Utrecht University

Faculty of Science
Department of Information and Computing Sciences

Validity evaluation

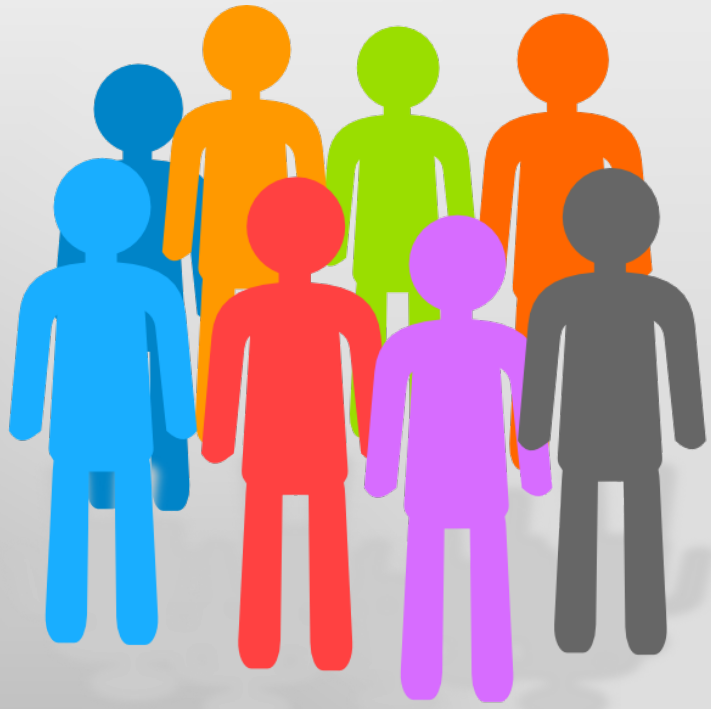
Advanced Research Methods 2018-2019

Marcela Ruiz

Department of Information and Computing Sciences
Utrecht University
m.ruiz@uu.nl

December 6, 2018

Validity evaluation



Interact

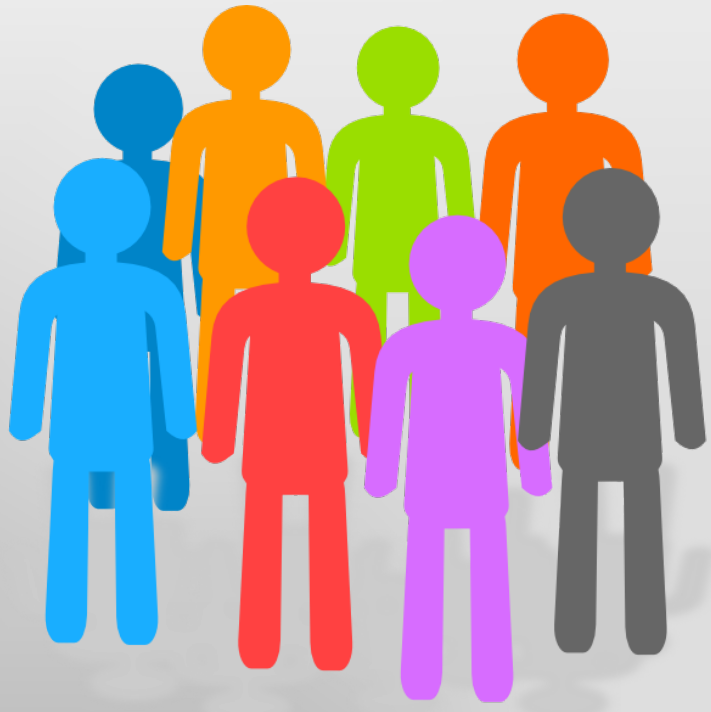
ARTEFACT

Validity evaluation

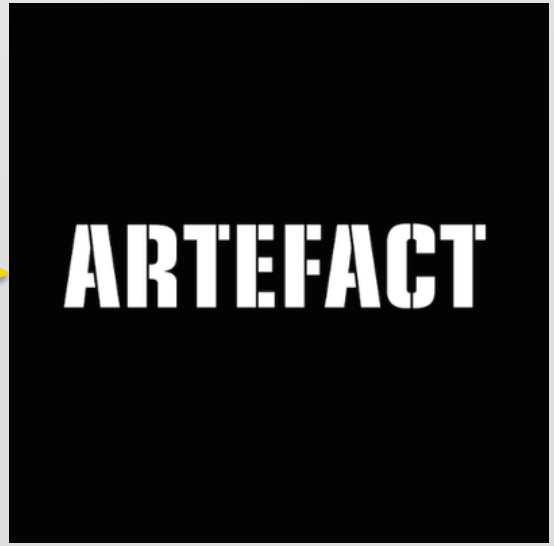
What is the population of your experiment?

The results should be valid just for your population?

