

PSYCHOMETRICS

Measurement in a Clinical Setting

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The Psychometric Domain

- States
- Traits
- Abilities
- Knowledge
- Attitude
- Health Status
- Potential

Psychometric Concerns

- **Classification**
- **Prediction**
- **Change**

Reasons for Assessment

- **Diagnostic Aid**
- **Treatability**
- **Treatment Evaluation**
- **Risk Assessment**

Psychometric Strategies

- **Normative Tests**
- **Idiographic Assessment**
- **Biosignal Assessment**

Measurement

An operation carried out in order to allow the objective comparison of objects (people).

Types of Comparison

'Level'	Information Available
<ul style="list-style-type: none"><li data-bbox="167 654 535 715">● Nominal<li data-bbox="167 761 500 822">● Ordinal<li data-bbox="167 868 506 929">● Interval	<ul style="list-style-type: none"><li data-bbox="990 654 1681 715">● Same or Different<li data-bbox="990 761 1521 822">● More or Less<li data-bbox="990 868 1734 1015">● How much more or less

Example of Levels of Measurement

Name	Pass	Class	Mark
● Erinitrea	P	1	93
● Lysander	P	1	70
● Ermintrude	P	2.1	69
● Thor	P	2.1	62
● Demeter	P	2.2	59
● Caleb	P	2.2	50
● Dolly	P	3	49
● Pericles	P	3	48
● Dido	F	F	38
● Aeneas	F	F	10

Psychometric Theory

The Classical Model

A History of Psychometric Theory

- Galton and Anthropometric Measurement
- Spearman and 'g'
- Thurstone, Likert, Guttman and Scaling
- Lord and Item Response Theory

The Psychometric Problem

$$T = X + e$$

T = True Score

X = Observed Score

e = Error

Assumptions

- Error is random
- Error is evenly distributed around zero

The Parallel Test Approach

$$X1 = T1 + e1$$

$$X2 = T2 + e2$$

$$X3 = T3 + e3$$

$$X4 = T4 + e4$$

$$X5 = T5 + e5$$

$$\text{Sum } X = T + 0$$

The Issue of Reliability

- **Consistency over time**
- **Consistency over subcomponents**
- **Consistency over judges**
- **Consistency over situations**

Estimating Reliability

- **Test Re-test Correlation**
- **Split-Half Correlation (Alpha)**
- **Inter-Judge Agreement**
- **Generalisability (ANOVA)**

Standard Error of Measurement

$$S.E. = \sigma_x(1-r_{tt})^{1/2}$$

$$True\ Score_{Deviation} = r_{tt}(x-mean_x)$$

Good Reliability

- **Depends on use of test**
- **Percentage Error**
- **Rules of Thumb**

The Problem of Validity

- **Reliability precedes Validity**
- **Content Validity**
- **Criterion Validity**
- **Construct Validity**

Transformations

- **Z Scores**
- **T Scores**
- **Sten / Stanine Scores**
- **Baseline Adjustments**

Problems with CTT

- **Systematic Error**
- **SE for test not person**
- **Based upon assumptions of normality**
- **Insensitive to profile variation**

Profile Equivalence

- 1 0 1 1 0 0 1 1 5
- 0 0 0 1 1 1 1 1 5
- 0 1 0 1 0 1 0 1 4
- 1 0 1 0 1 0 1 0 4

Item Response Theory

- **Models the probability of a specific person responding in a certain way to a specific item.**
- **The relationship between ability and probability of getting an item correct is explicitly modelled.**

Advantages of IRT

- **Some IRT Models are Cumulative**
- **The position of the person on the continua is statistically robust**
- **Item and Person S.E.s are available**
- **It is possible to tailor tests to the person**

