

Analysis of social interactions

Week 1: SNA research questions & designs

Dr. Isabel Raabe
Institute of Sociology
University of Zürich

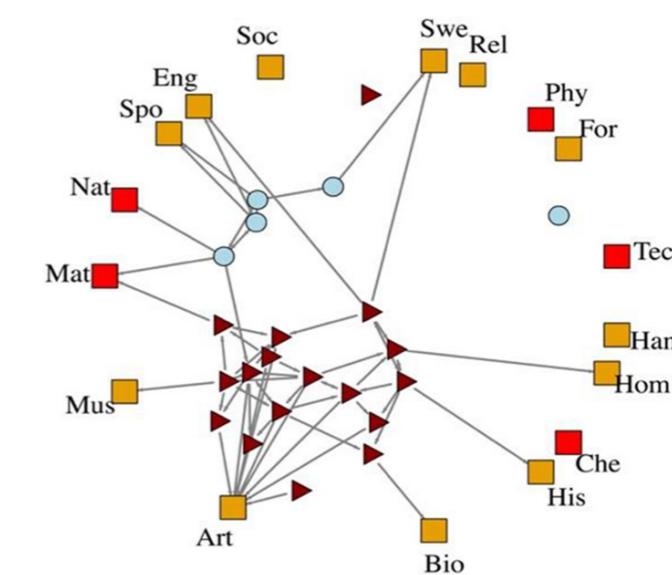
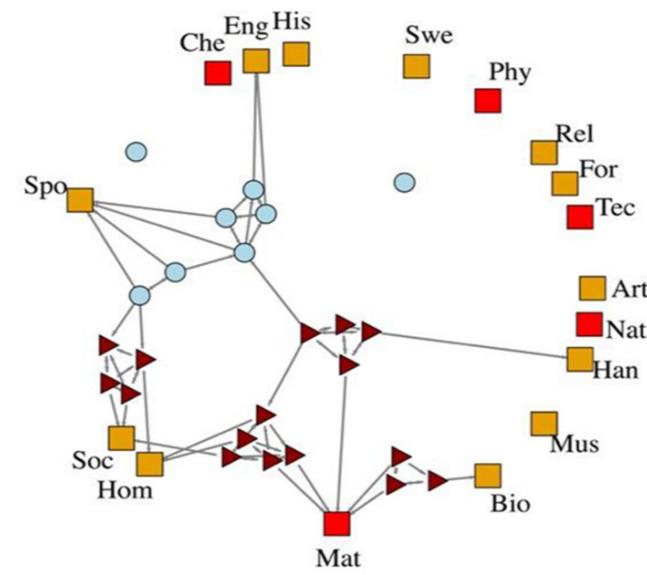
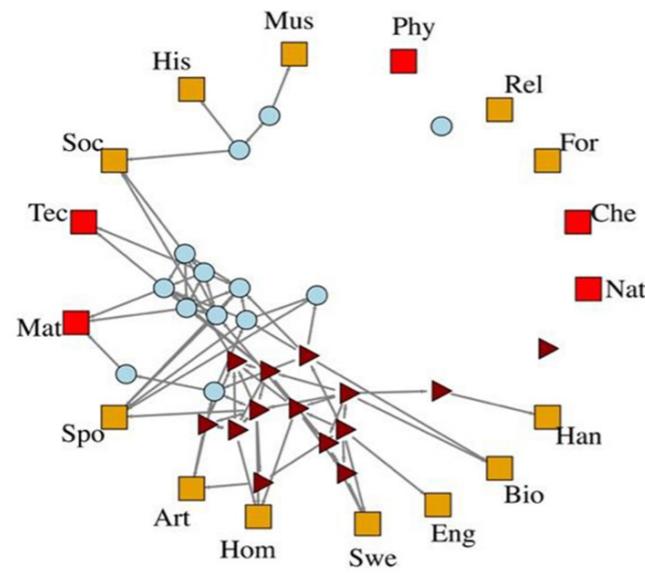
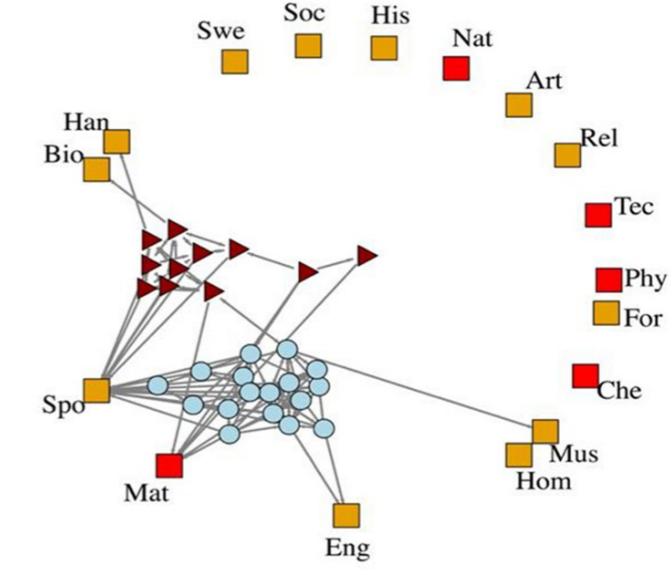
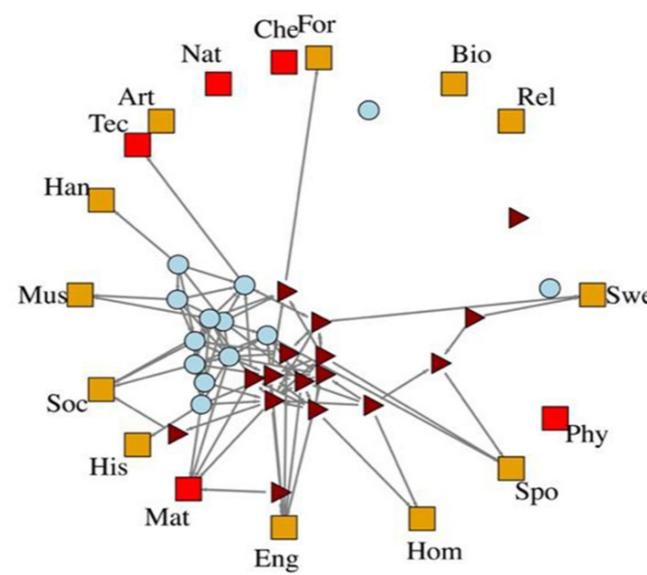
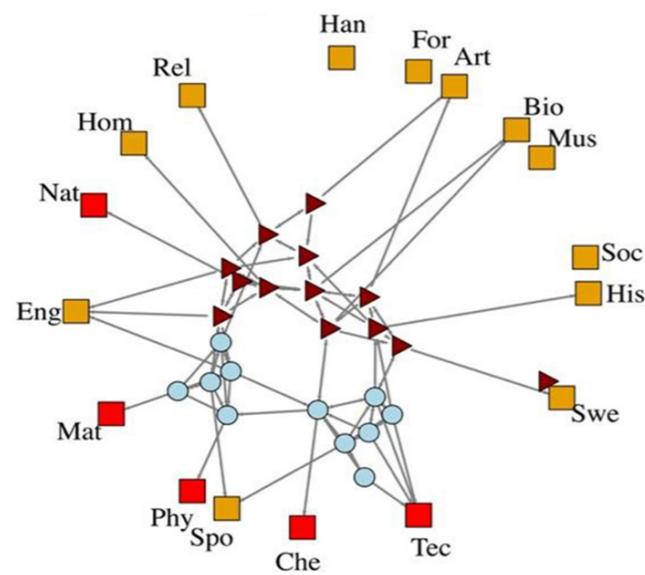
Introductions: Who am I?

