

## Lecture 11

### Empirical Research Methods IN4304

#### interim Exam training

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## Previous lecture

### Common feature

- Codes, Memos, Finding patterns & themes, Analysis feeds in next data cycle, Focus small set generalisation, and Generalisation to theory

### Research question

- Perception / experience
- Concept underlie phenomenon for people
- Study theory about reported experience

**Setup** Case study analysis, grounded theory analysis, content analysis and interpretative phenomenological analysis

### Dealing with validity threats

- Prolonged involvement
- Triangulation
- Peer debriefing/support
- Member checking
- Negative case analysis
- Audit trail

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## Today

- Exam procedure
- Examples interim exam questions

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## Learning outcomes of this lecture

After today's lecture you should be able to:

- Describe the set up of the interim exam
- Explain the format of answering an interim exam question

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## Set up of the interim exam

- Scheduled in week 4.11, Monday 28/06/2010 14:00 – 17:00 IO-Bernd Schierbeek (Please check this yourself as I am not sure whether this might change)
- Closed book, no calculator is allowed (or needed).
- 10 Questions, max score on each question is 10 points
- Exam mainly focuses on the following learning outcomes:
  1. Recognise and begin to utilise appropriate strategies for carrying out empirical research for answering research questions
  2. Appreciate how empirical research is conducted and findings can be evaluated
  3. Understand key principles underlying statistical data analysis
- Interim exam counts towards 70% of the overall mark
- An overall pass mark can only be obtained if a pass mark has been obtained for both the individual exam and the group coursework project.

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## How to answer question

- Clearly indicate Question Number!!
- Written in full sentences (not just key words, or bullet points)
- Provide full argumentation
- Make sure you address all elements in a question
- Make sure not to dump information in the hope that the right answer is somewhere included. Irrelevant or wrong answer information will have negative impact on the mark

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## Question 1

- Explain the difference between Rationalism and Empiricism.

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## Question 1 - Answer

### Rationalism

- Knowledge is established from (intellectual and deductive) reasoning
- Independent of experience taking Mathematics as example aims at establishing universal systems

### Empiricism

- Knowledge is derived from experiences (Inductive reasoning from fact to axiom to laws)
- Don't believe knowledge can be obtained from innate "truths" (intuition)
- Theories must be tested with observations

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## Question 2

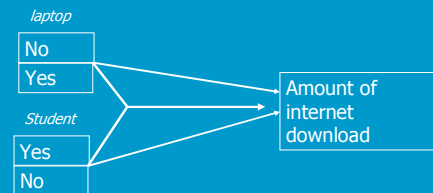
- Draw a conceptual model that would adequately illustrate the following research questions: *Does having a laptop, or being a university student, or combination of these two have an effect on the amount of data a person downloads from the Internet?*

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## Question 2 - Answer



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## Question 3

- In his book Robson mentions several threats to **internal** validity when discussing fixed designs. Explain how a Post-test-only randomized controlled trial design addresses the validity issues of history, selection, instrumentation and testing.

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## Question 3 – Answer (A)



Potential threats to internal validity can be ruled out: history, selection, instrumentation, and testing.

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### Question 3 – Answer (B)

#### Internal Validity

- **History** : Things that have changed in the participants' environment other than caused by independent variable – both groups are exposed to same environment
- **Selection Bias**: Participants will not form equivalent groups – participants are randomly assigned to groups so unlikely to have systematically different groups
- **Instrumentation**: Change caused by difference in measurement instrumentation between pre-test and post-test – no pre-test included
- **Testing**: Changing caused by pre-test – no pre-test included

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### Question 4

- Give an example of a question and an answer scale for each of the following scales of measurement: nominal, ordinal and interval scale, and explain the difference between these scales of measurement.

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### Question 4 - Answer

- Nominal; What is your gender?  
O Male  
O Female  
No continuous order in answer categories
- Ordinal; How much experience do you in speaking Russian?  
O not at all  
O a little bit  
O some experience  
O reasonably well  
O extensively  
Continuous order in answer categories
- Interval; How old are you?  
..... years  
Equal distance between answer categories

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### Question 5

- Explain the concept of inter-observer agreement and how this can be analysed.

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### Question 5 - Answer

- Inter-observer agreement: extent to which two or more observers obtain the same results when measuring the same behaviour
- Observation scale:
  - Interval : Pearson Correlation
  - Ordinal : Spearman Correlation
  - Nominal : Cohen's Kappa

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### Question 6

- Explain the statistical term outliers. Next explain different approaches for dealing with outliers.