Yes



Interact



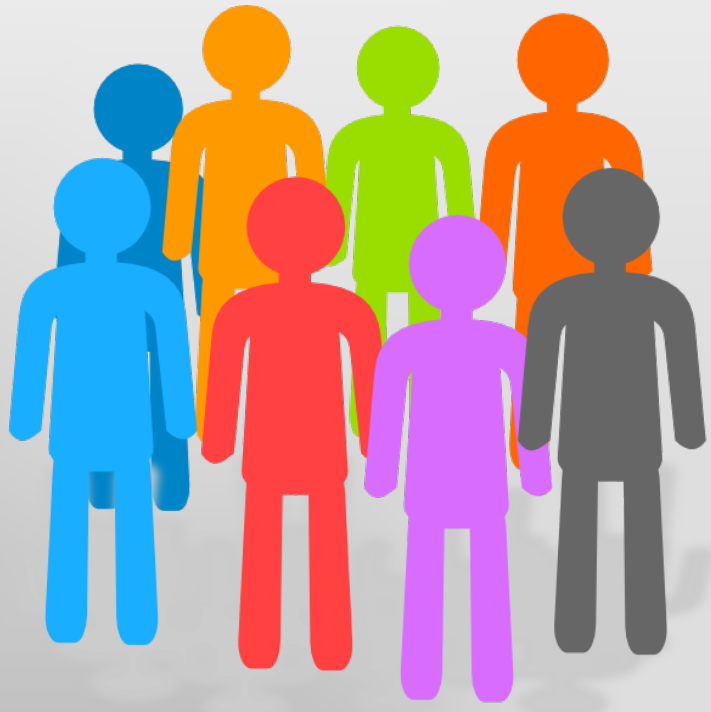
Validity evaluation

What is the population of your experiment?

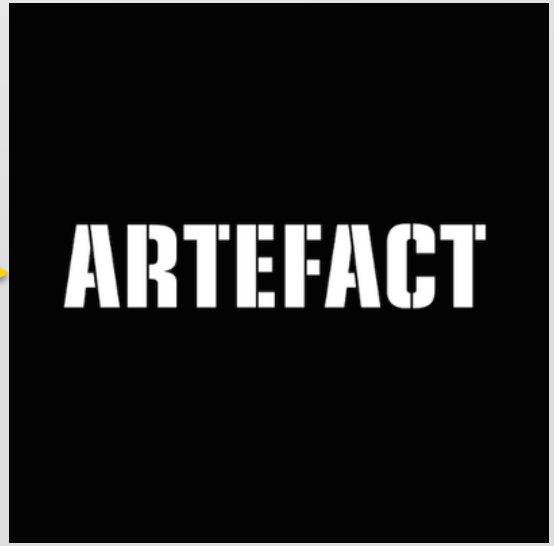
The results should be valid just for your population?

Yes

What happen if I want to generalize the results?



Interact



Validity evaluation

What is the population of your experiment?

The results should be valid just for your population?

Yes

What happen if I want to generalize the results?

Interact

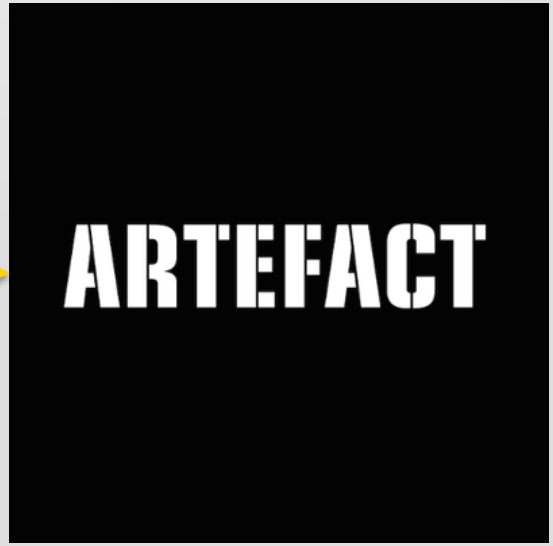


Fig. 8.2 Experiment principles (Adapted from Trochim [171])

