Lecture 2

**Empirical Research Methods
IN4304**

Research plan

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Previous lecture

- **Focus** on empirical research methods and obtain practical experience with quantitative data analysis methods
- **Assessment**: Written exam and coursework
- All details about module can be found in **syllabus** on blackboard

- **Rationalism**: Knowledge is established from reasoning
- **Empiricism**: knowledge is established from experiences
- **Positivism**: Use deductive logic and empirical observation in searching causal laws
- **Alternative scientific approaches**: can not apply natural science methods to study humans

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Today

- General information about the module
  - Research Plan
  - Research Question
  - Type of research

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Learning outcomes of lecture 2

After today's lecture you should :
- have a better understanding of what constitutes a research plan
- be able to formulate a research question
- be able to make a conceptual model
- know different types of research

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Class question

- What could be the phases in a research cycle?

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The Research Cycle

Research project
plan → implement → Analyse results → Write report

Met research aim?
no / yes

abandon

Findings addition to current knowledge?
yes

Ethics committee

Check and/or modify research and re-run

funding

Modification of/ support theory

no

Submit for publication

review

publish

Research proposal

Develop aims research

Event in world

Research word

(Coolican, 2004, p.18)

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Type of research

From the view of

Application
- Pure research
- Applied research

Objectives
- Descriptive research
- Exploratory research
- Correlation research
- Explanatory research

Inquiry mode
- Quantitative research / Fixed design / Structured
- Qualitative research / Flexible design / unstructured

(Kumar, 2005, p.9)

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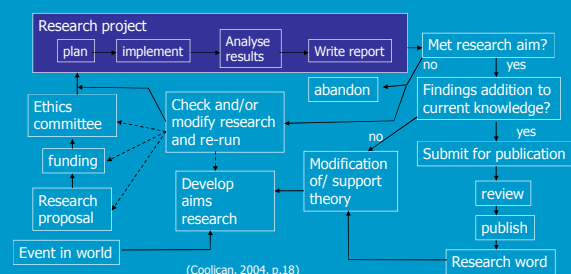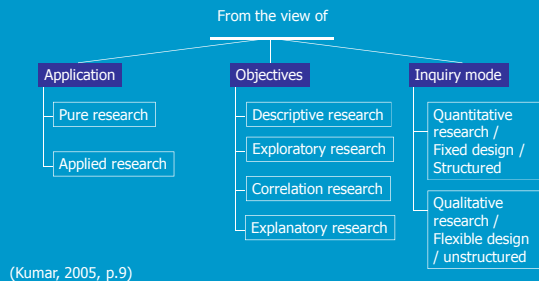
Class Questions

- What factors can influence your research question?

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Research Question - framework
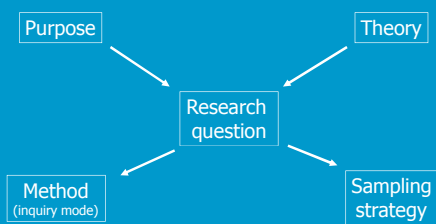
Purpose

Theory

Research question

Method (inquiry mode)

Sampling strategy

(Robson, 2002, p.82)

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Successful and unsuccessful research

Successful research
- Activity and involvement
- Convergence
- Intuition
- Theory
- Real world value

Unsuccessful research
- Expedience
- Method or technique
- Motivation by publication, money or funding
- Lack of theory

Features considered by research to characterize antecedents of their successful and unsuccessful research

(Robson, 2002)

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Criteria for good research questions

- Clear
- Specific
- Answerable
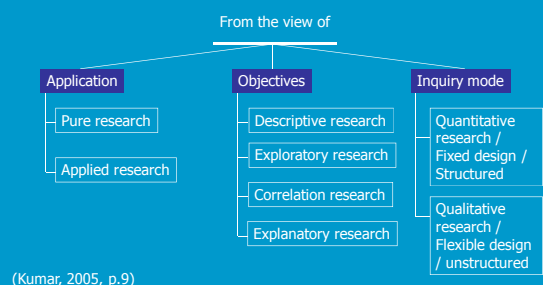- Interconnected
- Substantively relevant

(Robson, 2002)

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Type of research

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(Kumar, 2005, p.9)

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Purpose of enquiry – Descriptive research

- To portray an accurate profile of person, event or situations
- Requires extensive previous knowledge of the situation etc to be researched or described, to know appropriate aspects on which to gather information
- May be of flexible and/or fixed design

- *What is the attitude of phobic patients towards VR treatment?*

<div align="right">(Robson, 2002)</div>

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Purpose of enquiry – Exploratory research

To find out what is happening, e.g. in little understood situation
- To seek new insights
- To ask questions
- To assess phenomena in new light
- To generate ideas and hypotheses for future research
- Almost exclusively of flexible design
- *What is the experience of teenage users playing computer games?*

<div align="right">(Robson, 2002)</div>

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Purpose of enquiry – Correlational research

- To discover or establish the existence of a relationship/association/interdependence between two or more aspects of a situation (Kumar, 2005)

- *What is the relationship between programmers' mood and their programming performance?*

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Purpose of enquiry – Explanatory research

- Seeks an explanation of the situation or problem, traditionally but not necessarily in the form of causal relationships
- To explain patterns relating to the phenomenon being researched
- To identify between aspects of the phenomenon
- May be of flexible and/or fixed design

- *Do content sensitive image compression technique improve perceived image quality?*

<div align="right">(Robson, 2002)</div>

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Developing the research question

- Know the area
- Widen the base of your experience
- Avoid the pitfalls
  - Allowing a pre-decision on method to determine the question
  - Questions that can not be answered satisfactory
  - Questions that already have been answered
  - Normative Questions
  - Policy questions (value based questions)
- Focus
- Consider the purpose the research

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Formulating a research question (1)

- Should end with a question mark
- Distinction between:
  - Frequency (descriptive) questions
    - *How often do programmers take a break?*
    - *What are reasons for programmers to take a break?*
  - Difference questions
    - *Compared to computer artists, do programmers use computers for longer continuous intervals?*
  - Relationship questions
    - *Is there a relationship between the image quality of the focus of attention and the perceived overall quality of image?*

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Formulating a research question (2)

Important element to recognise in question:
- Property of the element which can **vary** between elements of the population
- Unit (the elements of the population)

Professional programmers' attitude towards mood support software.

