

INTR 5057 Research Design & Methods in IR Day 07

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14 Brumaire CCXXV

Outline

Intro

Homework

Intro

Causality

Intro

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Intro

- ▶ Who am I?

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- ▶ Who am I?
- ▶ What is this part of the course for?

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- ▶ How will the classes go?

Intro

- ▶ Who am I?
- ▶ What is this part of the course for?
- ▶ How will the classes go?
- ▶ What are the slides for?

Intro

- ▶ The p -word.

Intro

- ▶ The p -word.
- ▶ “Prove”.

Intro

- ▶ The p -word.
- ▶ “Prove”.
- ▶ Only limited use allowed, e.g. for mathematical proofs.

Homework #1

Homework # 1

- ▶ Write a 300 word paper with three causal questions of your interest. At least one of them has to be a “causes of effects” question and at least one an “effects of causes” question. For each question indicate which one of them it is. Briefly explain why is this question interesting, and how would you go about answering it.
- ▶ Deadline: 9:00 a.m. Budapest time of the Friday 11 November 2016.

“The philosophers have only interpreted the world, in various ways; the point is to change it.”

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Karl Marx

Inference in Social Science

What kinds of inference does social science aim to produce?

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- ▶ Descriptive
- ▶ Causal

Questions about Causes

What kinds of questions do we ask if we care about causes?

Questions about Causes

What kinds of questions do we ask if we care about causes?

- ▶ Why?
- ▶ How?

Questions about Causes

What kinds of questions do we ask if we care about causes?

- ▶ Why?
- ▶ How?
- ▶ Can you give some examples of such questions?

Causal Inference

- ▶ What does **causal inference** mean?

Causal Inference

- ▶ What does **causal inference** mean?
- ▶ Making conclusions about causes.

Social Science & Causes

- ▶ Why do we in social science care about causes?

Effect

- ▶ How do you use the word **effect** in everyday language?

Cause

- ▶ How do you use the word **cause** in everyday language?

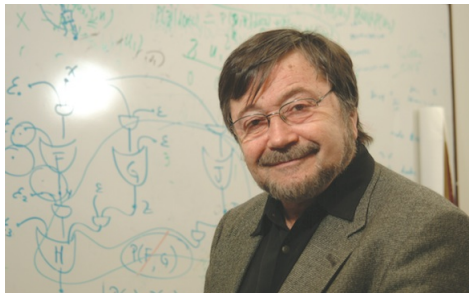
Cause & Effect in Social Science

- ▶ Can you give some examples of **cause** and **effect** from social sciences?

Cause & Effect in Social Science

Today we will work with the concepts of **cause**, **effect**, and **causality**, and tools that help to deal with them.

Causality



- Pearl, J. (1996). 'The Art and Science of Cause and Effect'. in Pearl J. (2000). *Causality*, 341–358.

Determinism

- ▶ What is **determinism**?

Determinism

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- ▶ Belief that given the past the future is fixed.

Determinism

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- ▶ What are the alternatives to that?

Determinism

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- ▶ Belief that given the past the future is fixed.
- ▶ What are the alternatives to that?
- ▶ probabilism, ...

Correlation & Causation

- ▶ Have you ever heard the following phrase?

“Correlation does not imply causation.”

Correlation & Causation

- ▶ Have you ever heard the following phrase?

“Correlation does not imply causation.”

- ▶ What would you say it means?

Correlation & Causation

- ▶ Have you ever heard the following phrase?

“Correlation does not imply causation.”

- ▶ What would you say it means?
- ▶ If two things occur together, it does not automatically mean one caused the other.

Correlation

- ▶ In everyday language, **correlation** *is the same as association*.

Correlation

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- ▶ In statistics, **correlation** *is a special type of association*.

Correlation

- ▶ In everyday language, **correlation** *is the same as association*.
- ▶ In statistics, **correlation** *is a special type of association*.
- ▶ Use **association** instead, so “*Association does not imply causation.*”

Causes & Conditions

- ▶ *“It is a triangle because it has three angles.”*

Causes & Conditions

- ▶ *“It is a triangle because it has three angles.”*
- ▶ Is this a causal statement?

Causes & Conditions

- ▶ *“It is a triangle because it has three angles.”*
- ▶ Is this a causal statement?
- ▶ No. It is a conditional statement. Having three angles is a condition to be a triangle. It is a matter of definition.

Symmetry in Description

- ▶ How about this?