- PhD in Sociology from the University of Oxford (2018)
- 2016 to 18 at ETH Zürich, Chair of Social of Networks
- Since 2018: Postdoc in Sociology at University of Zürich



Introductions: Who am I?

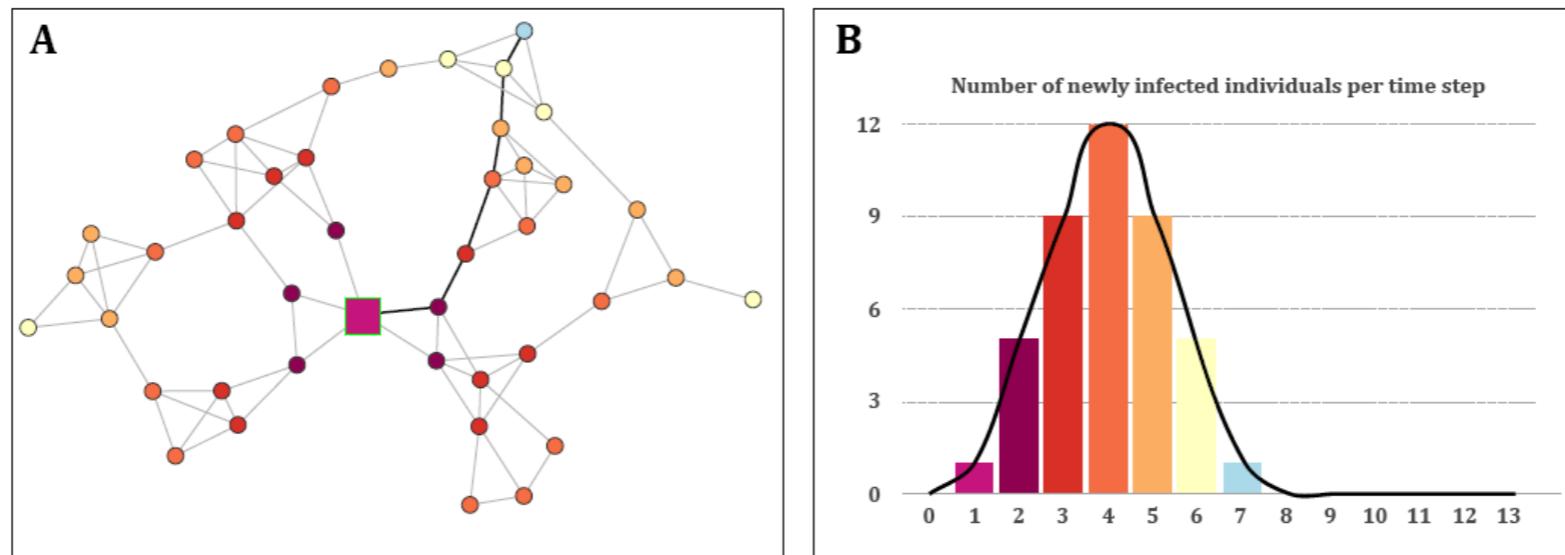
My first networks: Friendship & favourite subjects