Experiment principles and validity evaluation

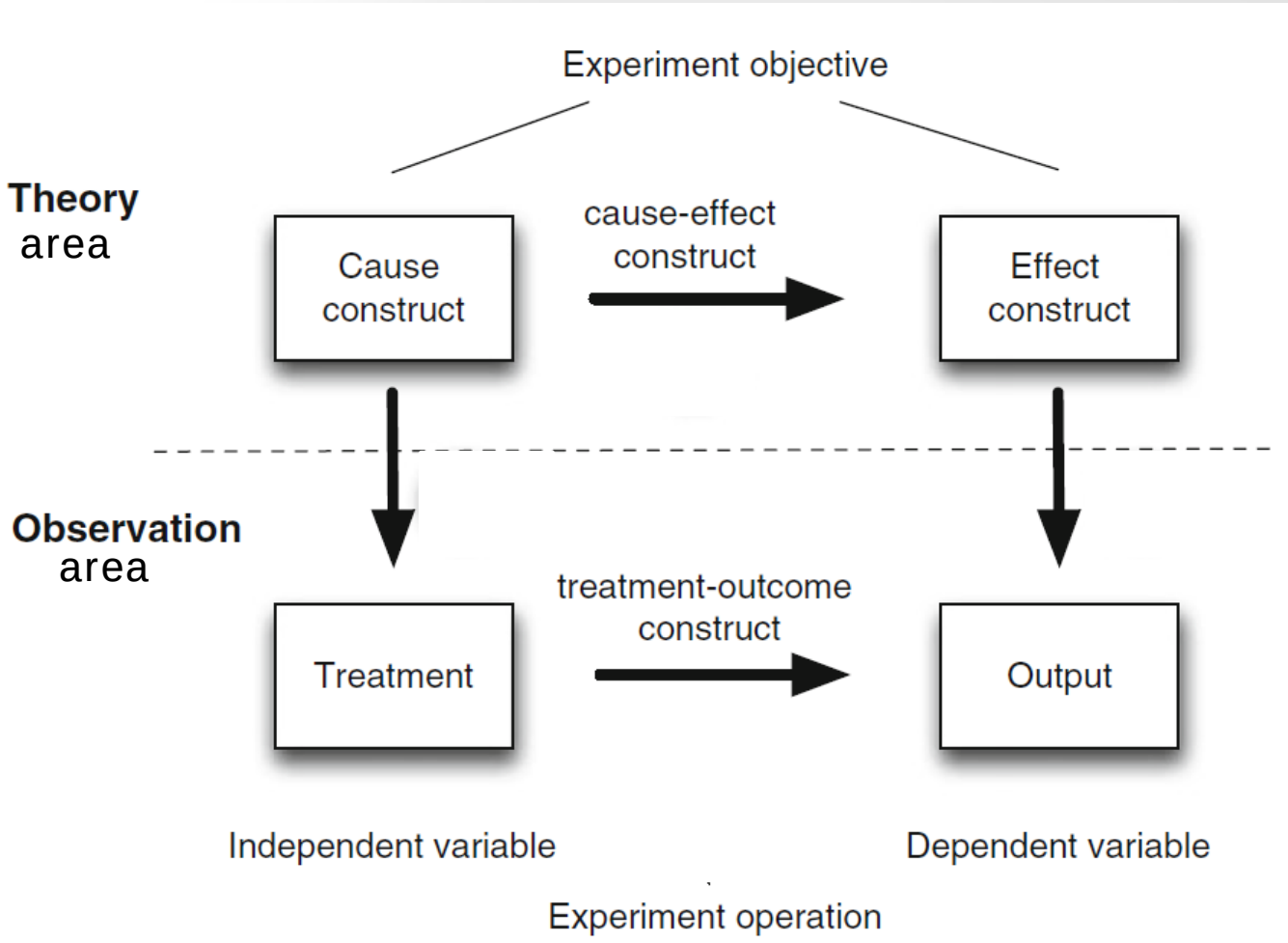


Fig. 8.2 Experiment principles (Adapted from Trochim [171])

What is the link between theory and observation?