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## Question 6 - Answer

- A case whose value is very different from most others
- Can bias statistics such as mean
- Option to consider when dealing with outliers?
  - Exclude them
  - Investigate them
  - Include them in the analysis

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## Question 7

- Explain the ideas behind statistical hypothesis testing. Also explain the terms null hypothesis, alternative hypothesis and p-value. Given an alpha level of 0.05, explain what conclusions can be drawn from:
  - a p-value < alpha
  - a p-value > alpha

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## Question 7 – Answer (A)



- Is the difference between two samples a reflection of the difference of two different populations or simply caused by sampling error?

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## Question 7 – Answer (B)

- **Null hypothesis:** observed difference in sample is caused by sampling error and when considering the whole population there is no difference
- **Alternative hypothesis:** observed difference in sample is a real effect plus some change variation
- **p-value:** if null hypothesis is true, than what is the probability of observing a difference at least as extreme as the one observed in the sample?
- Social Science:  $p < 0.05$  supports rejection of Null hypothesis

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## Question 7 – Answer (C) Interpreting p-value

- **p-value:** if null hypothesis is true, than what is the probability of observing a difference at least as extreme as the one observed in the sample?
- $p < 0.05$  -> reject  $H_0$
- $p > 0.05$ 
  1. Inconclusive
  2. Or if there are no methodological problems, argue based on power analysis that the real difference can not be very large

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## Question 8

An IT company has conducted a survey under its customers to investigate their satisfaction towards their latest product X and possible points they can focus on to improve this product. From their customers they collected the following data:

- Satisfaction towards product X (score on scale from 1 to 100, with 1 very low satisfaction and 100 very high satisfaction)
- Satisfaction with support (score on scale from 1 to 100, with 1 very low, and 100 very high satisfaction)
- Perceived Usability of product X (score on scale from 1 to 100, with 1 very low and 100 very high usability)
- Ability to integrate product X with other software that the customer uses (score on scale from 1 to 100, with 1 very low and 100 very high ability to integrate the product)

Describe an appropriate statistical approach the company can use to analyse the factors that explain their customers' satisfaction of product X. What are the relevant indicators that this analysis will produce, and explain how these indicators should be interpreted.

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### Question 8 - Answer

- Multiple Linear Regression analysis might be appropriate as both the dependent variable (Satisfaction towards product X) and the independent variables can be expressed on an interval level. To create an effective model to explain the variance the analysis might be conducted with a stepwise selection method.
- Indicators to consider
  - **R** - correlation between predicted and observed
  - **R<sup>2</sup>** - Coefficient of Determination shows the proportion of variation in the dependent variable that can be explained by the model
  - **Adj. R<sup>2</sup>** - Corrected for the number of Independent variables
  - **Std Error of the Estimate** – the accuracy of the prediction
  - p-value of the mode in ANOVA – significant difference between model with multiple parameters and model with only a constant.
  - **B, Beta values, and p-value of the parameters** – effect of individual parameter and dependent variable.

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### Question 9

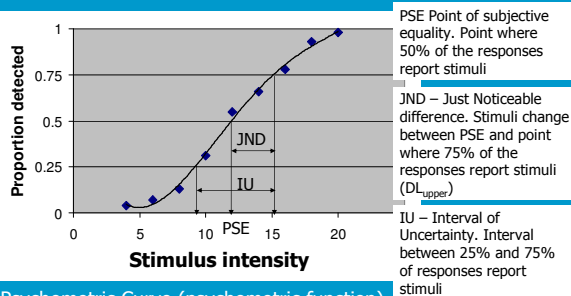
- Draw a Psychometric Curve (i.e. psychometric function) and use the graph to explain the terms: Point of Subjective Equality (PSE), Just Noticeable Difference (JND), and Interval of Uncertainty.

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### Question 9 – Answer



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### Question 10

- In his book Robson lists 6 strategies for dealing with threats to validity for flexible designs. Name them and explain their effect on potential Researcher bias.

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### Question 10 – Answer

- **Prolonged involvement**; extent the period over which data is collected (increase threats to Researcher bias)
- **Triangulation**; employing more than one perspective, theory, participant, data set, method, or analysis. (reduces threats to researcher bias)
- **Peer debriefing/support**; let peers review your approach and interpretation. (reduces threats to researcher bias)
- **Member checking**; ask participant to review your material (reduces threats to researcher bias)
- **Negative case analysis**; searching for cases that would disconfirm your theory (reduces threats to researcher bias)
- **Audit trail**; keep full record of your research activities. (reduces threats to researcher bias)

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### Old Intern Exam

- Exam and Marking scheme from 17 June 2009 and 26 Aug 2009 are on BB

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## Practicum

- Deadline of handing in coursework 11/6/2010
- Each group should submit 1 report on Blackboard
- Don't forget to include names and student ID numbers
  
- Also have look at the evaluation forms on BB

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## Final Remark

**Good Luck with your revisions  
and the interim exams**

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## References

- Robson, C., (2002) *Real world research: A resource for social scientists and practitioner-researchers* (2<sup>nd</sup> ed). Malden: MA, Blackwell.

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