Idiographic Measurement

A Clinical Strategy for Assessment

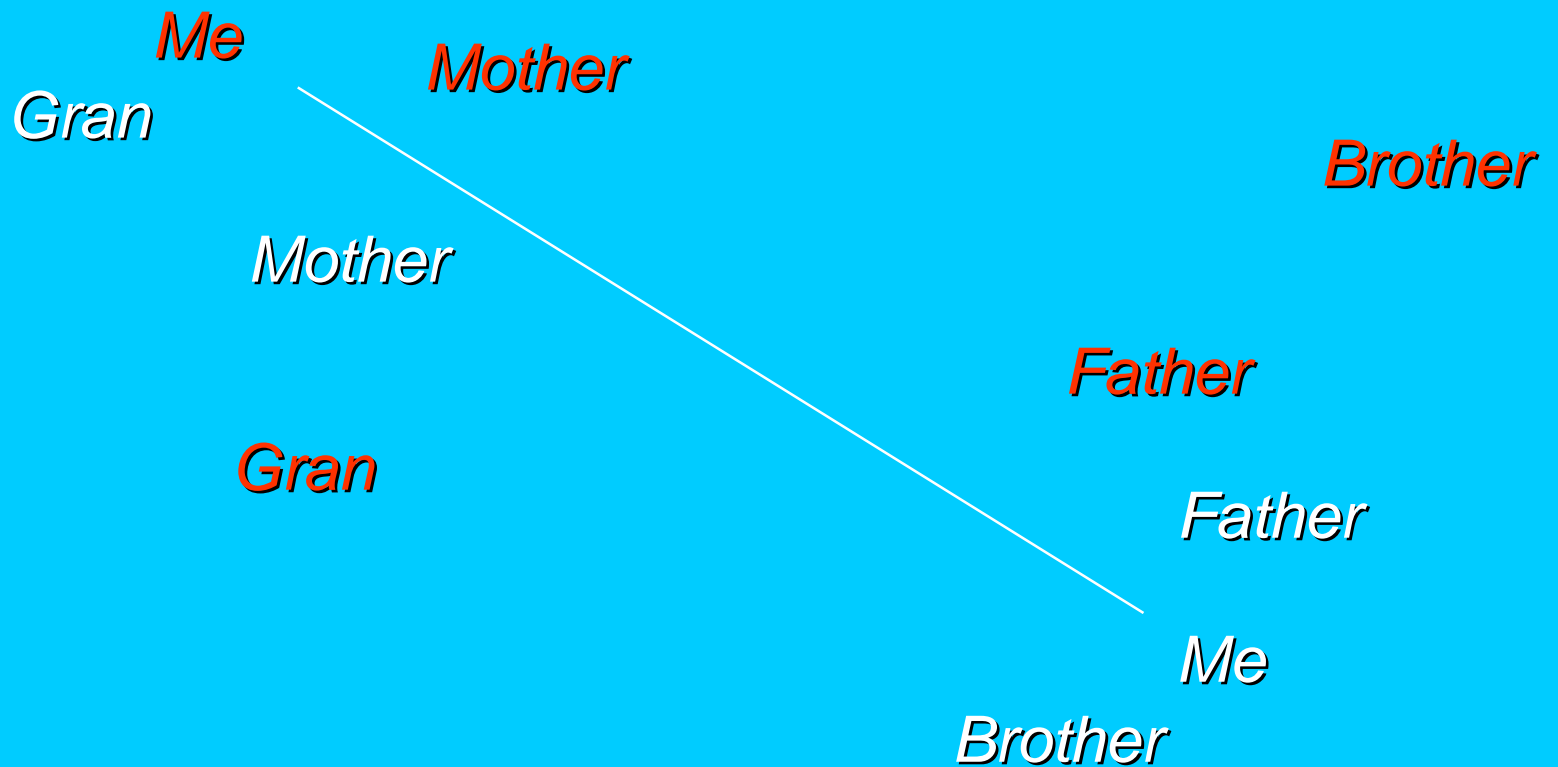
Types of Idiographic Data

- **Biography**
- **Diary**
- **Biosignal**

Structuring Idiographic Data

- **Content Analysis**
- **Repertory Grid**
- **Multiple Card Sort**

Changing Structures



Normative Structures

- **Map Idiographic Structures**
- **Identify the 'Average' Normative Structure**
- **Fit individuals to the norm**

Biosignal Measurement

- **Cortical Arousal**
- **Emotional Arousal**
- **Sexual Arousal**

The Viewing Time Paradigm

- **Correlation does not imply measurement**
- **Ipsative Measures**
- **Lack of Measurement Model**

Tests to Avoid

- **Ipsative Tests**
- **Tests without appropriate norms**
- **Tests with low reliability estimates**
- **Old tests that have not been re-evaluated in the last 10 years.**
- **Glossy, packaged tests with no psychometric details.**