Experiment principles and validity evaluation

Example of MDD vs traditional SW development

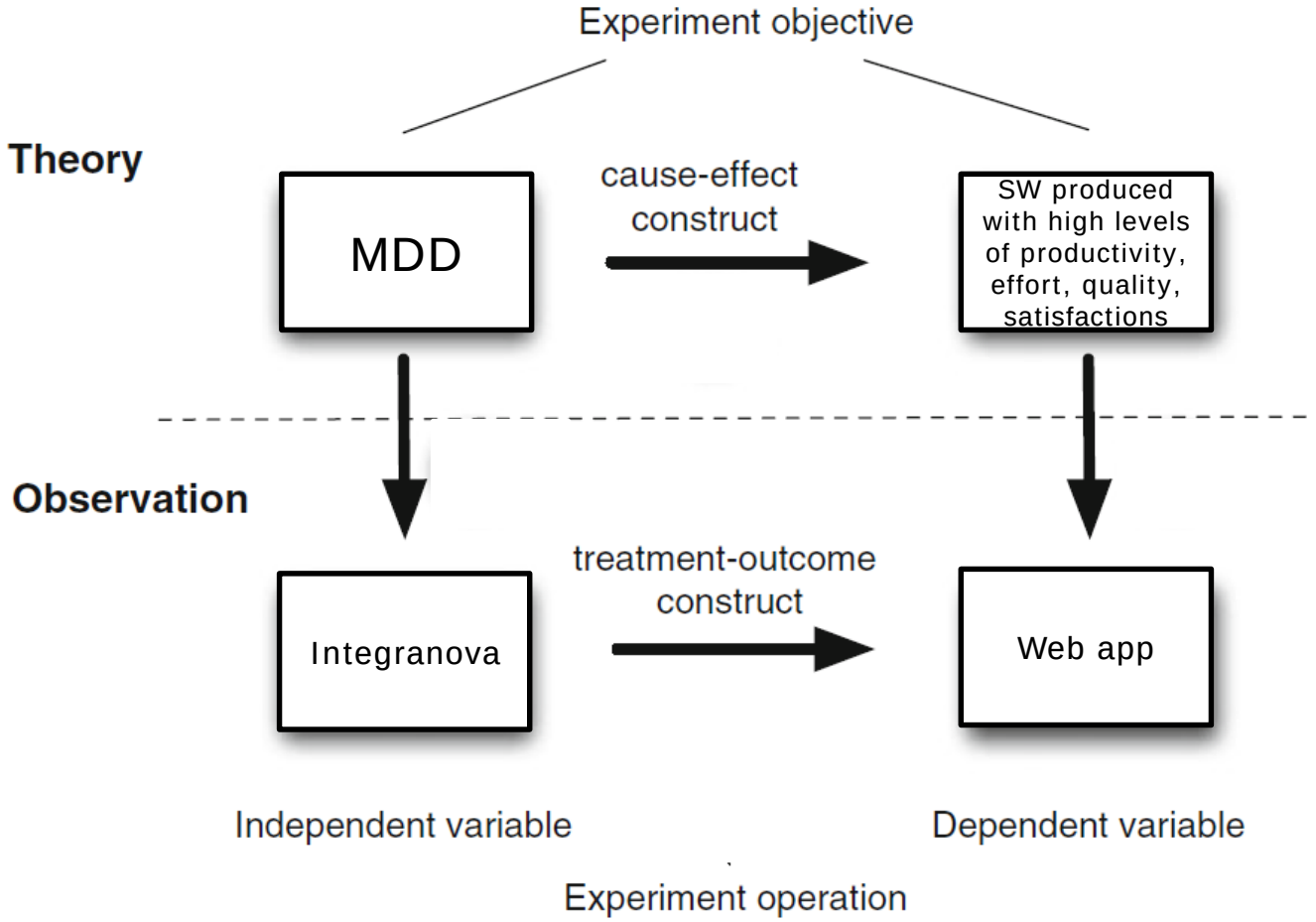


Fig. 8.2 Experiment principles (Adapted from Trochim [171])

Experiment principles and validity evaluation
What about your experiment?

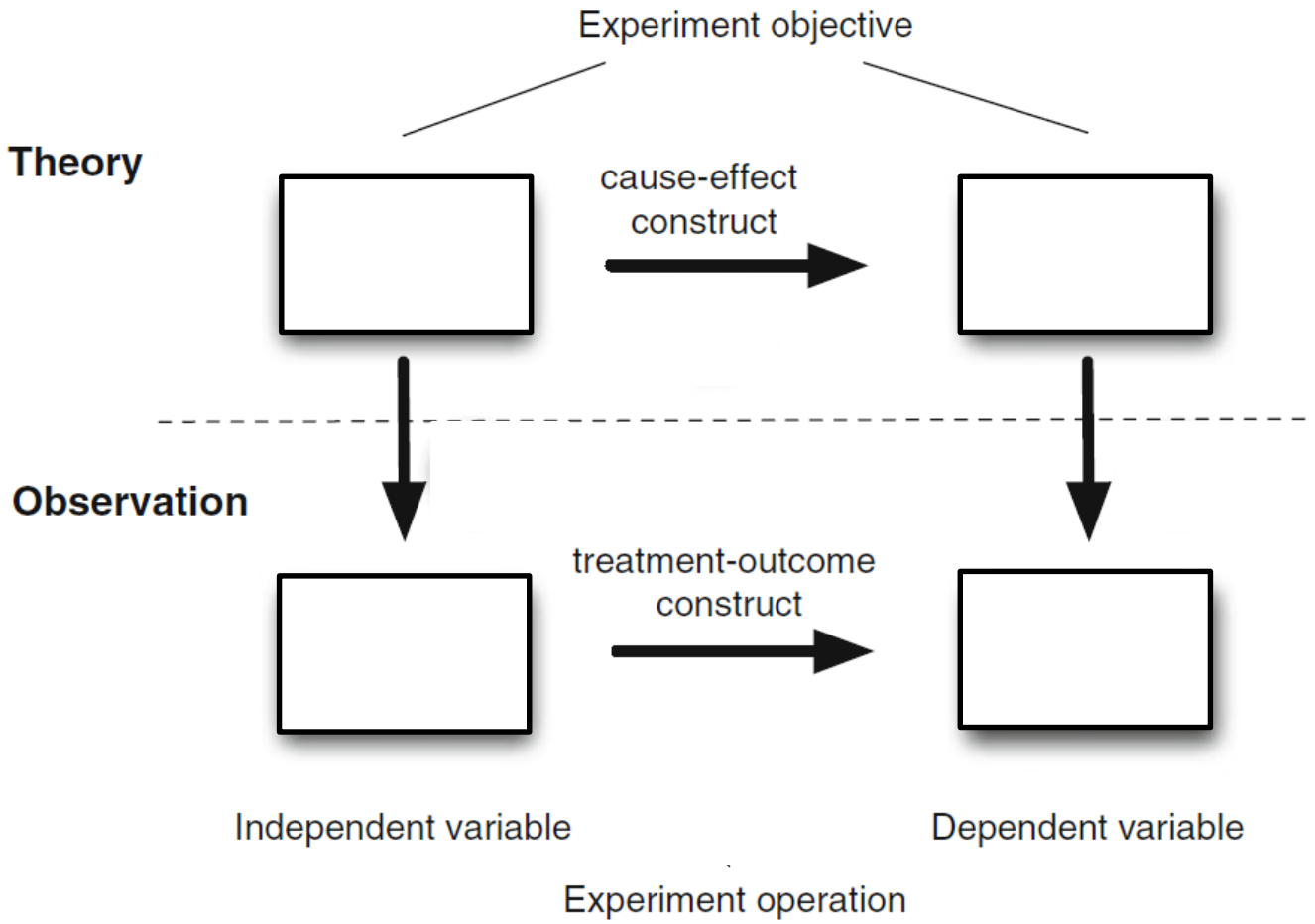


Fig. 8.2 Experiment principles (Adapted from Trochim [171])