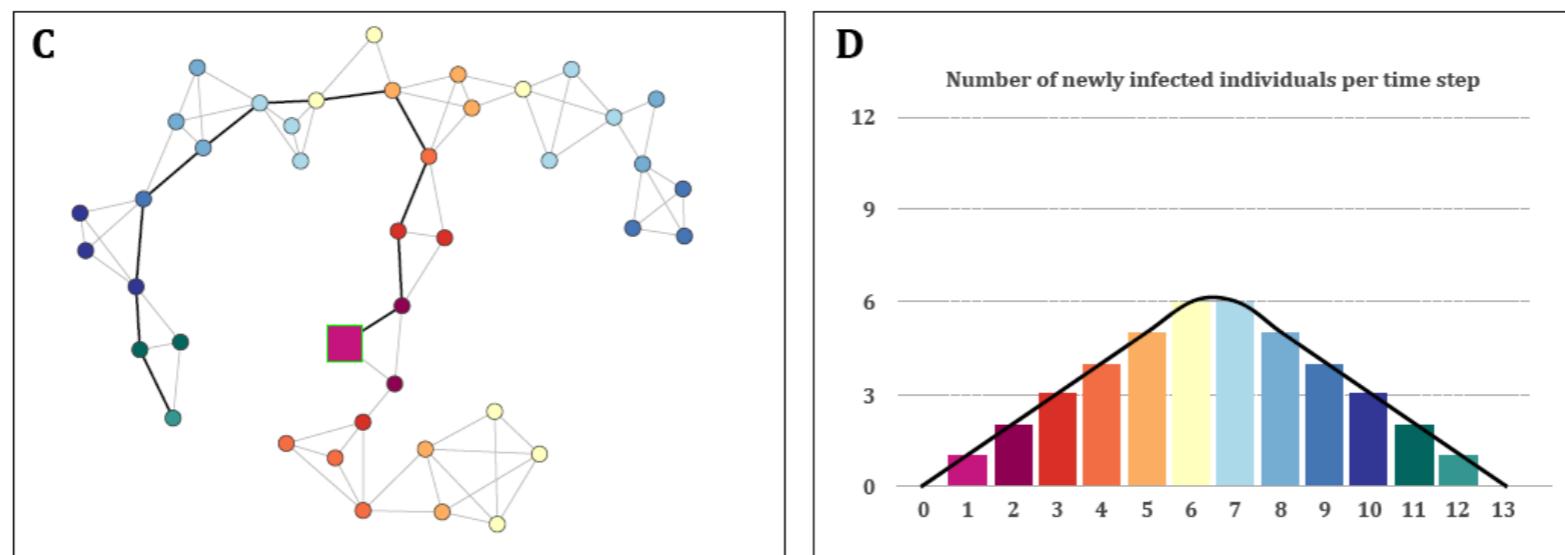
Introductions: Who am I?