H ... person's height in cm.

I ... person's yearly income in thousands of USD.

$$I = 30 + 0.2 \times H$$

Symmetry in Description

- ▶ How about this?

H ... person's height in cm.

I ... person's yearly income in thousands of USD.

$$I = 30 + 0.2 \times H$$

- ▶ And now this?

$$H = \frac{I - 30}{0.2}$$

Algebra, Description, & Causation

- So is algebra enough if we are interested in causation?

Algebra, Description, & Causation

- ▶ So is algebra enough if we are interested in causation?
- ▶ No. It serves to describe. We need more tools to deal with causation.

Asymmetry in Causation

- ▶ If being educated does lead to a higher income, does higher income lead to being more educated?

Asymmetry in Causation

- ▶ If being educated does lead to a higher income, does higher income lead to being more educated?
- ▶ It might, but it does not have to.

Asymmetry in Causation

- ▶ If being educated leads to a higher income, what if we educate someone?

Asymmetry in Causation

- ▶ If being educated leads to a higher income, what if we educate someone?
- ▶ Their income will increase.

Asymmetry in Causation

- ▶ If being educated leads to a higher income, what happens if we increase someone's income?

Asymmetry in Causation

- ▶ If being educated leads to a higher income, what happens if we increase someone's income?
- ▶ We cannot say from that statement.

Asymmetry in Causation

- ▶ Take 3 minutes to write down an example of asymmetry in causation.

Asymmetry in Causation

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- ▶ Can we write this as a diagram?

Asymmetry in Causation

- ▶ Take 3 minutes to write down an example of asymmetry in causation.
- ▶ Can we write this as a diagram?
- ▶ Yes, we can. The previous example:
Education \longrightarrow *Income*

Asymmetry in Causation

- ▶ Take 3 minutes to write down an example of asymmetry in causation.
- ▶ Can we write this as a diagram?
- ▶ Yes, we can. The previous example:
Education \longrightarrow *Income*
- ▶ Can you write your example as a diagram?

Asymmetry in Causation

- ▶ So what is it exactly that we mean when we say “*if someone were more educated, they would have a higher income*”?

Asymmetry in Causation

- ▶ So what is it exactly that we mean when we say “*if someone were more educated, they would have a higher income*”?
- ▶ That if any person’s education would be increased, their income would increase as well because of this.

Asymmetry in Causation

- ▶ What is the simplest way how to describe this increase of education?

Asymmetry in Causation

- ▶ What is the simplest way how to describe this increase of education?
- ▶ A change. Something about a person would change, i.e. their education.

Asymmetry in Causation

- ▶ Let us imagine we see that our neighbors education has increased, and then we learn their income has increased as well. What can we conclude about the statement *Education* \longrightarrow *Income*?

Asymmetry in Causation

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- ▶ The statement does not seem wrong in light of this evidence.

Asymmetry in Causation

- ▶ Let us imagine we see that our neighbors education has increased, and then we learn their income has increased as well. What can we conclude about the statement *Education* \longrightarrow *Income*?
- ▶ The statement does not seem wrong in light of this evidence.
- ▶ But is this evidence enough to convince us that it is really the education that lead to neighbor's increased income?

Asymmetry in Causation

- ▶ No. Why?

Asymmetry in Causation

- ▶ No. Why?
- ▶ Maybe something else caused the increased income.

Asymmetry in Causation

- ▶ No. Why?
- ▶ Maybe something else caused the increased income.
- ▶ So what do we need to know about the neighbor?

Asymmetry in Causation

- ▶ No. Why?
- ▶ Maybe something else caused the increased income.
- ▶ So what do we need to know about the neighbor?
- ▶ What would be their income if their education did not increase.

Asymmetry in Causation

- ▶ No. Why?
- ▶ Maybe something else caused the increased income.
- ▶ So what do we need to know about the neighbor?
- ▶ What would be their income if their education did not increase.
- ▶ And if we did see that, what problem would we have?

Asymmetry in Causation

- ▶ No. Why?
- ▶ Maybe something else caused the increased income.
- ▶ So what do we need to know about the neighbor?
- ▶ What would be their income if their education did not increase.
- ▶ And if we did see that, what problem would we have?
- ▶ We would not know what happened if their education would be increased.

Counterfactuals

- ▶ What is a **counterfactual**?

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Counterfactuals

- ▶ What is a **counterfactual**?
- ▶ Something that did not happen, i.e. it is contrary to the fact.
- ▶ Counterfactuals are necessary for thinking about causes.
- ▶ Can you say why?