Experiment principles and validity evaluation

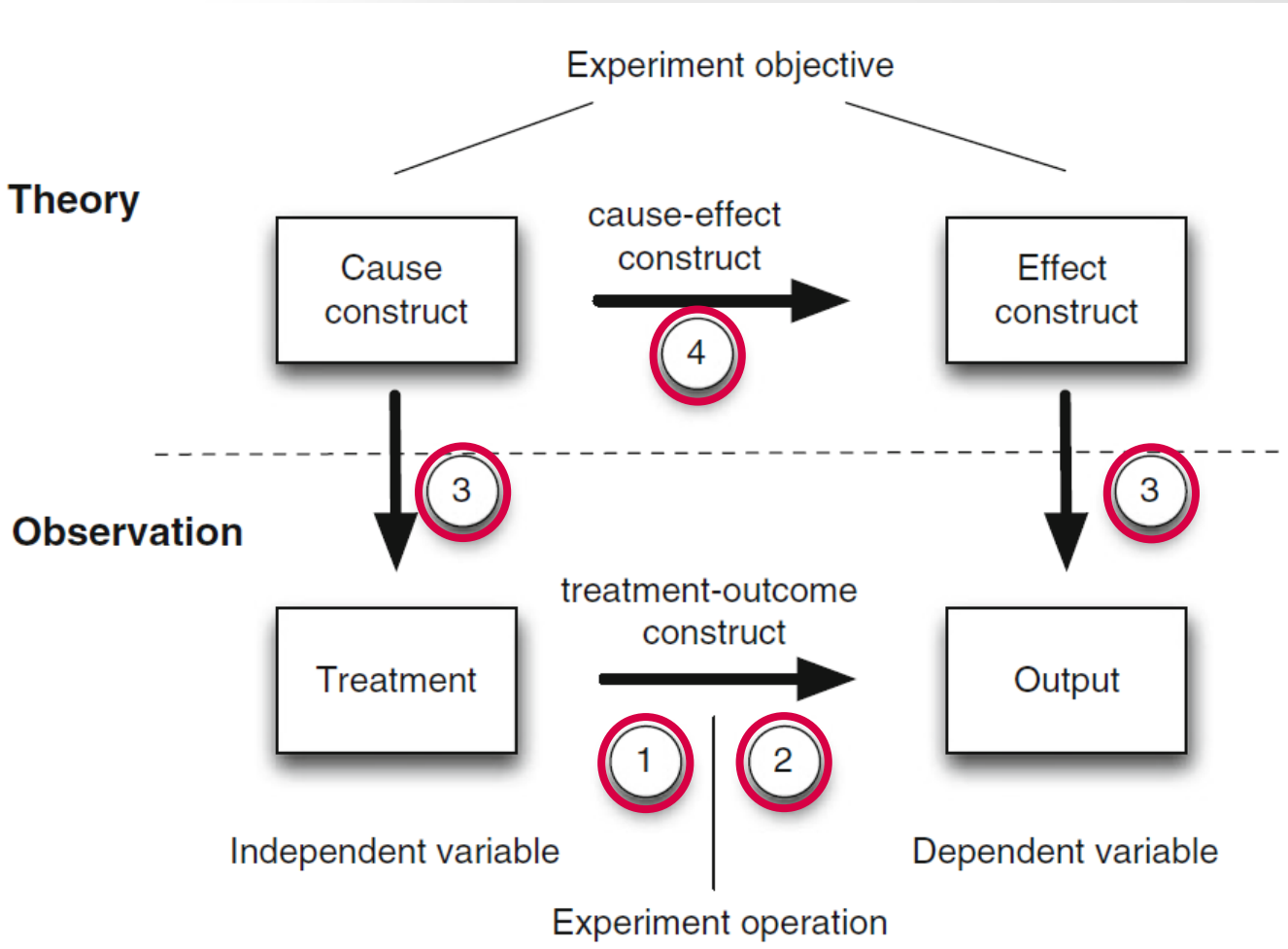
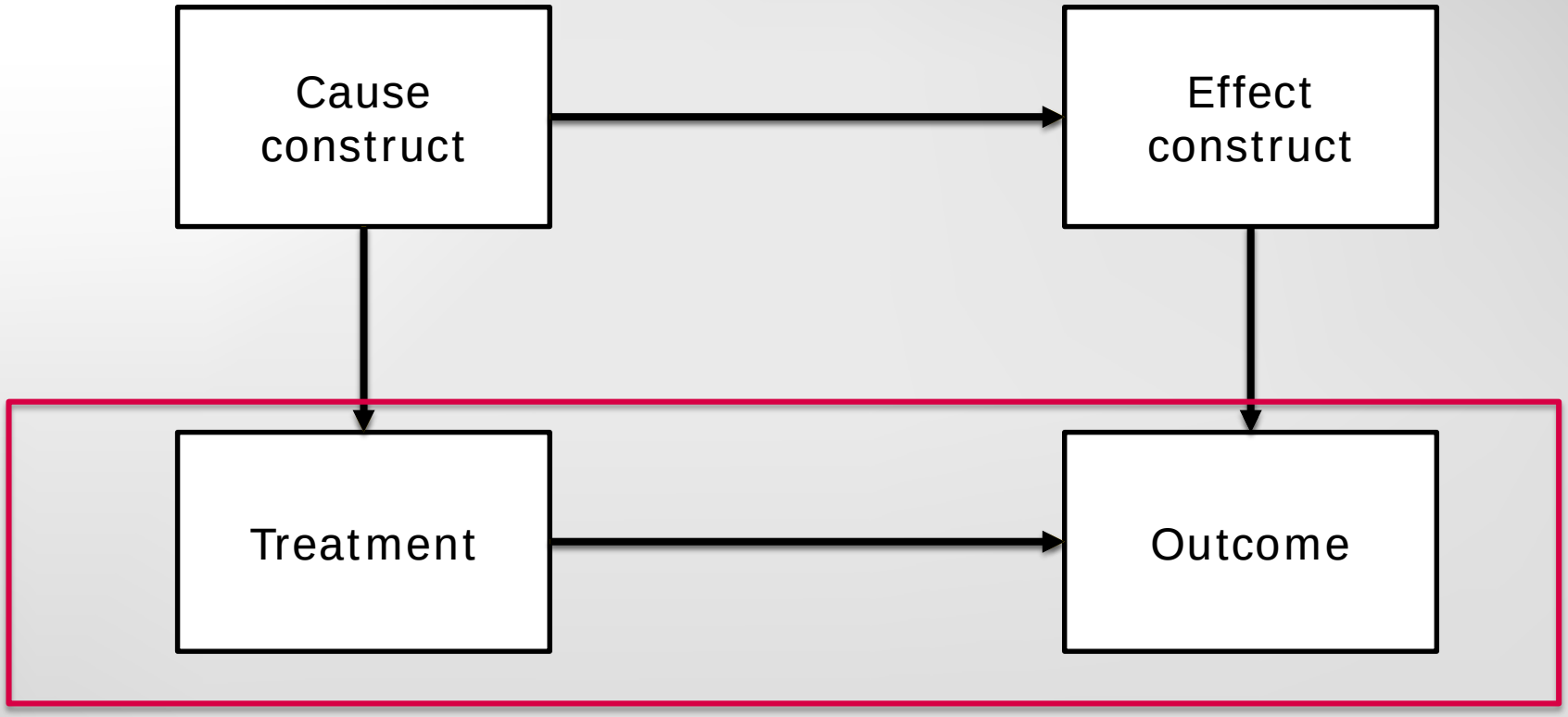