Current work: Strategies to keep the curve flat after the COVID-19 lockdown

Network with shorter path lengths



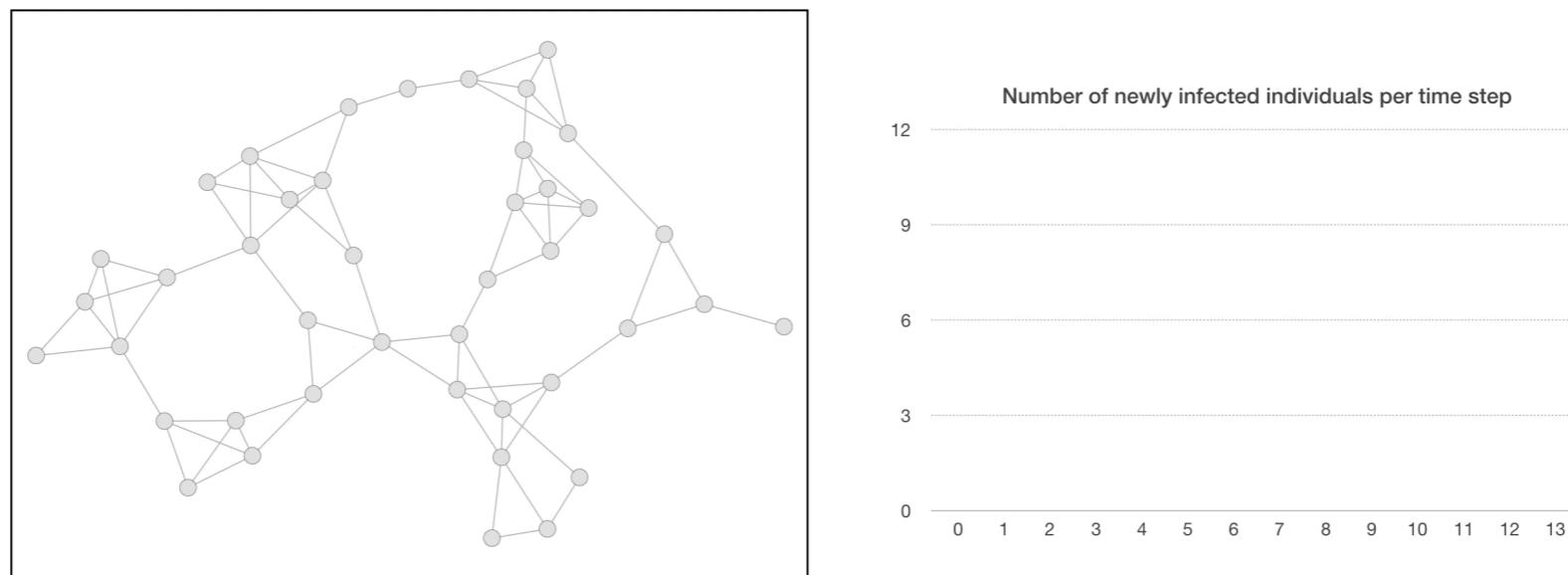
Network with longer path lengths



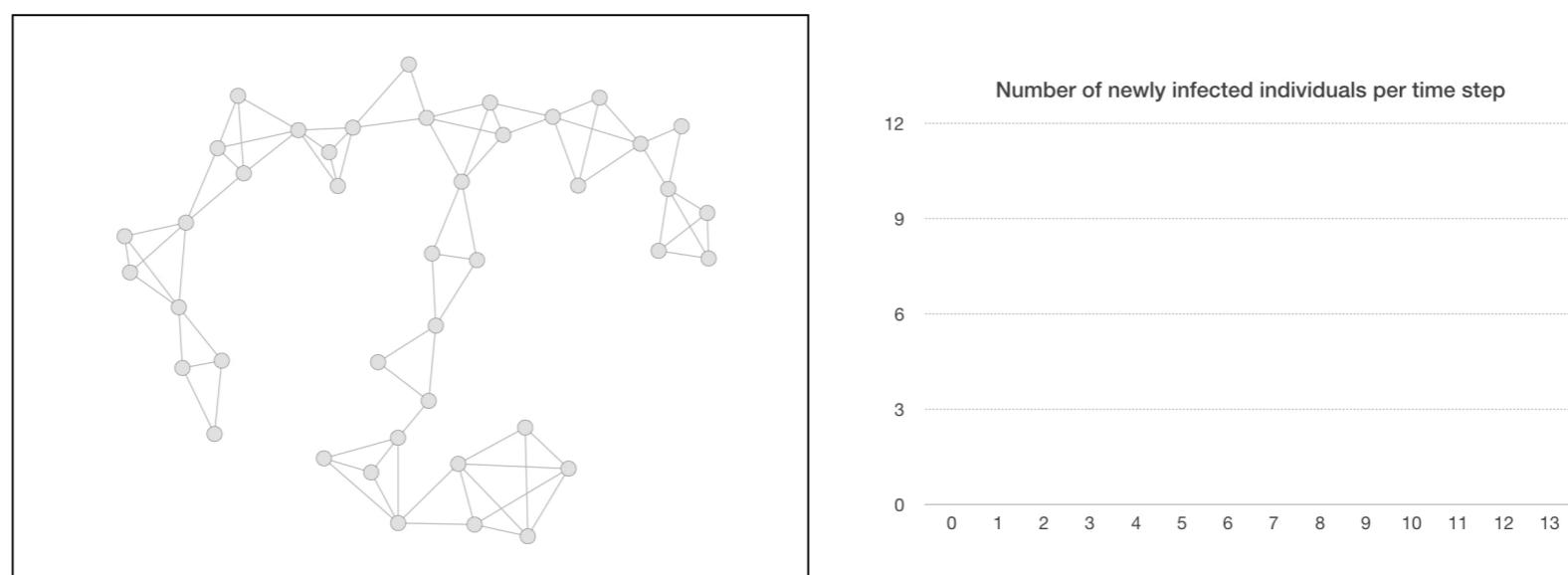
Introductions: Who am I?

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Network with shorter paths



Network with longer paths



(Block et. al 2020)

Introductions: And who are you?

Please raise your hand at the right moments

- **Your background?** Social sciences – humanities – science – business

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- **Programming experience?** None – a little – medium – expert

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- **Social networks experience?** None – a little – medium – expert
- **Why are you taking this course?** Interest – concrete project

Course outline

Week	Date	Topic
1	23/10	Introduction to social complexity (N) Research questions (I)
2	06/11	Introduction to social networks (I)
3	13/11	Clustering, community detection (I)
4	20/11	Data collection (N)
5	03/12	Mid-term check in on group projects (N)
6	11/12	Spreading and contagion in network (N)
7	18/12	Final group presentations (N)

Plan for the rest of today

- ▶ Research questions and designs (45 min)
- ▶ Research on social interactions (45 min)

Let's start!

Assignment requirements

To get credit for this course, you will have to:

- ▶ Come up with your own research design
 1. Find a research question
 2. Come up with a design of how this question can be answered (strategy, data, methods)
 3. Do the research
- ▶ Present your question, design and findings in a 15-min presentation in the last session of the course
- ▶ Around mid-term, you will get feedback on your progress

Assignment requirements

To get credit for this course, you will have to:

- ▶ Come up with your own research design
 1. **Find a research question → TOPIC FOR TODAY**
 2. Come up with a design of how this question can be answered (strategy, data, methods)
 3. Do the research
- ▶ Present your question, design and findings in a 15-min presentation in the last session of the course
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Part 1: Research questions

Actually - what is research?

Research is:

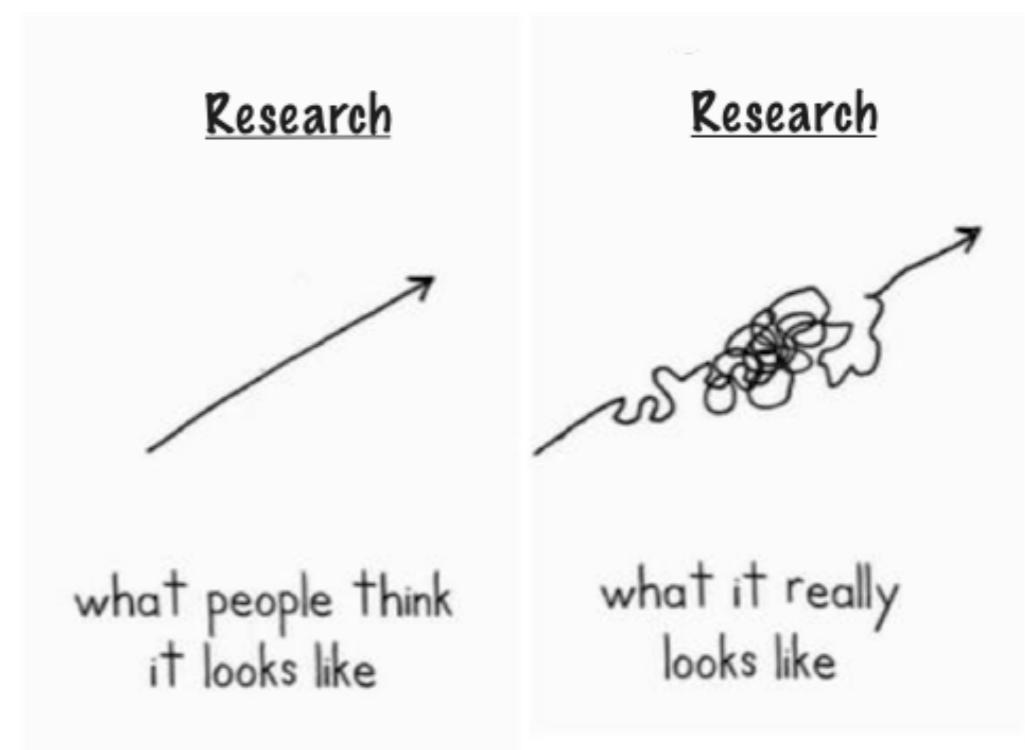
- ▶ “the systematic study of materials and sources in order to establish facts and reach new conclusions” (Oxford English Dictionary).
- ▶ the process of answering a question that is **worth being asked**.
- ▶ the process of answering a question that is **worth being answered**.

