



Lecture 8

Introduction to Correlational Designs

Introduction

- Quantitative research methods
 - measuring behaviour in numerical terms
- Quantitative approach studied so far:
 - Looking at significance of differences
 - differences between experimental groups/conditions due to variation or manipulation of independent variable (sign test, t-tests)
 - Differences between frequencies of occurrence (Chi-squared)

Introduction

- Sometimes in quantitative research, we are not necessarily concerned with investigating differences
- Correlational studies
 - also quantitative in nature
 - concerned with the relationship between two variables
 - not concerned with cause-and-effect relationships

Correlational designs

- Questions in correlational research
 - is there a consistent relationship between two variables?
 - how can this relationship be described?
 - how strong is this relationship?
 - is the relationship statistically significant?

Example of Correlation

Is there an association between:

- Children's IQ and Parents' IQ
- Urban growth and air quality violations?
- Number of police patrol and number of crime
- Grade on exam and time on exam
- Education level and salary
- Number of friends and happiness

Example

- The relationship between children's playfulness and level of involvement in a task
 - children measured on two variables:
 - Test of playfulness
 - Test of involvement while performing specific task
 - research question:
 - do children who have high playfulness scores tend to have higher involvement scores?
 - Concerned with the relationship between scores on the two variables

Example

Child	Playfulness	Involvement
1	16	11
2	20	12
3	10	7
4	12	6
5	18	10
6	10	5
7	15	8
8	8	6
9	17	9
10	13	6

Example

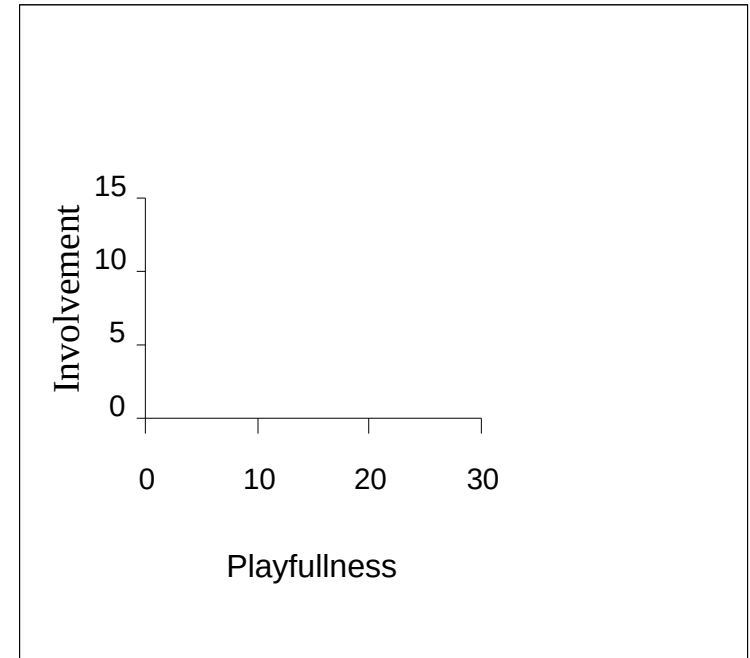
- This is a correlational design
 - not concerned with differences
 - Important:
 - no independent or dependent variables
 - not aiming to make a cause and effect connection between the two variables

Investigating the correlation

- Is there a consistent relationship, and how can it be described?
 - First, obtain descriptive information
 - in the case of correlational designs, we obtain a scatterplot

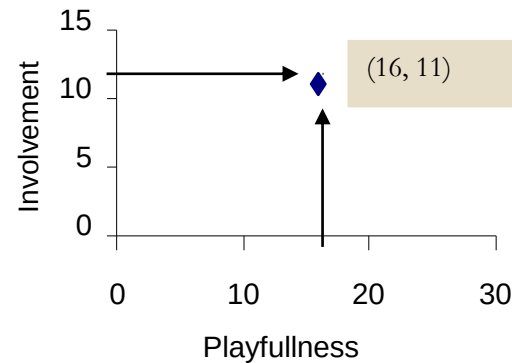
Investigating the correlation

- Consists of a horizontal (x) axis and a vertical (y) axis
- plot scores from one variable along x-axis, scores from other along y-axis
 - in this case, playfulness scores plotted along x-axis, involvement scores plotted along y-axis



