

Synthesis / Review

1642

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Copyright © 2023 Michael Diehr
All Rights Reserved
For use only by students enrolled
in my sections of Psyc 402
through the end of the semester.
May not be posted, shared or uploaded
online without permission.

1643

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Synthesis / Review

- Correlation & Variance
- Race, Ethnicity, DNA & Variance
- IQ tests
- Claims and analysis of “The Bell Curve”
- Societal / Social issues

1645

Psychology 402 - Spring 2023 - Dr. Michael Diehr

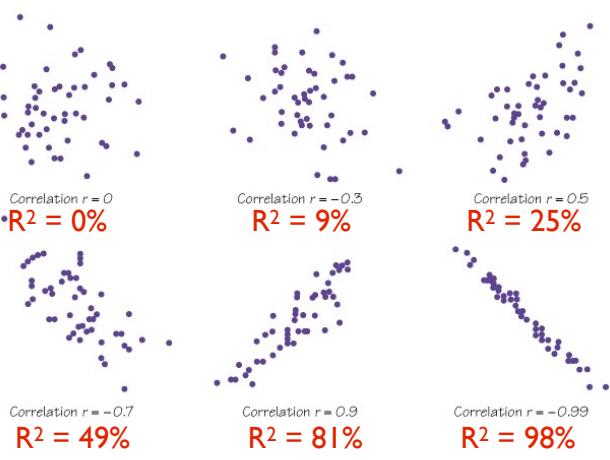
Review : correlation / variance

- Correlation expresses the strength of relationship between two variables
- but correlation is not causation

1646

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Correlations



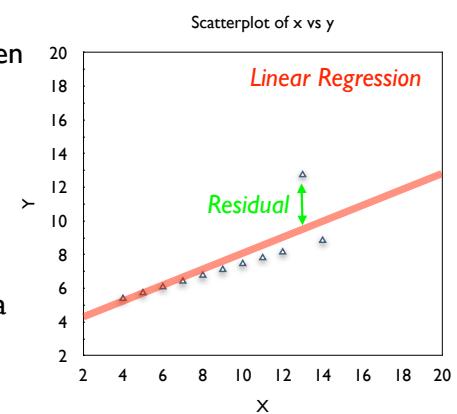
1648

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Residuals in Linear Regression

Residual is difference between actual Y and predicted Y' ($Y - Y'$)

Graphically it is equal to how far away (vertically) a point is from the linear regression line



1649

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Variance Pie Chart

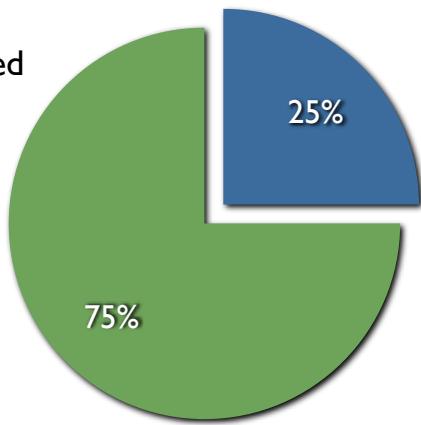
- Explained
- Unexplained

Example:

$$r = 0.50$$

$$r^2 = 0.25$$

a Large effect size.



25% explained
75% unexplained

1650

Psychology 402 - Spring 2023 - Dr. Michael Diehr

IQ testing

- IQ tests
- Reliable? Yes. ($R > 0.90$)
- Valid? Answer depends on context
- To determine validity
 - What is the Construct?
 - What are the Criterion(s)?

1651

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Race vs. DNA

- Ethnicity is a sociocultural construct
- Race is hard to define biologically
- DNA variation among humans exists, but...
 - is about 0.1% (humans are 99.9% similar genetically)
 - 85% of variance is *within* population groups
 - 15% of variance is *between* population groups
- :: the genetic variation *within* groups is much larger than the difference *between* them

1652

Psychology 402 - Spring 2023 - Dr. Michael Diehr

IQ testing

- Binet -- developed IQ test to identify low-functioning children to help.
- Assumptions:
 - Ranking or Normal / High functioning pupils?
 - Hereditary (Genetic?)
 - Mutable?

1653

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Stanford-Binet Test

- Louis Terman (American) developed Binet's test at Stanford.
- Applied a *hereditarian* framework
 - assumes IQ is
 - genetic
 - immutable
 - good for ranking individuals and groups

1654

Psychology 402 - Spring 2023 - Dr. Michael Diehr

The Bell Curve (1994)

- Herrnstein & Murray -- as criticized by Gould
- Intelligence can be quantified as a single number
- IQ can rank people (or groups) in linear order and is the *cause* of social problems (crime, disease, poverty...)
- Intelligence is genetic
- Intelligence is immutable

1655

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Intelligence : IQ as Single Number?

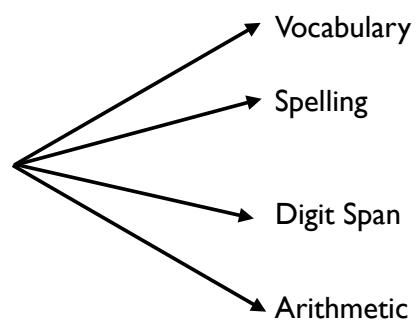
- Pro:
 - common “g” factor ($R^2 > 80\%$)
 - IQ tests give single result
 - high correlations between IQ and “success”
 - Factor analysis : “objective”
- Con:
 - “g” has been over-estimated ($R^2 < 40\%$)
 - IQ tests have multiple subtests
 - IQ measures only 3 of 8 Multiple Intelligences
 - Factor analysis : subjective

