Quantitative methods

Week #2-3

Gergely Daróczi

Corvinus University of Budapest, Hungary

15 February 2013



◆□▶ ◆□▶ ◆三▶ ◆三▶ ○□ ○○○

Outline

Validity and Reliability

2 Stages of Social Research

3 Formulation of the Research Problem

- Possible goals of research
- Units of analysis
- Ecological fallacy

4 Preparation of Research Design

- Conceptualization
- Operationalization

Survey design

Measuring the temperature of a bowl of water kept at 60°C



On the target



Source: customerthink.com

Gergely Daróczi (BCE)

Quantitative methods, 2-3/13

15/2/2013 4 / 51

표 🖌 🔺 표

On the target



э

In social context

We measured the height of 10 students:



In social context



Source: http://www.wallpaperhere.com/

Stages of Social Research

A flowchart



A how-to: reliable & valid research

Which of the followings would make a good topic for research?

- How many homeless people lives in Budapest?
- What is the most popular way of suicide?
- What color is a banana?

Possible goals of research

Example of topics seeming meanless

A simple time series analysis:



Possible goals of research

Example of topics seeming meanless



Source: http://blog.xkcd.com/2010/05/03/

color-survey-results/

A how-to: reliable & valid research

Which of the followings would make a good topic for research?

- How many homeless people lives in Budapest?
- What is the most popular way of suicide?
- What colour is a banana?
- How much does a pile of apples cost?
- What kind of relationship can be found between bodyweight and hair-colour?
- Which is the best book in the world?

What could be the main factors of choosing a topic?

Definition: exploratory vs. descriptive vs. explanatory study

What entities are described and compared below?

- Are older people more afraid of crime than younger people?
- Does economic development lower the birth rate?
- Which Hungarian soccer team has the utmost fan club?
- The longer the engagement period, the longer the marriage.
- What is the most prestigious occupation?

Do we always ask the units of analysis?

We found, that 2 million tourists arrived to Budapest in 2010. It was also known, that 2.5 million tourists visited the lake Balaton in the same year.

Could we state that ...

- the inhabitants of Budapest are not as friendly as people living at the lake Balaton?
- Budapest has less spectacle than the lake Balaton?
- the lake is a bigger tourist goal?
- more tourists visited the lake Balaton?
- tourists think that lake Balaton is a lot nicer place than Budapest?
- the beach of Balaton is lot more crowded than the streets of Budapest?

What can be said based on the above data?

A classical example

Emile Durkheim (1897): Le Suicide

- Suicide rates are higher in men than women.
- Suicide rates are higher for those who are single than those who are married.
- Suicide rates are higher for people without children than people with children.
- Suicide rates are higher among Protestants than Catholics and Jews.
- Suicide rates are higher among soldiers than civilians.



A classical example

Emile Durkheim (1897): Le Suicide

- Suicide rates are higher in men than women.
- Suicide rates are higher for those who are single than those who are married.
- Suicide rates are higher for people without children than people with children.
- Suicide rates are higher among Protestants than Catholics and Jews.
- Suicide rates are higher among soldiers than civilians.

Definition

The ecological fallacy occurs when you make conclusions about individuals based only on analyses of group data.



Preparation of Research Design

Conceptualization and Operationalization



Preparation of Research Design

Conceptualization and Operationalization

Conceptualization:

Definition

Conceptual definition is the process of formulating and clarifying concepts.



Operationalization:

Definition

Operational definition describes the research operations that will specify the value or category of a variable on each case.

< ロ ト < 同

A catchy example

Let us make a research about Friendship!

▶ < 토 ▶ < 토</p>

A catchy example

Let us make a research about Friendship!

- "Friends have all things in common." (Plato)
- "Misfortune shows those who are not really friends." (Aristotle)
- "What is a friend? A single soul in two bodies." (Aristotle)
- "A friend to all is a friend to none." (Aristotle)
- "One loyal friend is worth ten thousand relatives." (Euripides)
- "My best friend is the one who brings out the best in me." (H. Ford)
- "In a friend you find a second self." (Isabelle Norton)
- "A friend should be a master at guessing and keeping still." (Nietzsche)

A catchy example (continued)

Do you have a best friend?

- Yes, I have one or two best friends with whom I share almost everything.
- Yes, I have several friends whom I consider tobe my best friend.
- No, I don't have a best friend.

Why do we need a friend?

- We need someone to confide into.
- We need someone who can listen to all our tantrums.
- We need someone with whom we can have fun.
- All of the above.
- We don't really need friends.

Source: http://www.samplequestionnaire.com/mcgill-friendship-questionnaire.html

Variables and attributes: an example

How old are you?

- < 18
- 19-24
- 25-30
- 31 40
- 41-100
- 100 <

What is variable and what is attribute in the above example?

▶ < 토 ▶ < 토

Variables and attributes: about question types

Research topics:

- Are older people more afraid of crime than younger people?
- Does economic development lower the birth rate?
- Which Hungarian soccer team has the utmost fan club?
- The longer the engagement period, the longer the marriage.
- What is the most prestigious occupation?

What is variable and what is attribute in the above example?

Types of variables and attributes

Types of variables

- explanatory variables
 - dependent variables
 - qualitative variables
 - quantitative variables
 - independent variables
 - qualitative variables
 - quantitative variables
- extraneous variables
 - control variables
 - other variables

Let's make up some examples based on the above list!