Fig. 8.2 Experiment principles (Adapted from Trochim [171])

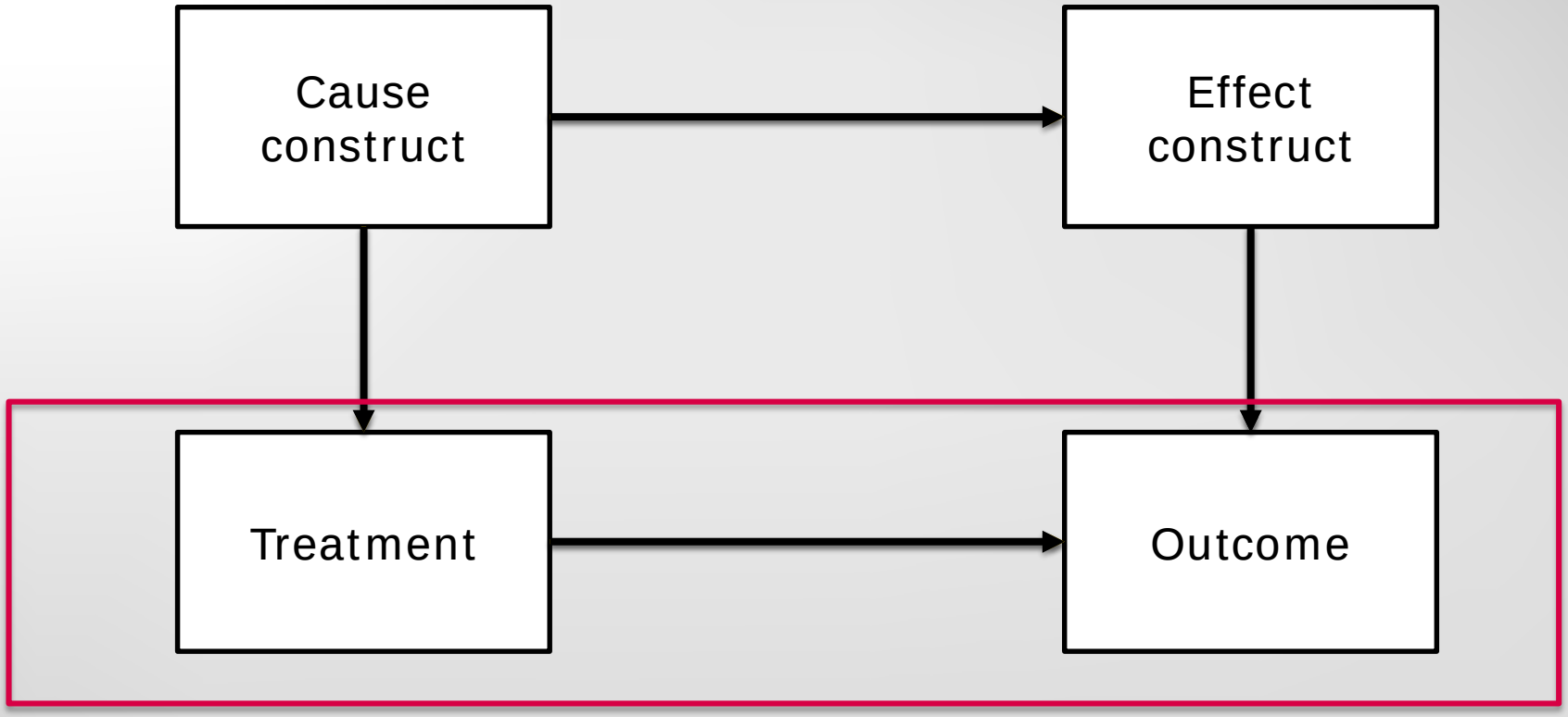
1. Conclusion validity
2. Internal validity
3. Construct validity
4. External validity