Actually - what is research?

Research is:

- ▶ “the systematic study of materials and sources in order to establish facts and reach new conclusions” (Oxford English Dictionary).
- ▶ the process of answering a question that is **worth being asked**.
- ▶ the process of answering a question that is **worth being answered**.

- ▶ open-ended and difficult process that often leaves more questions than answers
- ▶ a process that students often struggle with ☺

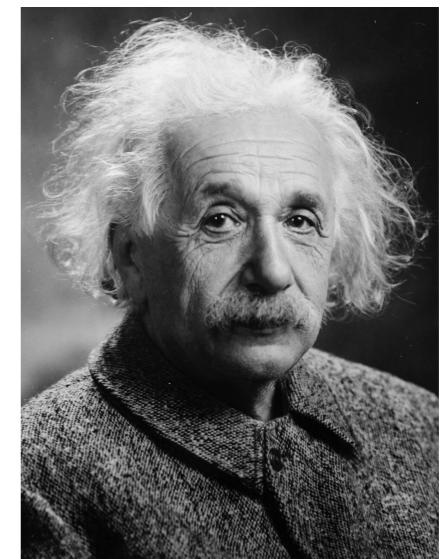


Core skills for good research

- ▶ **curiosity** [the desire to know or learn something].
- ▶ **critical thinking** [the ability of reasonable, reflective thinking focused on deciding what to believe or do]

“I have no special talents. I am only passionately curious.”

(Albert Einstein, 1952)



Steps in a successful research project (I)

1. Problem identification

- What is driving my curiosity? What am I interested in?
- Where do I see problems?
- Can I investigate it?
- Is it manageable with my resources and time?

2. Question development

- Do I want to explore, describe or explain the problem?
- What needs to be known to solve the problem?
- What is unknown?
- How can I narrow it down to a researchable question?

Steps in a successful research project (II)

3. Data considerations and collection

- What data do I need? Who has the data I need? How do I get it?
- Will my operationalisation really measure what I want?

4. Research methods

- What methods have others used?
- Is my method suitable to answer my research question?
- What assumptions do I implicitly or explicitly make, and are they reasonable?
- Will others trust in my method / is it as simple as possible?

Steps in a successful research project (III)

5. Data analysis

- What is the effect of...?
- Are there confounding factors?
- Are my findings robust?

6. Conclusion

- What do my findings tell me?
- Do my findings answer my research question?
- How can my research influence future research?

Research Question: Definition

- ▶ A research question describes a **scientific uncertainty** that a researcher intends to **address and resolve** by conducting a research project.
 - “The single most important component of a study ...” (Bordage and Dawson, 2003)
 - A sentence with a question mark at the end (!) that defines the aim of a research study
 - It is rarely simply found, but rather requires a good understanding of the topic as well as a structured way of thinking

Research Questions: 7 tips to get a bad research question

1. The topic should be trivial and boring.

- “What was the first company to reach a \$1 trillion market value?”

2. The topic should be entirely unknown to you.

- “What are the electronic structures of high-temperature superconductors at various points on their phase diagrams?”

3. Answer a question that everyone knows.

- “Is Zurich in Switzerland?”

4. Answer a question that nobody can answer.

- “What is the universe made of?”

5. Study something that is only relevant to you.

- “Why is my daughter sick all the time?”

6. Have a broad scope.

- “What are the effect of rules on behaviours?”

7. Have a very vague and unspecific question.

- “What is gender?”

Research Questions: A good (quantitative) research question...

- ▶ asks about the relationship between two or more variables
- ▶ is stated clearly and in the form of a single question
- ▶ takes part in a scientific discussion
- ▶ is testable (i.e. possible to collect data which allows to answer the question)
- ▶ is specific and restricted in scope
- ▶ is relevant

Research Questions: Terminology

- ▶ Relationship
 - Looking for a simple relationship between two or more variables (i.e. that they are non-independent)
- ▶ Differences
 - Implies that you intend to compare two or more groups
- ▶ Directional and non-directional relation
 - Indicates a certain direction of relationship, based on earlier empirical or theoretical evidence
- ▶ Effects
 - Implies that you intend to seek for a cause-effect relationship between variables

