ \text{item 5} \\ \text{item 6} \end{matrix}.$$

Back to the cake

Interdisciplinary applications $\longrightarrow$

Reformulation Bayesian EFA and CFA $\longrightarrow$

Bayesian model selection criteria $\longrightarrow$

Application: Metabolic Syndrome

Application: Chimpanzee handedness

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