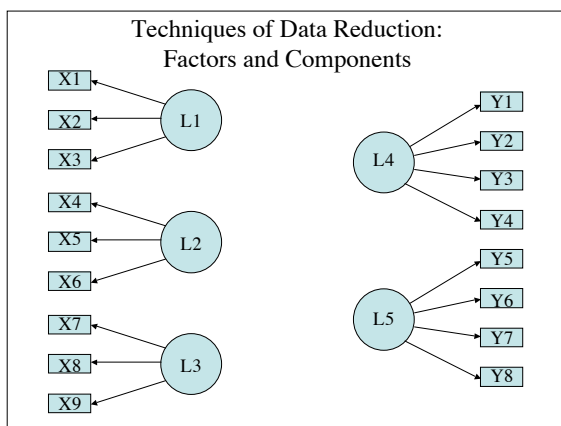
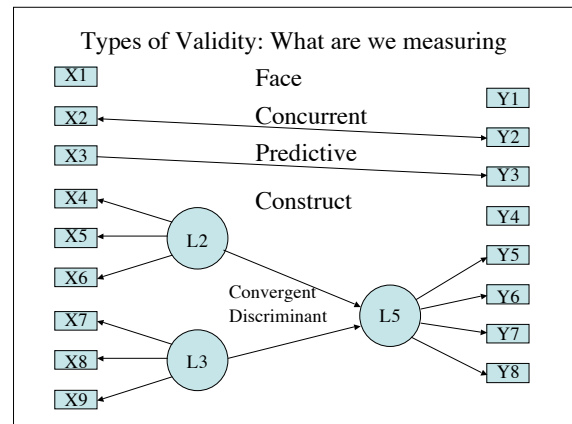
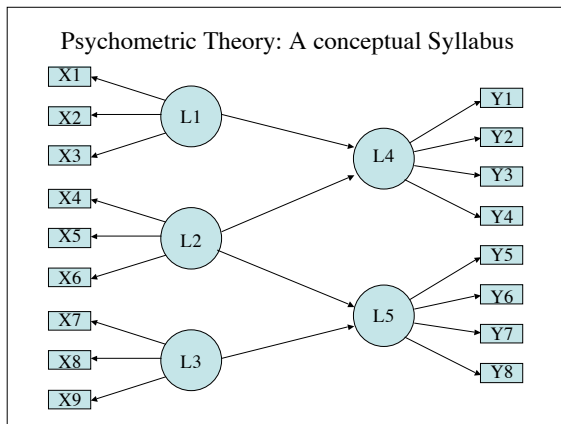
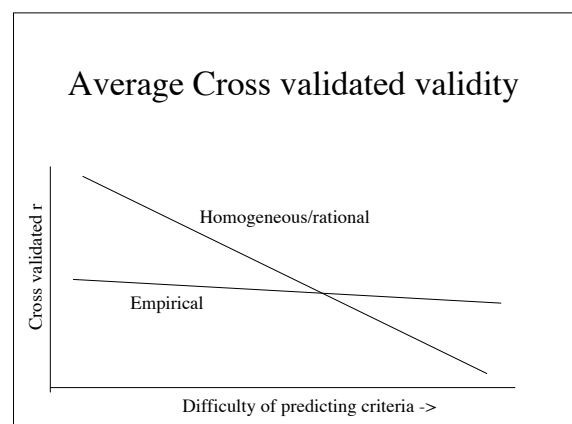




Scale Construction

Pragmatics

- Comparison of techniques
- Empirical
 - Rational
 - Theoretical
 - Homogeneous
 - Does it make a difference?
 - Hase and Goldberg: No
 - Goldberg, Yes.