     Unit   property

- Situation and/or environment (e.g. when debugging, at the office, when working in groups)

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Class Question

Write down:
- Frequency/descriptive research questions
- Difference research questions
- Relationship research questions

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Some examples of frequency research questions (Descriptive research)

- How usable do users find application X?
- How sociable are facebook users?
- How often do network servers crash?
- What are user's views on 3D TV?

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Some examples of Difference research questions

- Is there difference between male and female users in time spend online?
- Has culture an effect on a person's preference of web page design?
- Has effectiveness of recognising emotion using computer face recognition technique influence by type of emotion expressed in the face?

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Some examples of Relationship research questions

- Is there a relationship between perceived usability of system X and computer skills of the user?
- Does an increase in perceived image quality coincide with an increase in compression time?
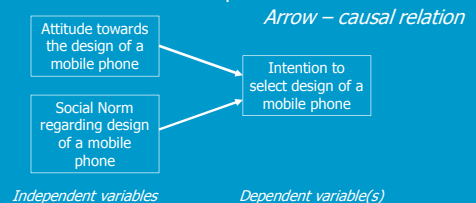- Has the degree of presence a positive effect on effectiveness of VR treatment?

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Conceptual Models (1)

- Illustrate in a figure the research question by showing the relation between concepts

Arrow – causal relation

Attitude towards the design of a mobile phone

Social Norm regarding design of a mobile phone

Intention to select design of a mobile phone

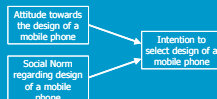*Independent variables*   *Dependent variable(s)*

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Conceptual Models – independent and dependent variables

- **Independent variable** – the cause supposed to be responsible for bringing about change(s) in the phenomenon or situation
- **Dependent variable** – the outcome of the change(s) brought about by introduction of an independent variable

Attitude towards the design of a mobile phone

Social Norm regarding design of a mobile phone

Intention to select design of a mobile phone

(Kumar, 2005)

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Conceptual Models (2) – Intervening variable

- Intervening variable links the independent and dependent variable

Display type

HMD / Monitor → Presence → Effectiveness VR treatment

Independent variables   Intervening variable   Dependent variable(s)

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Conceptual Models (2) – Extraneous variable

- Extraneous variable: factors that might influence the strength of the relationship. (factor might not be direct focus in the study).

Display type

HMD / Monitor → Effectiveness VR treatment

Gaming experience

Independent variables   Extraneous variable   Dependent variable(s)

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Class Question

- Construct a conceptual model for the following research question:

- Does gender, or having a university degree or combination of this have an effect on the users' attitude towards using decision aid tools?
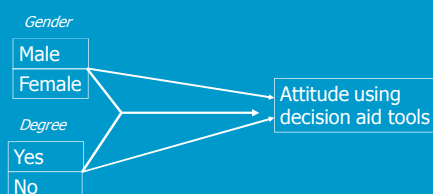
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Class Question - solution

Does gender, or having a university degree or combination of this have an effect on the users' attitude towards using decision aid tools?

Gender

Male / Female

Degree

Yes / No

→ Attitude using decision aid tools

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Inquiry mode – Fixed design research strategies

- **Experimental strategy**
  - Experimenter can manipulate/control the independent variable and observe the effect on the dependent variable
- **Non-experimental strategy**
  - Experimenter does not attempt to manipulate independent variable

Typical features
- Selection of samples of individuals from known population
- Allocation of sample to different experimental conditions
- Measure on small number of variables
- Control of other variables
- May or may not involve hypothesis testing

(Robson, 2002)

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Inquiry mode – flexible design research strategies

- **Case study –** Development of detailed, intensive knowledge about a single 'case', or of a small number of related 'cases'

- **Ethnographic study –** Seeks to capture, interpret and explain how a group, organisation, or community live, experience and make sense of their lives and their world

- **Grounded theory study –** The central aim is to generate theory from data collected during the study

(Robson, 2002)

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Summary

A research plan
- Consider: purpose, theory, research question, mode inquiry, sampling method

Research question
- Descriptive/ Difference/ Relationship
- Properties, Unit

Conceptual model
- Causal relationship
- Independent, dependent variable

Type of research
- Explorative
- Descriptive
- Explanatory
- Correlational

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This week in practicum

Week 3.2 Research plan·
- Working on project coursework on setting up research plan

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Next time

Week 3.3 Experimental design
- **Biases·**
- **Within/between subject design**
- **Counter-balancing, Latin Square**
- **Sampling method·**
- **Sample size**
- **(Robson ch. 5)**

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References

- Coolican, H., (2004). *Research methods and statistics in psychology* (4th ed). London, UK: Hodder Arnold.
- Kumar, R. (2005). Research Methodology; A step-by-step guide for beginners (2nd ed). London, UK: SAGE.
- Robson, C., (2002) *Real world research: A resource for social scientists and practitioner-researchers* (2nd ed). Malden: MA, Blackwell.

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