A visual example



Gergely Daróczi (BCE)

15/2/2013 19 / 51

A visual example



A visual example



ggplot(diamonds, aes(clarity, fill=cut)) + geom_bar() + ylab("N") + theme_bw() + opts(title="53.940 diamonds")

E ■ ● Q C 15/2/2013 21 / 51

A visual example



53.940 diamonds

gqplot(diamonds, aes(clarity)) + geom_bar() + ylab("N") + facet_wrap(~ cut) + theme bw() + opts(title="53.940 diamonds")

▶ < 글 ▶ < 글 ▶</p>

< 口 > < 🗇

Levels of Measurement

Qualitative variables:

- Nominal: exhaustive labels with no intersect (mutual exlcusivity) not in a specific order
- Ordinal: an (possible) ordered variable with exhaustive labels not intersecting

	Nominal	Ordinal	Interval	Ratio
Classification	Х	Х	Х	х
Rank order		Х	Х	Х
Equal intervals			Х	Х
Nonarbitrary zero				Х

Quantitative variables:

- Interval: equal distances between the ordered labels (numbers)
- Ratio: a scale with a zero point

Levels of Measurement: examples

Determine the level of measurement of the following variables!

- Gender
- Education
- Salary
- o IQ
- Scholastic record
- Place of birth
- Favourite colour

< ≣ > <

Respondets have to ...

- comprehend the literal and indended meaning of the question,
- retreive the information requested from memory,
- formulate a response in accord with the question and the information retrieved,
- communicate a response deemed appropriate.

Source: Singleton-Stairs (1999: 280)



Purposes of choosing:

- open-ended (free-response) or
- Iclosed-ended (fixed-choice) questions.

Advantages and disadvantages of:

- direct and
- indirect questions.

What is coding?

Giva an example of different response formats and argue your choice:

- dichotome,
- If the second second
- Likert response,
- numerical rating scales,
- scales crossing zero (with negative values),
- ranking labels,
- semantic differential scale.

Survey Design

Dichotome variable



15/2/2013 28 / 51

표 🖌 🔺 표

Giva an example of different response formats and argue your choice:

- dichotome,
- If the second second
- Likert response,
- numerical rating scales,
- Scales crossing zero (with negative values),
- ranking labels,
- semantic differential scale.



15/2/2013 30 / 51

∃ → 4 ∃

Where (please specify!) would you put a ... question in the questionare?

- question dealing with sensitive subjects,
- demographic data,
- complicated, large matrix-like questions,
- routine questions,
- attributes in a nominal or ordinal variable.

How often do you play World of Warcraft?

- never
- rarely
- once a year
- not very often
- often

How often do you pay in your tuition fees?





Do you think you'd be a better presenter if you received some type of professional training and all required equipments including a laser pointer?

- yes
- o no

Do you think you'd be a better presenter if you received some type of professional training and all required equipments including a laser pointer?

- yes, if I could attend to a pro. training
- yes, if I would get my laser pointer
- yes, if I could attend to a pro. training **and** also get my laser pointer
- no, I would not become a better presenter in any way

< □ ▶ < 両

Please specify the model number of your last bought laptop:

Please choose your operating system from the belowlist running on your computer:

- Windows '95
- Windows XP
- Windows 7
- Windows Vista Business
- RedHat Linux
- Intrepid Ibex
- MacOS



How often do you check your Facebook profile?

- every hour
- once a day
- twice a week
- every month

Do you agree with Professor Sumetrolin that death penalty should be forbiden?

- yes
- no, because there are a lot of bad people
- no, because Prof. Sumetrolin has nothing to do with laws as being a professor in chemistry

How do you feel about maritial statuses?

- being single equals to freedom
- being married is so boring
- I would never marry anyone in my life

Please specify your maritial status:

- single
- married
- divorced
- . . .

What if the questions were ordered backwards?



Have you ever paid for sexual services?

- yes
- on

How would you ask a question in this subject?

How many books did you buy in the last 5 years?

- 50-100
- 100-200
- 200-500
- 500-20.000

How would you improve the above question?

∃ ► 4.

Do you have a driving licence?

- Yes
- No
- Almost, I am before the final exam.
- I had a driving license, but it's expired.
- I had a driving license, but the police took it away.

How do you travel in the capital?

- by car
- on foot
- I'm cycling
- scooter!

How would you improve the above question?

글 🕨 🖌 글

Which newspaper do you read regularly?

- Story
- Blikk
- Star
- other (please specify)

How would you improve the above question?

글 🕨 🖌 글

Do you prefer watching TV or reading news on paper?

- reading newspapers
- wathcing TV as I like movies
- watching TV as I have no time for reading
- both
- reading newspapers as being more relaible compared to TV

You travel on a bus and a homeless people sits next to you. Tell us what would you do!

- I get off the bus immediately.
- I ask him to take another seat.
- I say something loudly to the others about the smell..
- I try to make no attention to him but having a hard time.
- Nothing.

Do you use public vehicles?

- yes
- no
- rarely
- sometimes

How would you improve the above question?

★ 문 ▶ ★ 문

How many award do you have?

- one
- two
- three
- four

How would you improve the above question?

★ 글 ▶ ★ 글

What you think: how many people in your neighbourhood have ever thought about travelling to Mexico?

- Everyone, Mexico is so cool
- None.
- Less than 50 percent
- More than 50 percent

What do you think about hooligans?

- Casting stones on them.
- I do not care.
- Nothing.
- I am a quite liberal person.
- I am a hooligan!

How often do you play truant on public vehicles?

- Every day, as unfortunately I have no money to buy tickets.
- Every day, as I think public transport should be free and it is against my principles to pay to the government.
- Never.
- A few times.

How much alcohol do you drink on a common friday night?

- I take no alcohol.
- I take 1-2 beers.
- I take 2-6 beers.
- I take 2-6 beers and some shots.

More practice

Making up a questionare



It was a pleasure!

Gergely Daróczi daroczi.gergely@btk.ppke.hu

◆□▶ ◆□▶ ◆三▶ ◆三▶ 三三 のへで