

# Synthesis / Review

1668

Psychology 402 - Fall 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.

1669

Psychology 402 - Fall 2023 - Dr. Michael Diehr

# Synthesis / Review

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

1672

Psychology 402 - Fall 2023 - Dr. Michael Diehr

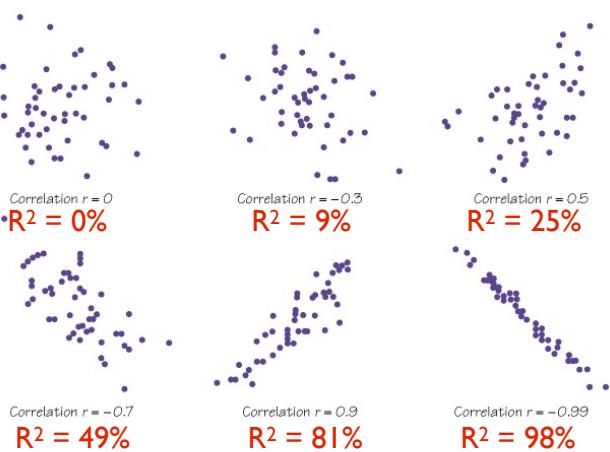
# Review : correlation / variance

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

1673

Psychology 402 - Fall 2023 - Dr. Michael Diehr

# Correlations



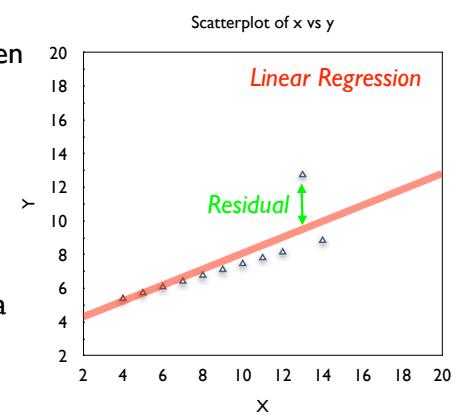
1675

Psychology 402 - Fall 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



1676

Psychology 402 - Fall 2023 - Dr. Michael Diehr

## Variance Pie Chart

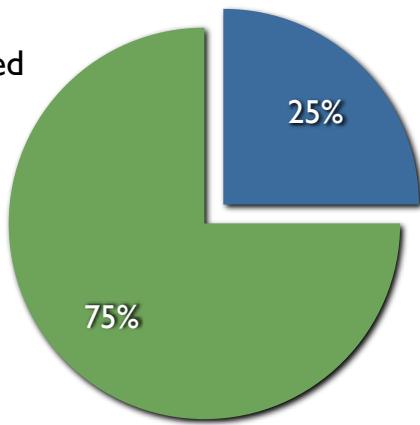
- Explained
- Unexplained

Example:

$$r = 0.50$$

$$r^2 = 0.25$$

a Large effect size.



25% explained  
75% unexplained

1677

Psychology 402 - Fall 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)?

1678

Psychology 402 - Fall 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

1679

Psychology 402 - Fall 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?

1680

Psychology 402 - Fall 2023 - Dr. Michael Diehr

## Stanford-Binet Test

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

1681

Psychology 402 - Fall 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

1682

Psychology 402 - Fall 2023 - Dr. Michael Diehr

## Intelligence : IQ as Single Number?

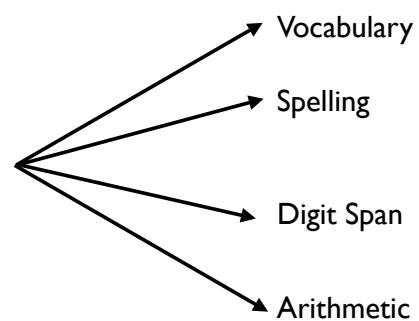
- Pro:
  - common “g” factor ( $R^2 > 80\%$  )
  - IQ tests give single result
  - high correlations between IQ and “success”
  - Factor analysis : “objective”
- Con:
  - “g” has been over-estimated ( $R^2 < 40\%$ )
  - IQ tests have multiple subtests
  - IQ measures only 3 of 8 Multiple Intelligences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

1683

Psychology 402 - Fall 2023 - Dr. Michael Diehr

## Factor Analysis

Four Tests,  
showing high  
correlations



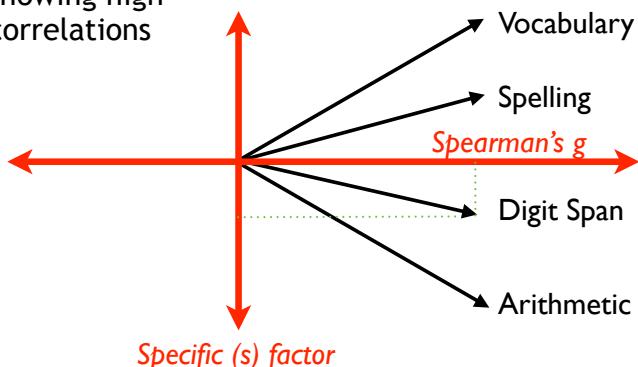
What are the  
Factors?

1684

Psychology 402 - Fall 2023 - Dr. Michael Diehr

## Factor Analysis

Four Tests,  
showing high  
correlations

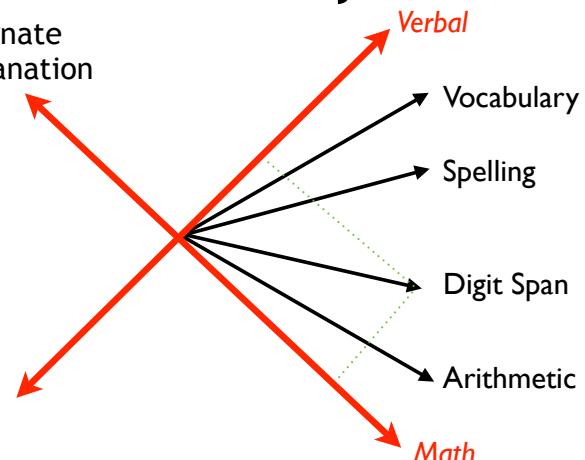


1685

Psychology 402 - Fall 2023 - Dr. Michael Diehr

## Factor Analysis

Alternate  
explanation



1686

Psychology 402 - Fall 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	<b>0.75</b>	0.17
Spelling	<b>0.87</b>	0.05
Digit Span	-0.02	<b>0.65</b>
Arithmetic	0.10	<b>0.91</b>

1687

Psychology 402 - Fall 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

1688

Psychology 402 - Fall 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

1689

Psychology 402 - Fall 2023 - Dr. Michael Diehr

## Real-world Issues

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

1690

Psychology 402 - Fall 2023 - Dr. Michael Diehr