Counterfactuals & Comparisons

- ▶ But could we simply compare the neighbor's income before getting the additional education and after getting it?

Counterfactuals & Comparisons

- ▶ But could we simply compare the neighbor's income before getting the additional education and after getting it?
- ▶ Well, there is a problem. Can you pin it down?

Counterfactuals & Comparisons

- ▶ But could we simply compare the neighbor's income before getting the additional education and after getting it?
- ▶ Well, there is a problem. Can you pin it down?
- ▶ There could be something that caused both the education increase and the income increase.

Counterfactuals & Comparisons

- ▶ There could be something that caused both the education increase and the income increase.

Counterfactuals & Comparisons

- ▶ There could be something that caused both the education increase and the income increase.
- ▶ What can we do about this?

Counterfactuals & Comparisons

- ▶ There could be something that caused both the education increase and the income increase.
- ▶ What can we do about this?
- ▶ We have to know what caused the increase in education.

Counterfactuals & Comparisons

- ▶ There could be something that caused both the education increase and the income increase.
- ▶ What can we do about this?
- ▶ We have to know what caused the increase in education.
- ▶ How can we do it?

Counterfactuals & Comparisons

- ▶ There could be something that caused both the education increase and the income increase.
- ▶ What can we do about this?
- ▶ We have to know what caused the increase in education.
- ▶ How can we do it?
- ▶ By increasing it from the outside.

Interventions & Treatments

- ▶ What is an **intervention**?

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- ▶ What is an **intervention**?
- ▶ A change from the outside.

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- ▶ What is a **treatment**?

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- ▶ The act of being subject to an action or agent, this action or agent.

Interventions & Treatments

- ▶ What is an **intervention**?
- ▶ A change from the outside.
- ▶ What is a **treatment**?
- ▶ The act of being subject to an action or agent, this action or agent.
- ▶ If we say that something would cause something else, we say what would happen if only this one thing, the cause, would be introduced.

Interventions & Treatments

- ▶ What is an **intervention**?
- ▶ A change from the outside.
- ▶ What is a **treatment**?
- ▶ The act of being subject to an action or agent, this action or agent.
- ▶ If we say that something would cause something else, we say what would happen if only this one thing, the cause, would be introduced.
- ▶ In this way it resembles a *surgery*.

Raising the Buda Hills

- ▶ If Buda hills were 4000 meter tall, it would make the streets of Budapest much colder.

Raising the Buda Hills

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- ▶ Now if this were true, would making Budapest streets colder make the Buda hills raise to 4000 meters?

Raising the Buda Hills

- ▶ If Buda hills were 4000 meter tall, it would make the streets of Budapest much colder.
- ▶ Now if this were true, would making Budapest streets colder make the Buda hills raise to 4000 meters?
- ▶ We cannot say from this statement.

Raising the Buda Hills

- ▶ But isn't something wrong with the statement that if Buda hills were 4000 meter tall, it would make the streets of Budapest much colder?

Raising the Buda Hills

- ▶ But isn't something wrong with the statement that if Buda hills were 4000 meter tall, it would make the streets of Budapest much colder?
- ▶ Maybe there would be no Budapest then, perhaps only Pest.

Raising the Buda Hills

- ▶ But isn't something wrong with the statement that if Buda hills were 4000 meter tall, it would make the streets of Budapest much colder?
- ▶ Maybe there would be no Budapest then, perhaps only Pest.
- ▶ How is this different from increasing neighbors education?

Raising the Buda Hills

- ▶ But isn't something wrong with the statement that if Buda hills were 4000 meter tall, it would make the streets of Budapest much colder?
- ▶ Maybe there would be no Budapest then, perhaps only Pest.
- ▶ How is this different from increasing neighbors education?
- ▶ The education could be increased without simultaneously changing other aspects of the neighbor.

Review of Concepts

- ▶ Cause

Review of Concepts

- ▶ Cause
- ▶ Effect

Review of Concepts

- ▶ Cause
- ▶ Effect
- ▶ Counterfactual

Review of Concepts

- ▶ Cause
- ▶ Effect
- ▶ Counterfactual
- ▶ Treatment

Review of Concepts

- ▶ Cause
- ▶ Effect
- ▶ Counterfactual
- ▶ Treatment
- ▶ Intervention

Reminder: Homework # 1

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