Advantages and disadvantages

- Empirical
 - Harder to fake
 - Harder to interpret
 - Requires new scale validation for every criterion
- Rational/Homogeneous
 - More transparent
 - Homogeneity of measure suggests single construct

3 stages of scale construction: I: Design

1. Review theory of attribute to be measured
 1. Convergent measures
 2. Discriminant measures
2. Write items based upon theory
 1. items drawn from different facets of theory
 2. items balanced for response styles
3. Screen items for readability, bias, understandability
4. Include "hyperplane stuff"
 1. possible related constructs
 2. theoretically important alternatives
5. Define target population
 1. Who is to be measured
 2. Consider issues of homogeneity/heterogeneity
 3. Consider issues of generalizability

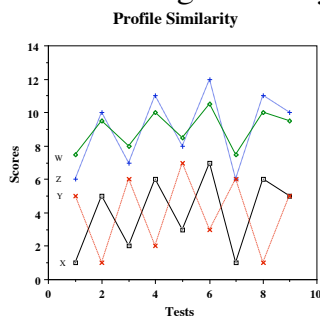
3 stages of scale construction: II: Data

1. Administer items and record responses
 1. (1) Monitor for serious, engaged test taking
 2. (2) Double check for data entry errors
2. Examine the distribution and search for outliers
 1. data entry errors
 2. uncooperative subjects
3. Form proximity (correlation) matrix
4. Extract optimal number of factors or clusters
 1. statistically (chi square and maximum likelihood)
 2. psychometrically (maximize alpha, beta, VSS)
 3. for interpretation (to maximize understanding)

3 stages of scale construction: III: Application

1. Form scales based upon these factors/ clusters
 1. score salient items
 2. drop non salients
2. Purify scales -- item analysis
 1. high correlation with scale
 2. low correlations with other scales
 3. low correlations with measures of response styles
 4. moderate levels of endorsement
3. Validate against other measures of same and different constructs
 1. Assess reliability (internal consistency & stability)
 2. Demonstrate convergent, discriminant and incremental validity

Measuring similarity



Similarity

Questions:

Given a set of scores on multiple tests (a subject profile), how should we measure the similarity between different profiles? What does it mean to have a similar profile?

What metric to use?

$$\text{Minkowski Distances} = \sqrt[r]{\sum (X_i - Y_i)^r}$$

$r=1$ city block metric $\implies$ all distances equally important (no diagonals)

$r=2$ Euclidean metric $\implies$ diagonals are shorter than sums

$r>2$ non-Euclidean $\implies$ emphasizes biggest differences

$r=\infty$ non-Euclidean $\implies$ distance = biggest difference

Similarity and correlation

$$D = \sqrt{\sum (X_i - Y_i)^2}$$

let $M_X = \text{mean } X$ $M_Y = \text{mean } Y$ $L = M_X - M_Y$
 $x = X - M_X$ $y = Y - M_Y$

$$D = \sqrt{\sum (X_i - Y_i)^2} = \sqrt{\sum \{(X_i - M_X) - (Y_i - M_Y)\}^2}$$

$$D = \sqrt{\sum (x - y + L)^2} \Rightarrow D = \sqrt{\text{Var}_X + \text{Var}_Y + 2\text{Cov}_{XY}}$$

Distance is a function of differences of Level, Scatter, and Pattern

Level $\Rightarrow$ differences of means $L^2 = (M_X - M_Y)^2$

Scatter $\Rightarrow$ Variances $\text{Var}_X + \text{Var}_Y$

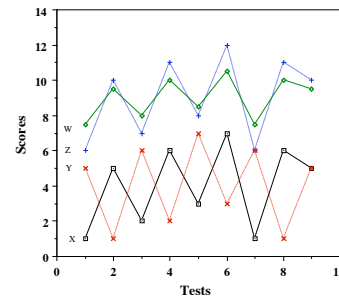
Pattern $\Rightarrow$ Covariance 2Cov_{XY}

If variables are standardized (means set to zero and variances to 1) then distance is a function of the correlation between the two profiles.

$$D^2 = 2(1 - r_{XY})$$

Similarity

Profile Similarity



Sources of Data

Self Report

Direct subjective

empirical scales: MMPI/Strong-Campbell

factorial scales: EPI/16PF/NEOPI-R

rational scales: PRF

Indirect/projective (access to subconscious?)