Investigating the correlation

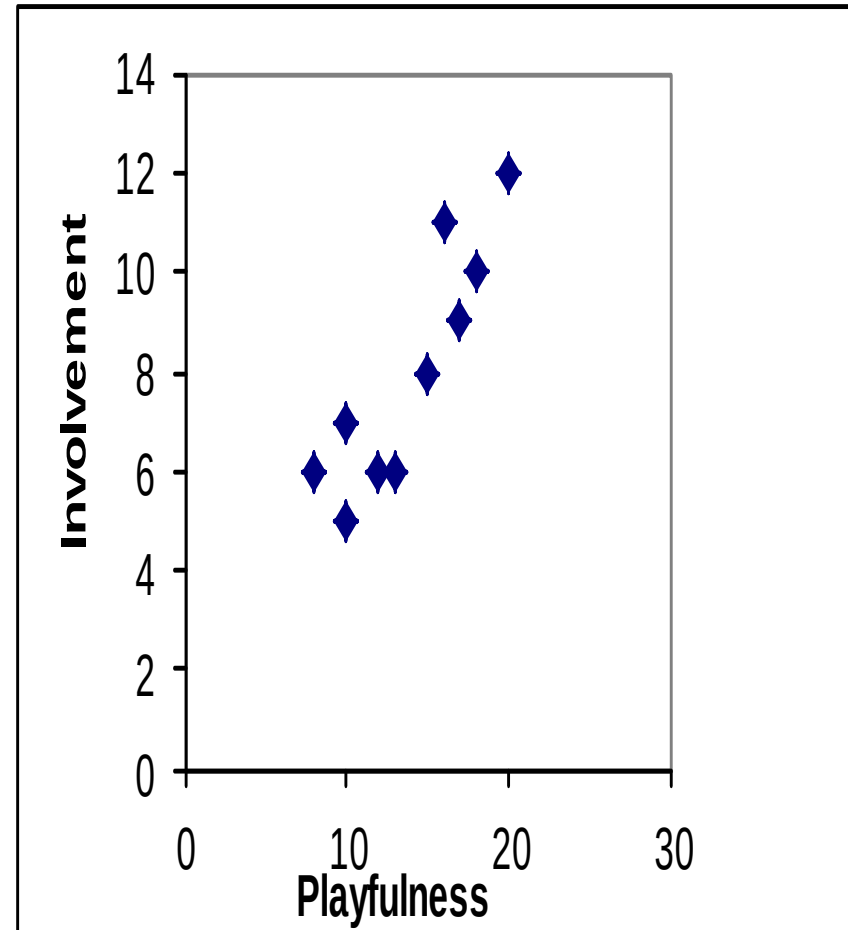
- Take each participant's pair of scores
 - where they intersect on the graph, place a dot.
 - do this for each pair of scores
 - So to plot first pair of scores (playfulness score = 16, involvement score = 11)