Research Questions: Terminology

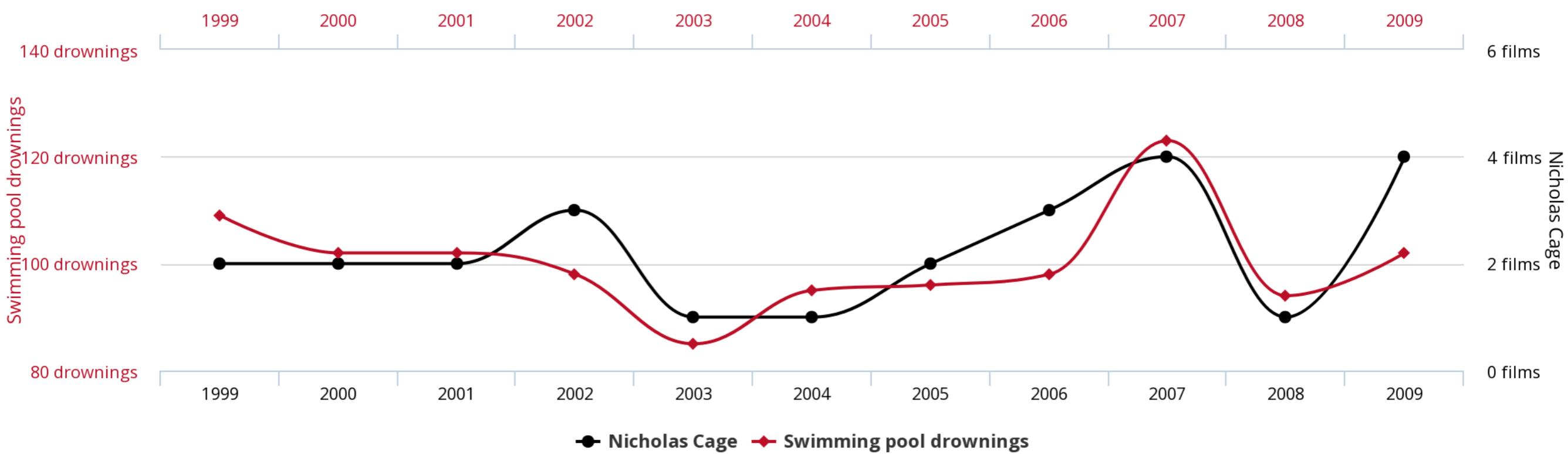
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 - Implies that you intend to seek for a **cause-effect relationship** between variables

Example

- ▶ E.g.: How do experiences of racial discrimination of refugees in Switzerland **affect** the time until they find a permanent job?
- ▶ imagine:
 1. we asked 100 refugees in Switzerland about how often they felt discriminated against since they arrived here, and how long it took them to find a permanent job
 2. in our data, we see a strong positive relationship between perceived discrimination and time needed to find a permanent job
- ▶ We have a strong **correlation**. Can we infer **causation**?

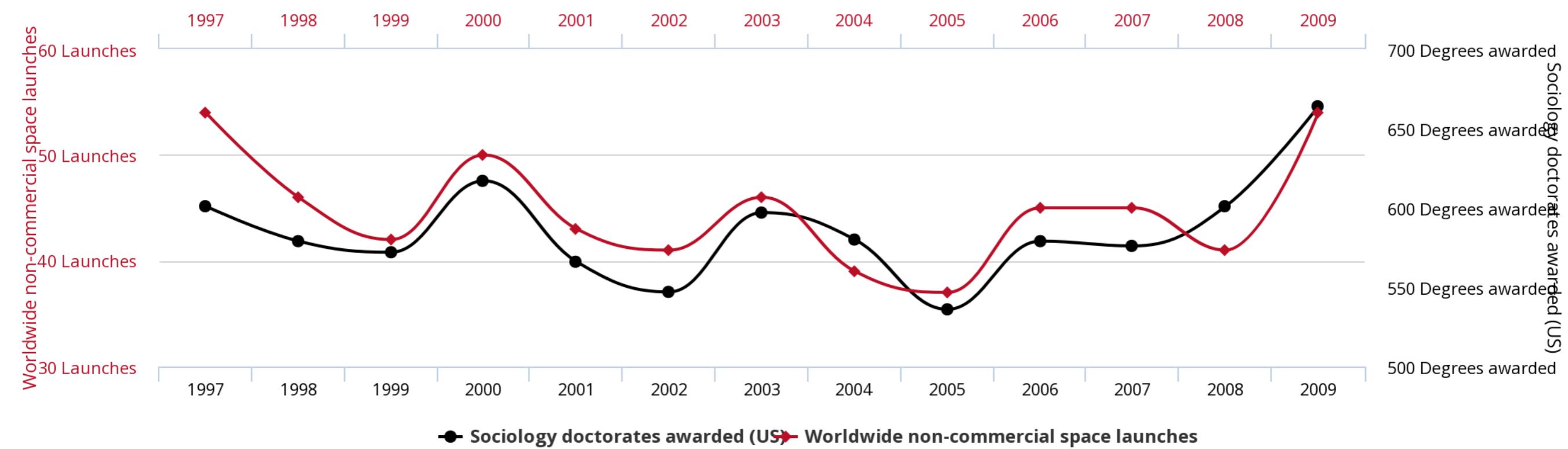
Example: “non-sense”-correlations

Number of people who drowned by falling into a pool
correlates with
Films Nicolas Cage appeared in