TAT

Rorschach

Indirect/objective

Cattell objective test battery

Implicit Attitudes Test (RT measures)

Emotional "Stroop"

Indirect/other

a) Kelly Construct Repetory Grid

b) Carroll INDSCAL

City blocks vs. Euclid

MATRIX OF CITY BLOCK DISTANCES

	X	Y	Z	W
X	0.000			
Y	3.778	0.000		
Z	5.000	5.000	0.000	
W	5.000	5.000	1.000	0.000

(W and Z are most similar, followed by X and Y)

MATRIX OF NORMALIZED EUCLIDEAN DISTANCES

	X	Y	Z	W
X	0.000			
Y	4.028	0.000		
Z	5.000	6.420	0.000	
W	5.115	5.855	1.080	0.000

(W and Z are most similar, followed by X and Y)

Covariance and Correlation

COVARIANCE MATRIX

	X	Y	Z	W
X	5.250			
Y	-3.875	5.250		
Z	5.250	-3.875	5.250	
W	2.625	-1.938	2.625	1.313

(X and W are most similar, X is negatively related to Y)

PEARSON CORRELATION MATRIX

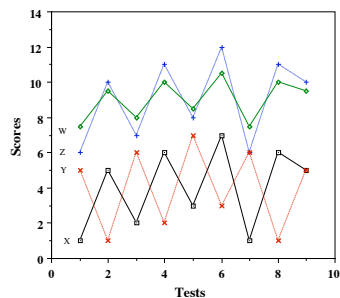
	X	Y	Z	W
X	1.000			
Y	-0.738	1.000		
Z	1.000	-0.738	1.000	
W	1.000	-0.738	1.000	1.000

(X is identical to W and Z, negatively related to Y)

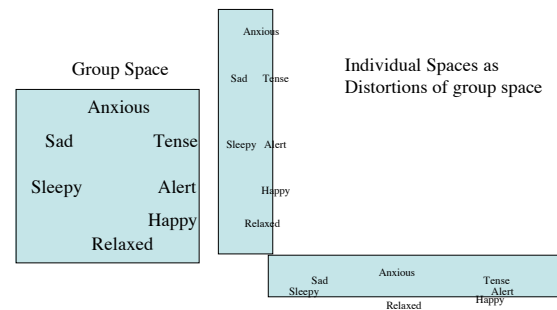
Kelly Rep Test

self	O		O				
lover	O						
mother		O					
father				O			
sib	O						
teacher			O				
Best friend		O		O			
Boss			O				
coworker		O		O			
construct							

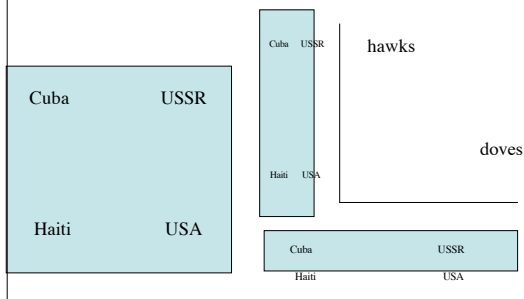
Similarity of Profiles: Level, scatter, pattern



Carroll IndScal model Individual Differences in MDS



Representation of Countries and attitudes towards Vietnam



Sources of Data

Structured interviews (e.g., SCID)

Other ratings

- Peer ratings
- supervisory ratings
- subordinate ratings

archival/unobtrusive measures

- unobtrusive measures
- historical record

- GPA
- Publications
- Citations

Neuropsychological

- a) neurometrics
- b) "lie detection"

Sources of Data

Performance tests

- OSS stress tests
- New faculty job talks
- Clinical graduate applicant interviews
- Internships
- Probationary Periods

Web based instrumentation

- self report
- indirect (IAT)