Conclusion validity



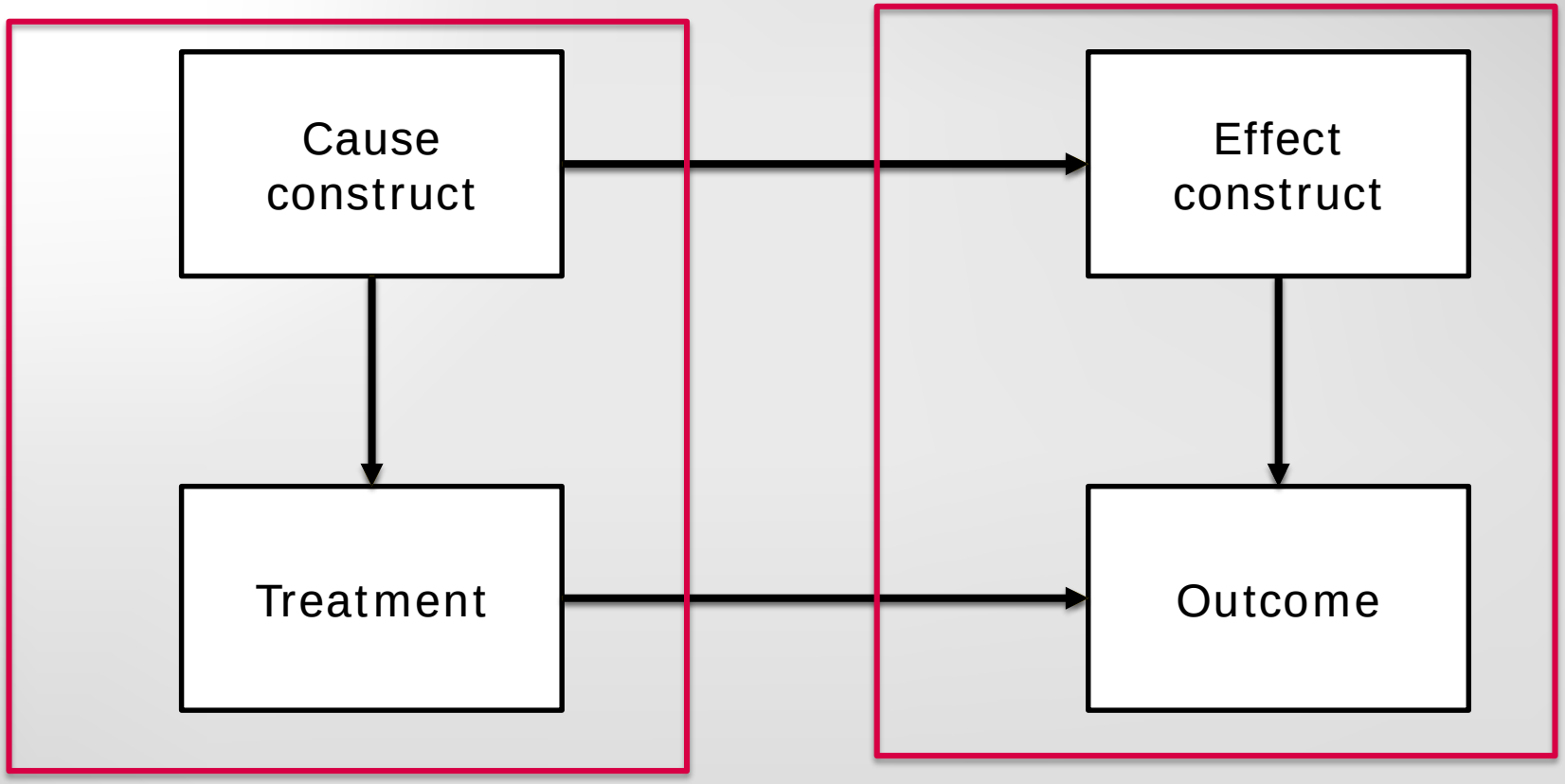
Statistical relationship: Significance

Internal validity



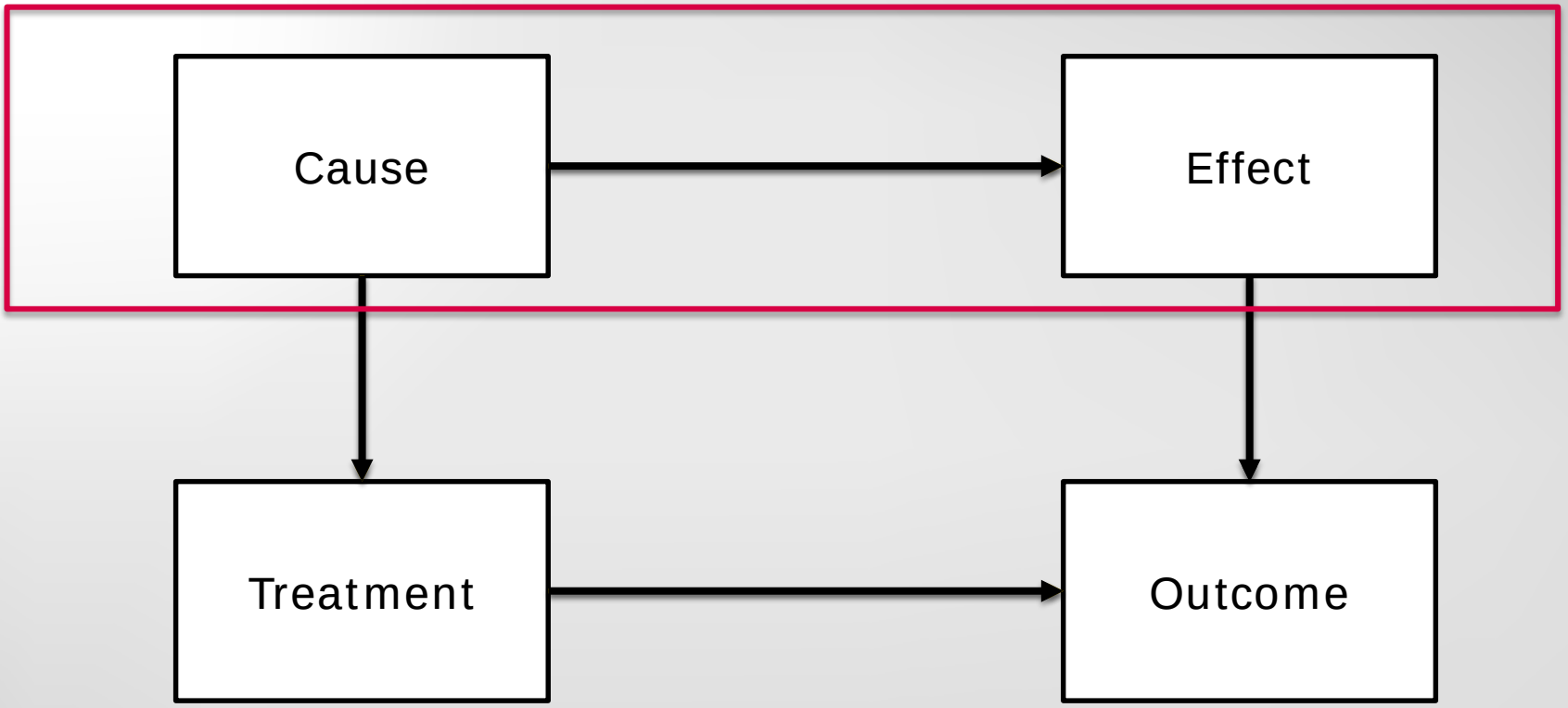
Causal relationship: the treatment causes the outcome

Construct validity



Causal relationship: experiment setting reflects the construct under study

External validity



Generalisation: Can the results of the study be generalized outside the scope of study?

Question

From last year

Hi! I have a question about the measurement of validity. In the email we got it says we have to derive this from output models (created by the research team and the participants). However, shouldn't the validity refer to the treatment? An output model is only valid if the process and guidelines are closely followed. If a participant by accident comes up with a correct output model, we should still regard it unvalid, shouldn't we? @Marcela Ruiz (edited)

What type of threat is mentioned in this question?

Details about validity threats

Use a checklist for experiment

If there is any threat:
It has to be addressed, or
It has to be accepted!

There are no silver bullets

It may be impossible to carry out an experiment without threats

What can we do?

Validity threats

Conclusion validity

- Low statistical power
- Violated assumptions of statistical tests
- Fishing and the error rate
- Reliability of measures
- Reliability of treatment implementation
- Random irrelevancies in experimental settings
- Random heterogeneity of subjects

Discussion

Threats in our experiment

Ideas to mitigate the threats / accept the threats

Validity threats

Internal validity

Single group threats

- History
- Maturation
- Testing
- Instrumentation
- Statistical regression
- Selection
- Mortality
