



Session 3: Models of LST Theory

- The set of possible outcomes of the random experiment

$$\Omega = \Omega_U \times \Omega_{S_1} \times \dots \times \Omega_{S_k} \times \dots \times \Omega_{S_n} \times \Omega_{O_1} \times \dots \times \Omega_{O_k} \times \dots \times \Omega_{O_n}$$

- Observables

- $Y_{ik}: \Omega \rightarrow \mathbb{R}$

- Projections

- $U: \Omega \rightarrow \Omega_U$ Person projection

- $S_k: \Omega \rightarrow \Omega_{S_k}$ Situation projections



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- Latent Variables

- $\tau_{ik} := E(Y_{ik} | U, S_k)$ Latent State Variable

- $\varepsilon_{ik} := Y_{ik} - \tau_{ik}$ Measurement Error Variable

- $\xi_{ik} := E(Y_{ik} | U)$ Latent Trait Variable

- $\zeta_{ik} := \tau_{ik} - \xi_{ik}$ Latent State Residual

- Decomposition of the Variables

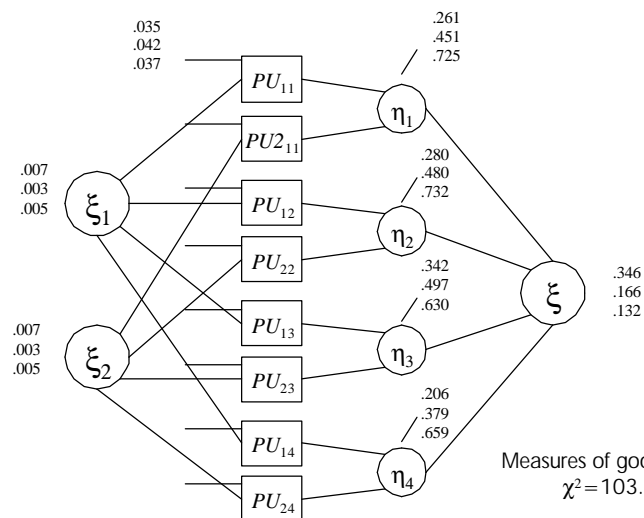
- $Y_{ik} = \tau_{ik} + \varepsilon_{ik}$

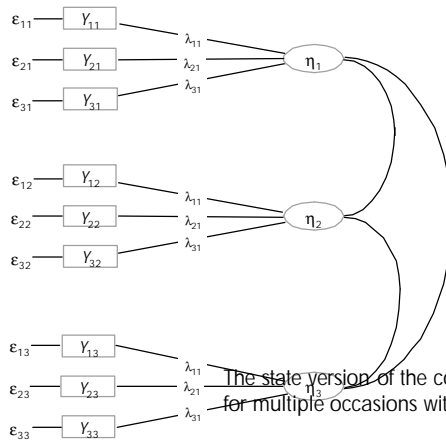
- $\tau_{ik} = \xi_{ik} + \zeta_{ik}$



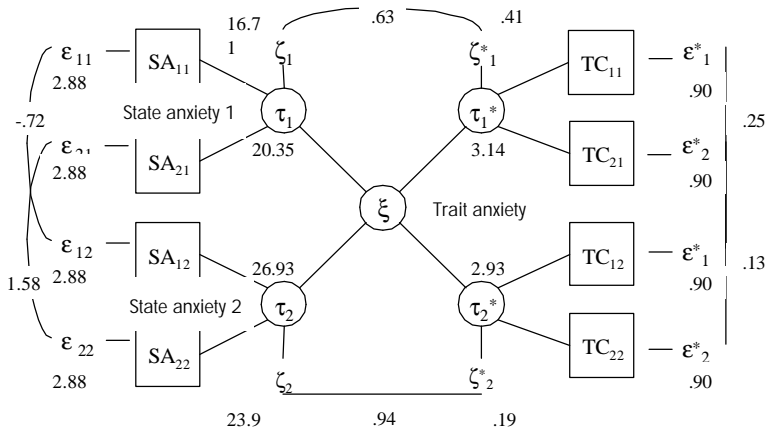
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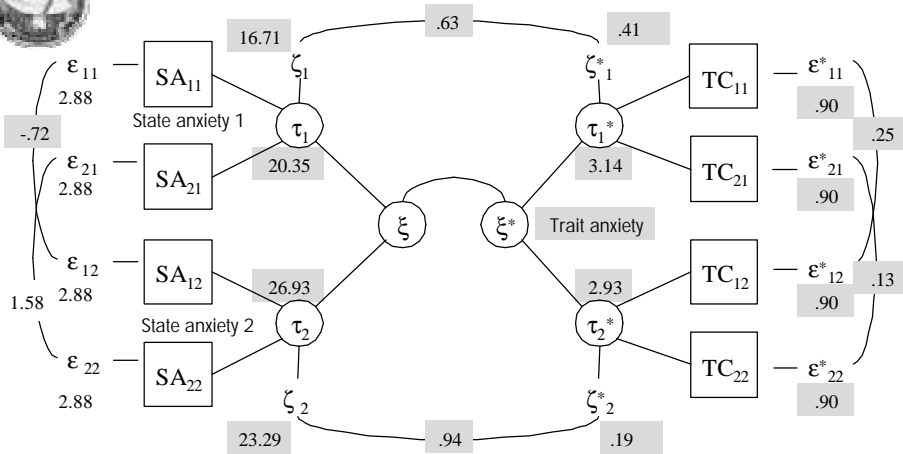
- Decomposition of the Variances
 - $Var(Y_{ik}) = Var(\tau_{ik}) + Var(\varepsilon_{ik})$
 - $Var(\tau_{ik}) = Var(\xi_{ik}) + Var(\zeta_{ik})$
- Important properties
 - $Rel(Y_{ik}) := Var(\tau_{ik}) / Var(Y_{ik})$ Reliability
 - $Con(Y_{ik}) := Var(\xi_{ik}) / Var(Y_{ik})$ Consistency
 - $Spe(Y_{ik}) := Var(\zeta_{ik}) / Var(Y_{ik})$ Occasion specificity





The state version of the congeneric model for multiple occasions with invariant parameters





$\chi^2 = 46.65$, $P = 0.00$; goodness-of-fit (adj.) = 0.91
absolutely largest standardized residual = 4.03