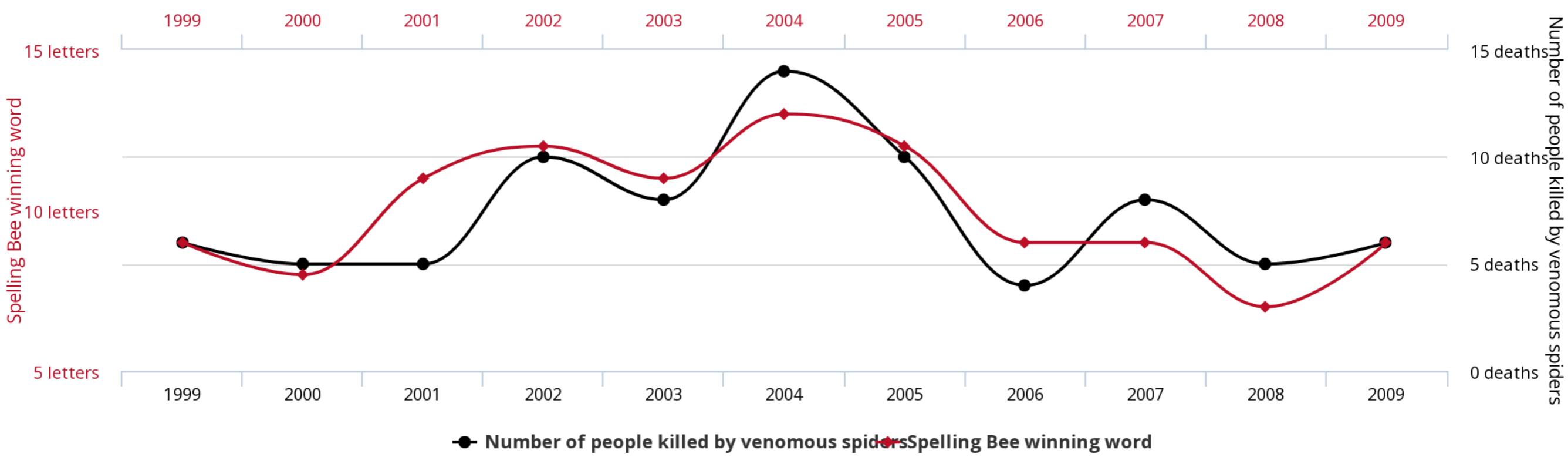
Example: “non-sense”-correlations

Worldwide non-commercial space launches
correlates with
Sociology doctorates awarded (US)



Example: “non-sense”-correlations

Letters in Winning Word of Scripps National Spelling Bee
correlates with
Number of people killed by venomous spiders



Correlation ≠ causation

- ▶ E.g.: How do experiences of racial discrimination of refugees in Switzerland **affect** the time until they find a permanent job?

Just because we observe empirically that (e.g.) those who experienced more discrimination take on average longer to find a permanent job does not mean that we have identified a causal relationship!

Research Questions: How to make it feasible

- ▶ If the scope of your research is **too broad**, you can narrow it by adding adjusting variables to your research question
- ▶ **Narrow down** the constructs
 - What kind of experiences of discrimination are you talking about?
 - Gender-, culture-, race-, ... related?
 - What type of success are you talking about?
 - Sport? Career? Love life?
- ▶ **Population**
 - Who do you talk about exactly?
 - Swiss prisoners, adolescents in mainly Islamic states, or British retirees?
 - You can even add further demographic restrictions beside age, gender etc.
- ▶ **Time-dimension**
 - About what time-span are you talking - immediate effect or later in life?
 - Are we talking about today or in the 18th century?

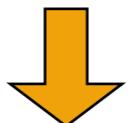
Research Questions: How to make it feasible

- ▶ **Two-versions of your research question:**

1. “Big picture RQ” -- what you intend to learn from your investigation from a broader and curiosity-driven perspective (more general and catchy)
 - Summarizes the overall idea and curiosity behind the research
2. “Focus RQ” -- what you precisely intend to investigate (more focused, technical and doable)
 - Includes: sampled population characteristics, specific constructs, time...

- ▶ Example:

“How do experiences of discrimination affect success?”



“How do experiences of racial discrimination among refugees in Switzerland affect their success on the labour market?”

Why research questions are so important?

- ▶ The research question is the most fundamental question in the research process...
 - it gives **focus**
 - sets **boundaries**
 - provides **direction**
- ... throughout your research journey

Research questions give focus

- ▶ defines the **topic** of interest
- ▶ defines the **nature** of the research endeavour:
 - explore, explain, describe, or compare
- ▶ define the **question type** you are interested in
 - whether you are interested in what, where, how, when, why
- ▶ indicate whether you foresee a **relationship** between concepts you are exploring (e.g. directional or non-directional)
 - whether you are looking for impacts, increases, decreases, relationships, correlations, causes etc.

Research questions set boundaries

- ▶ During the research you will face many new and interesting questions and aspects that arise
- ▶ Ask yourself: '**What does this have to do with my actual research question?**'
 1. 'Actually, nothing... I will have to leave it. However, it's interesting.'
 - write it down (!), revisit it, and pick it up for your next research project
 2. 'Actually, it is quite relevant ... '
 - add this aspect as a new dimension to your work
 3. 'Well nothing really, but I actually think this is at the heart of what I want to know.'
 - Rethink and reformulate your research question under this important aspect

Research questions, provide direction to

- ▶ the **theory** you need to explore
- ▶ the **literature** you need to review
- ▶ the **data** you need to gather
- ▶ **methods** you need to call on

On the contrary, an ill-defined research question:

- ▶ makes it impossible to come up with a clear methodology
- ▶ does not allow to evaluate the appropriateness of your method
- ▶ makes it very difficult for others to understand and help you

Research questions are extremely important, both for conception and communication

Five questions to evaluate your study

(based on seven questions by Shyam Sunder)

- ▶ **What is the question that you would like to have answered after the study?**
(This should be a single sentence with a question mark at the end.)
- ▶ **Is your research design particularly suited for this kind of research question?** (What are other possible ways of finding an answer to the question?)
- ▶ **Does your research design permit to answer the question you have stated?**
- ▶ **What are the chances that the answer will surprise you and others?** What are the chances that it will change someone's mind?
- ▶ **Is your research design the simplest possible** to help answer the question you have stated?

(At any stage of your thinking, feel free to go back and revise your earlier answers if you wish to.)

Take home message

- ▶ Research is about good questions and their answers.
- ▶ Good research questions need to be: right for you; right for the field; well articulated; doable; and get the approval of others
- ▶ Curiosity is essential, not only for research but for any career or aspect of life
- ▶ Be open-minded and critically observant.
- ▶ You need to communicate your curiosity

Part 2: Research on social interactions

Group work (15')

- ▶ Break-out rooms
- ▶ Each group will get an abstract of a scientific paper that deals with social interactions in some form.
- ▶ Read the abstract
- ▶ As a group, come up with answers to the following questions:
 1. What is the study about? (Give a brief summary to the rest of the class)
 2. What is the research question? Focus on:
 - ▶ What is the **outcome of interest**?
 - ▶ What the **predictor**?