- Ambiguity about the direction of causal influence

Internal validity

Multiple group threats

- Interactions with selection

Social threats to internal validity

- Diffusion or imitation of treatments
- Compensatory equalization of treatments
- Compensatory rivalry
- Resentful demoralization

Validity threats

Internal validity

- Multiple group threats
- Interactions with selection

- Social threats to internal validity
- Diffusion or imitation of treatments
- Compensatory equalization of treatments
- Compensatory rivalry
- Resentful demoralization

Discussion

Threats in our experiment

Ideas to mitigate the threats / accept the threats

Validity threats

Construct validity

- Design of the experiment
- Inadequate explication of constructs
- Mono-operation bias
- Mono-method bias
- Confounding constructs and levels of constructs
- Interaction of different treatments
- Interaction of testing and treatment
- Restricted generalizability across constructs

Construct validity

- Social
- Hypothesis guessing
- Evaluation apprehension
- Experimenter expectancies

Validity threats

Construct validity

- Social
- Hypothesis guessing
- Evaluation apprehension
- Experimenter expectancies

Discussion

Threats in our experiment

Ideas to mitigate the threats / accept the threats

Validity threats

External validity

- Interaction of selection and treatment
- Interaction of setting and treatment
- Interaction of history and treatment

Discussion

Threats in our experiment

Ideas to mitigate the threats / accept the threats

Main conclusions

Use a checklist of threats for experimental design

If there is any threat:

- It has to be addressed, or
- It has to be accepted! -> and discussed

Validity threats
Our experiment

To do!

Classroom discussion