Finished scatterplot

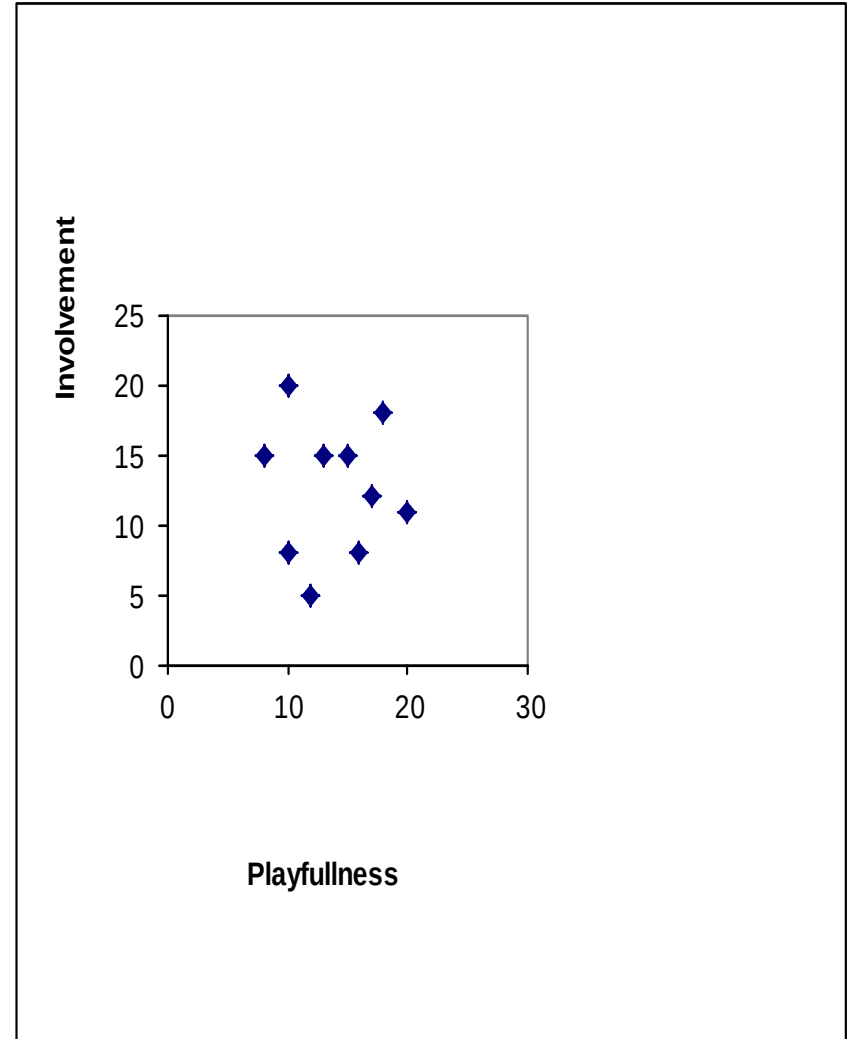
► Pattern

- points scattered in an 'upward' direction
- in general, the higher the playfulness score, the higher the involvement score.
- This is an example of a **POSITIVE** correlation