Group 1

SCIENTIFIC REPORTS | (2020) 10:2889 | <https://doi.org/10.1038/s41598-020-59594-z>

OPEN

Short-term and long-term effects of a social network intervention on friendships among university students

Zsófia Boda^{1,3,4*}, Timon Elmer^{1,4}, András Vörös^{1,2,4} & Christoph Stadtfeld^{1,4*}

1. What is the study about?
2. What is the research question?
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1. What is the study about?
2. What is the research question? **Does random contact lead to short-term and long-term friendships among university students?**
 - ▶ What is the **outcome of interest?** **Short-term and long-term friendship networks**
 - ▶ What the **predictor?** **Contact at induction event.**

Group 2

CYBERPSYCHOLOGY & BEHAVIOR
Volume 10, Number 4, 2007
© Mary Ann Liebert, Inc.
DOI: 10.1089/cpb.2007.9988

Social Interactions in Massively Multiplayer Online Role-Playing Gamers

HELENA COLE, B.Sc. and MARK D. GRIFFITHS, Ph.D.

1. What is the study about?
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Social Interactions in Massively Multiplayer Online Role-Playing Gamers

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1. What is the study about?
2. What is the research question? **Who interacts with whom in what way in massively multiplayer online role-playing games?**
 - ▶ What is the **outcome of interest?** **Social interactions in an online-gaming environment.**
 - ▶ What the **predictor?** **Individual characteristics of the players.**

Group 3

Misery Does Not Love Company: Network Selection Mechanisms and Depression Homophily

David R. Schaefer,^a Olga Kornienko,^a and Andrew M. Fox^a

American Sociological Review
76(5) 764–785
© American Sociological Association 2011
DOI: 10.1177/0003122411420813
<http://asr.sagepub.com>



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1. What is the study about?
2. What is the research question? **How does depression affect friend selection?**
 - ▶ What is the **outcome of interest?** **A friendship network.**
 - ▶ What the **predictor?** **Individual depression.**

Group 4

Social Science & Medicine 196 (2018) 47–55



Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed



Social interaction and pain: An arctic expedition

Per Block^{a,1}, Lauren C. Heathcote^{b,1}, Stephanie Burnett Heyes^{c,*}



^a Department of Humanities, Social and Political Science, ETH Zurich, Weinbergstrasse 109, 8092 Zürich, Switzerland

^b Department of Anesthesiology, Perioperative, and Pain Medicine, Stanford University, 1070 Arastradero Road, Palo Alto, CA 94304, United States

^c School of Psychology, University of Birmingham, B15 2TT, United Kingdom

1. What is the study about?
2. What is the research question?

- ▶ What is the **outcome of interest**?
- ▶ What the **predictor**?

Group 4

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^b Department of Anesthesiology, Perioperative, and Pain Medicine, Stanford University, 1070 Arastradero Road, Palo Alto, CA 94304, United States

^c School of Psychology, University of Birmingham, B15 2TT, United Kingdom

1. What is the study about?
2. What is the research question? **How do social interactions and experiencing physical pain interact with each other?**
 - ▶ What is the **outcome of interest?** **Social interaction network and the experience of physical pain.**
 - ▶ What the **predictor?** **Social interaction network and the experience of physical pain.**

Group 5

Smoking Diffusion through Networks of Diverse, Urban American Adolescents over the High School Period

Journal of Health and Social Behavior
2019, Vol. 60(3) 362–376
© American Sociological Association 2019
DOI: 10.1177/0022146519870521
jhsb.sagepub.com
SAGE

**Kayla de la Haye¹, Heesung Shin¹, George G. Vega Yon¹,
and Thomas W. Valente¹**

1. What is the study about?
2. What is the research question?
 - ▶ What is the **outcome of interest**?
 - ▶ What the **predictor**?

Group 5

Smoking Diffusion through Networks of Diverse, Urban American Adolescents over the High School Period

Journal of Health and Social Behavior
2019, Vol. 60(3) 362–376
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DOI: 10.1177/0022146519870521
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**Kayla de la Haye¹, Heesung Shin¹, George G. Vega Yon¹,
and Thomas W. Valente¹**

1. What is the study about?
2. What is the research question? **Does smoking initiation diffuse through friendship networks over the high school period? Do processes differ across schools?**
 - ▶ What is the **outcome of interest?** **Individual smoking initiation**
 - ▶ What the **predictor?** **Friend smoking**

Group 6

Journal of Adolescence 35 (2012) 1295–1305



Contents lists available at SciVerse ScienceDirect

Journal of Adolescence

journal homepage: www.elsevier.com/locate/jado

Embeddedness and empathy: How the social network shapes adolescents' social understanding

Ralf Wölfer ^{a,*}, Kai S. Cortina ^b, Jürgen Baumert ^c

^a Department of Educational Science and Psychology, Freie Universität Berlin, Habelschwerdter Allee 45, 14195 Berlin, Germany

^b Department of Psychology, University of Michigan, USA

^c Educational Department, Max Planck Institute for Human Development, Berlin, Germany

1. What is the study about?
2. What is the research question?

- ▶ What is the **outcome of interest**?
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^b Department of Psychology, University of Michigan, USA

^c Educational Department, Max Planck Institute for Human Development, Berlin, Germany

1. What is the study about?
2. What is the research question? **How does the social network shape adolescents' empathy**
 - ▶ What is the **outcome of interest?** **Individual levels of empathy**
 - ▶ What the **predictor?** **The social context**

Research on social interactions

Predictors	Outcomes
1. Contact at induction event.	1. Short-term and long-term friendship networks
2. Individual characteristics of the players.	2. Social interactions in an online-gaming environment.
3. Individual depression	3. A friendship network.
4. Social interaction network and the experience of physical pain.	4. Social interaction network and the experience of physical pain.
5. Friend smoking	5. Individual smoking initiation
6. The social context	6. Individual levels of empathy

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5. Friend smoking	5. Individual smoking initiation
6. The social context	6. Individual levels of empathy

The research you are going to develop for the purpose of this class has to use some form of social interaction either as the predictor or the outcome!