1656

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Factor Analysis

Four Tests,
showing high
correlations



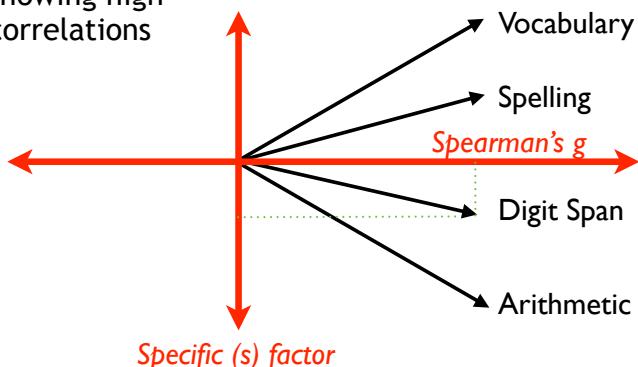
What are the
Factors?

1657

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Factor Analysis

Four Tests,
showing high
correlations

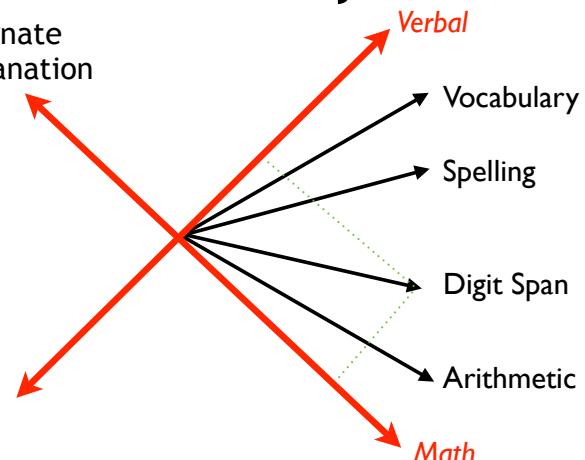


1658

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Factor Analysis

Alternate
explanation



1659

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Factor Analysis

- Patterns within correlation matrix
- Compute *Factors* which account for maximum variance
- Factors: How many? Naming them?

Correlation Matrix

Measure	Factor 1	Factor 2
Vocabulary	0.75	0.17
Spelling	0.87	0.05
Digit Span	-0.02	0.65
Arithmetic	0.10	0.91

1660

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Intelligence : Rank Groups

- Pro:
 - genetic factor within groups is high
 - cross-group factor “must be” genetic
- Con:
 - logical fallacy
 - height of villagers vs. city dwellers
 - even if group differences are genetic, R^2 (% of variance explained) is low
 - can’t predict individual behavior

1661

Psychology 402 - Spring 2023 - Dr. Michael Diehr

IQ is Genetic / Immutable

- Pro:
 - biological: cross-species genetic differences
 - genetic disorders (e.g. Down's syndrome)
 - test score differences between "Whites" & "Blacks"
- Con:
 - Flynn Effect : 30+ points in last 100 years, 15+ in last 50
 - Kendler (2015) - IQ of adopted siblings changed up to 12 points based on education of adopting parents

1662

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Real-world Issues

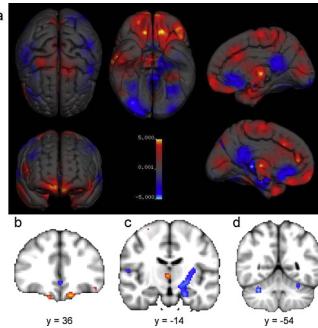
- IQ & Death Penalty
- Cuts to Childcare Spending
- College Enrollment & SAT scores
- Gender, IQ, and perceived IQ

1663

Psychology 402 - Spring 2023 - Dr. Michael Diehr

A meta-analysis of sex differences in human brain structure

They started with a set of MRIs that measured the volume of gray matter in the brains of 112 men and 169 women ages 18 to 79. On these scans, they examined 116 separate regions and zeroed in on the 10 that showed the greatest difference between men and women.



Using results from 570 participants in the Maryland Adolescent Development in Context Study, they found that only 1.8% of them scored consistently male or consistently female, compared with 59% who showed "substantial variability."

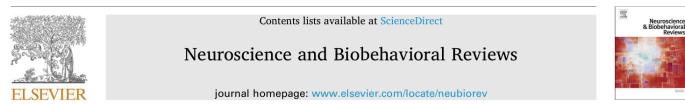
1670

Psychology 402 - Spring 2023 - Dr. Michael Diehr

No Dimorphism?

- Recent research (2021) says effect of sex/gender on brain organization is less than 1%
- Only real difference is overall size (~10%)

Neuroscience and Biobehavioral Reviews 125 (2021) 667-697



Dump the "dimorphism": Comprehensive synthesis of human brain studies reveals few male-female differences beyond size

Lise Eliot ^{a,b,*}, Adnan Ahmed ^b, Hiba Khan ^b, Julie Patel ^b

^a Department of Foundational Sciences and Humanities, Neuroscience Discipline, Rosalind Franklin University of Medicine & Science, 3333 Green Bay Rd, North Chicago, IL 60064, USA

^b Chicago Medical School, Rosalind Franklin University of Medicine & Science, 3333 Green Bay Rd, North Chicago, IL 60064, USA

10/1

Psychology 402 - Spring 2023 - Dr. Michael Diehr

Summary

- For 1000s of years, it was widely accepted that men were smarter than women.
 - denied opportunities -> lack of success
 - yet intelligence testing suggests this simply isn't true
- For 1000s of years, it was widely accepted that race ____ was superior to race ____.
 - denied opportunities -> lack of success

1673

Psychology 402 - Spring 2023 - Dr. Michael Diehr