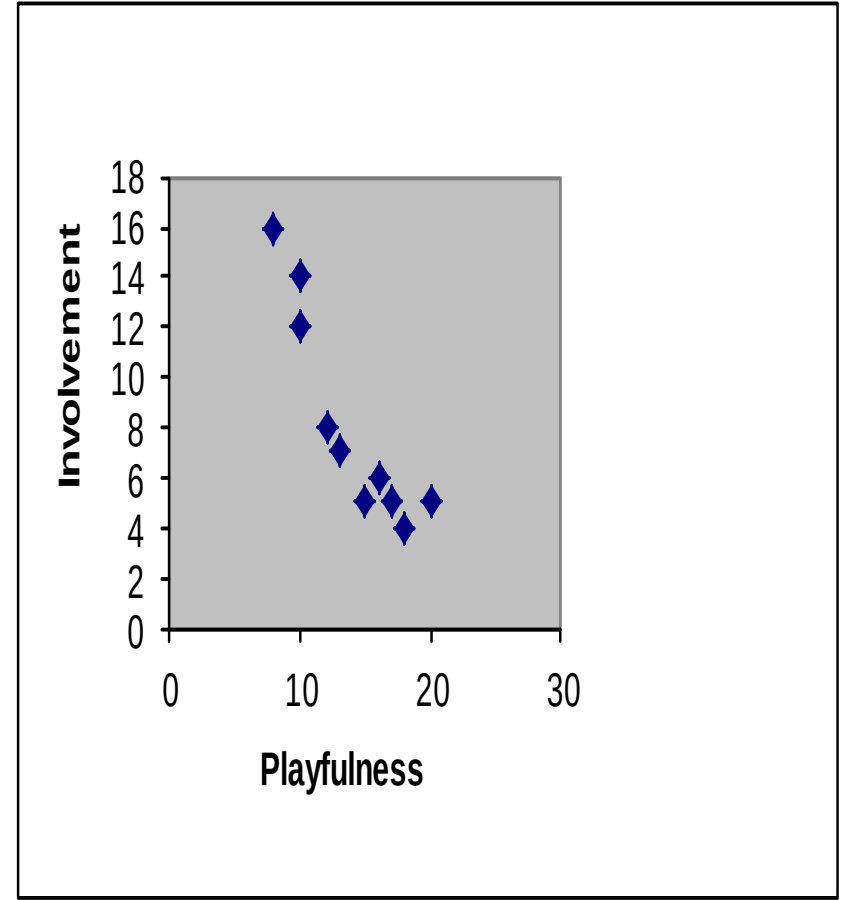
Other possible results

- No clear pattern in scatterplot
 - indicates no consistent relationship between the two variables
 - this is an example of a ZERO correlation



Other possible results

- Points scattered in a 'downward' direction
 - High involvement scores associated with low playfulness scores
 - this is an example of a **NEGATIVE** correlation



Investigate strength of correlation

- Scatterplot helps us to establish the direction
- Next we investigate the strength of the correlation
 - to a certain extent, the scatterplot informs us about this
 - the stronger the relationship, the closer the dots come to forming a straight line

Investigate strength of correlation

- However a numerical description of strength is more precise
- To do this we calculate a correlation coefficient
 - numerical measure of strength
 - ranges from -1 (perfect negative) through 0 (no correlation) to +1 (perfect positive)
 - closer the value to -/+ 1, the stronger the correlation

Investigate strength of correlation

- Types of correlation coefficients
 - Kendall's Tau
 - Spearman Rank correlation (ρ)
 - Pearson product moment correlation
- Pearson correlation most commonly used measure.
 - Can be done using SPSS
 - Gives us a correlation coefficient and allows us to test the significance of the correlation

Testing the significance

- A significant correlation
 - one that is unlikely to have occurred due to chance factors
 - Likely to be a correlation that exists in the wider population
- Predictions about correlations can be
 - one-tailed
 - predicting direction of correlation
 - two-tailed
 - simply predicting a significant correlation.

Strength of the relationship

- Cohen (1988) – recommends the following values of r

- | | | |
|-------------------|-------------|------------------|
| • Small/weak | .10 to .29 | (-.29 to -.10) |
| • Medium/moderate | .30 to .49 | (-.49 to -.30) |
| • Large/strong | .50 to 1.00 | (- 1.00 to -.50) |

Now...

- Using the SPSS correlation guide, obtain a scatterplot and a Pearson correlation coefficient using the data on playfulness and involvement.

Pearson correlation on SPSS

The output

- Correlation coefficient of .882
 - Indicates a strong positive correlation
- The 'sig' value
 - If less than .05, correlation is significant
 - As our value is .000, we can conclude that the correlation between playfulness and task involvement is significant.

Correlations		Playfulness	Involvement
Playfulness	Pearson Correlation	1.000	.882**
	Sig. (1-tailed)		.000
	N	10.000	10
Involvement	Pearson Correlation	.882**	1.000
	Sig. (1-tailed)	.000	
	N	10	10.000

** . Correlation is significant at the 0.01 level (1-tailed).

Interpreting the result

- We have observed a significant correlation between playfulness and problem solving
- What can this mean?
 - Possibilities
 - causal relationship between the two variables
 - correlation may be caused by shared relationship with a third variable (e.g. intelligence)

Interpreting the result

- Deciding between these explanations
 - technique of partial correlation
 - allows us to work out effects of third variable on correlation
 - Multiple regression
 - Allows us to work out if playfulness makes a unique contribution to predicting involvement scores
 - further (preferably experimental) research
- Important to remember that we can never make cause and effect conclusions on the basis of a simple correlation on its own.

Next...

- Look at the example in the correlation and regression practice handout
 - Data on playfulness and extraversion in trainee play therapists
 - Investigate the correlation between these two variables
 - Obtain scatterplot and correlation coefficient