

# General Framework for Assessing the Quality of Measurement

## Measurement framework

The structure of the measurement is defined by the **measurement model**

$$x = \mu + B\tau + \varepsilon$$

of **true scores**, **observed items**, and **measurement errors**. The concept of **multivariate measurement scale**

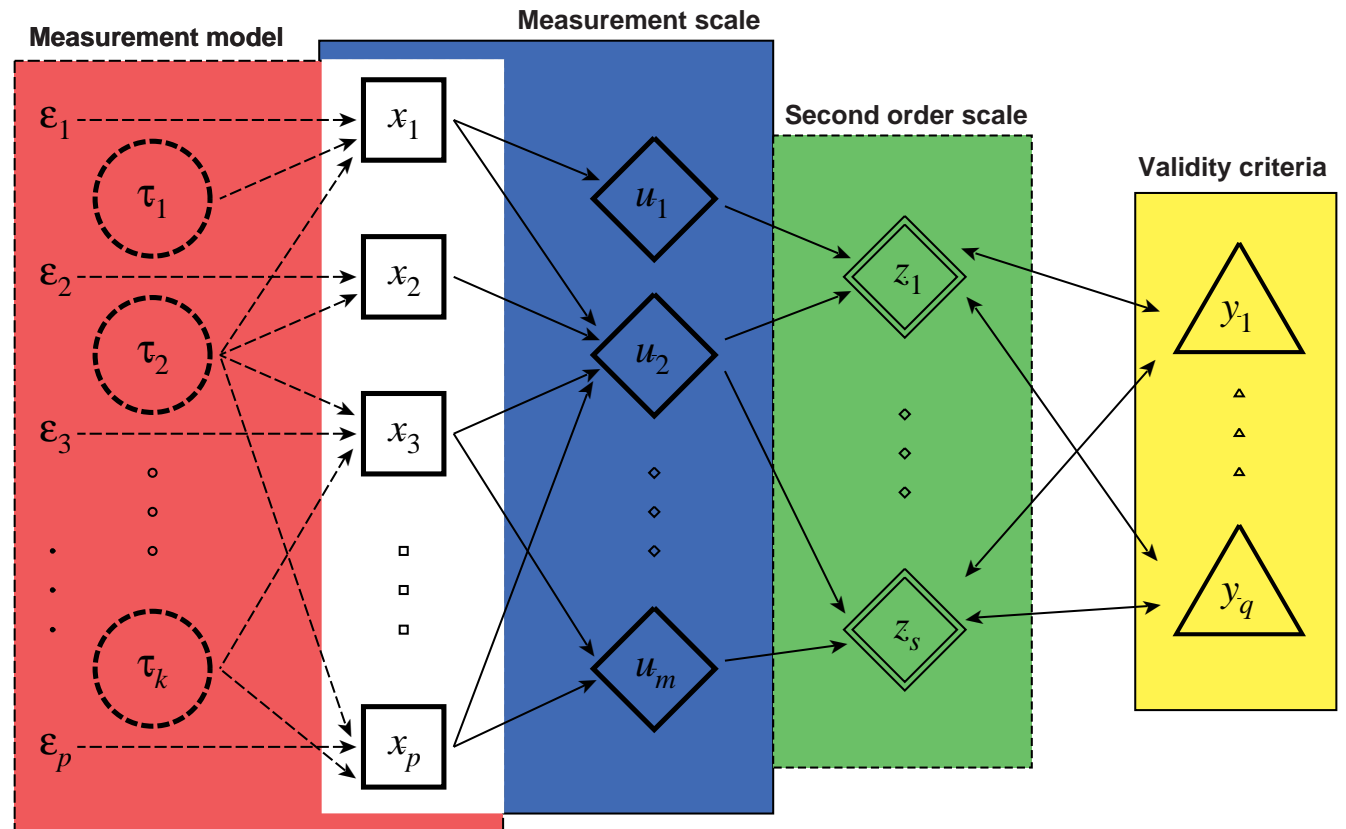
$$u = A'x$$

provides means to assess many types of **validity** and estimate **reliability** by

$$\rho_u = \text{diag}(A' B \Phi B' A) \times [\text{diag}(A' \Sigma A)]^{-1}$$

The assumptions of the earlier methods of reliability estimation (e.g., *Cronbach's alpha*) have **never been met** in practice.

Within our framework the effects of the measurement errors are assessed and reduced in **various statistical models** without any restrictive assumptions.



Measurement framework: from concepts to practice.

The **predictive validity** is improved by applying the correction for attenuation

$$\rho_{vy} = \frac{\rho_{vy}}{\sqrt{\rho_{uu}\rho_{yy}}}$$

where an estimate of reliability is essential.

## References

Tarkkonen, L. and Vehkalahti, K. (2005). Measurement errors in multivariate measurement scales, *Journal of Multivariate Analysis*, **96**(1), 172-189.