CHI 2024
Surfing the World
11-16 May 2024

Current Topics in Human–Computer Interaction

Reviewing • Quantitative Analysis • Qualitative Analysis

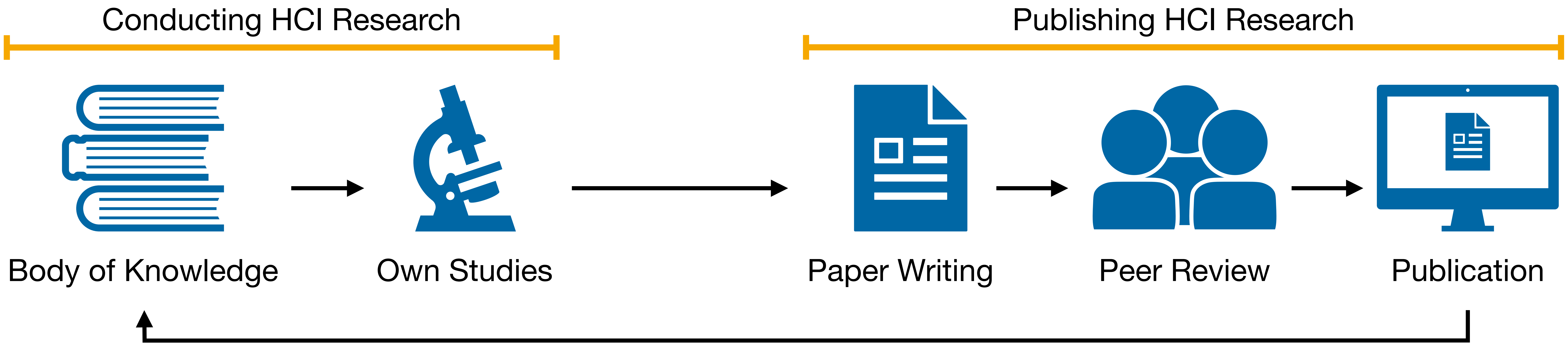
Prof. Dr. Jan Borchers
Media Computing Group
RWTH Aachen University

Summer Semester ’24

https://hci.rwth-aachen.de/cthci

RWTH AACHEN UNIVERSITY

Recap: The Full Picture on HCI Research



Covered so far:

- Research Contribution Types
- How to Read A Scientific Paper
- Contribution & Benefits Statement

- Research Approaches

- Criteria for a Good Paper (done)
- Guided Paper Walkthrough (done)

Next:

- Structure of a (CHI) Review

Criteria for a Good Paper

- **Contribution**: What new insight does it bring to the field?
- **Benefits**: What can the community learn from this / do with this?
- **Novelty**: Are the results new (original)? Is prior work covered well?
- **Validity**: Are the claims backed up properly?
- **Applicability**: How well does the paper match the likely audience?
- **Format**: Readability, consistency, and clarity. A clear, error-free presentation of text, figures, graphs, etc.

[Based on the Guide to a Successful Submission for CHI '21]

CHAPTER 10

Paper Reviews

Structure of a (CHI) Review

- Short summary of the contributions and benefits
  - “This paper presents… (who) will benefit from (what)”
- Concerns: Novelty, Validity, Applicability, Format
- Suggestions for improvement
- Overall rating: 1: definite reject – 5: definite accept
- Reviewer’s expertise: 1: no knowledge – 4 expert

[Based on the Guide to Reviewing Papers for CHI ’21]

Checklist for Reviewers

- If recommending accept:
  - Convince yourself that it has no serious defects
  - Convince the editor or meta-reviewer that it is of an acceptable standard, by explaining why it is relevant, original, valid, and clear
  - List the changes that should be made before it is published
    - Where possible: indicate not just what to change but what to change it to
  - Take reasonable care in checking details, e.g, mathematics, formulas, and bibliography

[Justin Zobel, Writing for Computer Science, 2004]

Checklist for Reviewers

- If recommending reject:
  - Clearly explain the faults and, where possible, discuss how they could be rectified
  - Indicate which parts of the work are of value and which should be discarded
  - Check the paper to a reasonable level of detail

[Justin Zobel, Writing for Computer Science, 2004]

Checklist for Reviewers

- Always do the following in either case
  - Provide good references with which the authors should be familiar
  - Ask yourself whether your comments are fair, specific, and polite
  - Be honest about your limitations as a referee of that paper
  - Check your review carefully as you would check one of your own papers prior to submission

[Justin Zobel, Writing for Computer Science, 2004]

Example: A CHI Review of ForceRay

Target acquisition problem is a well-known problem on the smartphones with larger size displays. This paper proposes an alternative method that uses force input to extend thumb reach. Results shows the proposed method (FR) does not outperform the previous technique (BC) in speed and accuracy but maintain more stable grip while selecting. The paper is well-written and clearly presents every parts in detail. Relevant related works also have been cited. However, the most worrying of this paper is the significance of the paper's contribution along with the paper length.

My first impression of this work through the figure 1 was the proposed technique might not be easy to control via the force input. Although [10] has showed a more reliable force input for quick release technique, FR requires users to control the force and the direction at the same time thus make the selection harder and less accurate. This concern has been confirmed in the result of the study. It might be a good try to combine force trigger mechanism + another targeting mechanism such as ExtendedThumb. The most advantage of FR over other techniques is the grip stability. However, the result of the subjective questionnaire (fig. 8) reveals that there is no significant difference between BC and FR. I would consider that the users' subjective feedbacks are more important than the sensor-level rotational data because it means that users have no such feeling even the sensor data has differences. I was confused that why the authors selected MagStick as one of the techniques in Study 1. Many previous work has already revealed MagStick's disadvantages on large phones. Instead, ExtendedThumb[26, *] and BezelSpace[50] are the better candidates to compare with since they can be seem as different versions of BezelCursor and never been compared before. There is a misleading description in line 243 to 249: CornerSpace and BezelSpace are two different approaches and the latter one provided the same benefits as FR on scalability, efficiency and visibility. In addition, the claim in line 934 to 937 is improper, because the experiments in both papers are not the same. It should be fairly compared then the claim shall be made. Study 2 didn't reveal any new finding versus study 1 except the training effect which is easy to predict. The authors can consider to save the space to make the paper more condense.

Overall, the paper is well-structured and easy to follow. But it lacks a strong contribution along it's page length. I would lean against accepting this submission at this point. # Minor typo on line 418: "to to". * Please consider to replace [26] with the following citation: J. Lai and D. Zhang, "ExtendedThumb: A Target Acquisition Approach for One-Handed Interaction With Touch-Screen Mobile Phones," in IEEE Transactions on Human-Machine Systems, vol. 45, no. 3, pp. 362-370, June 2015.

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Contributions & Benefits

Format

Novelty

Suggestions For changes

Validity

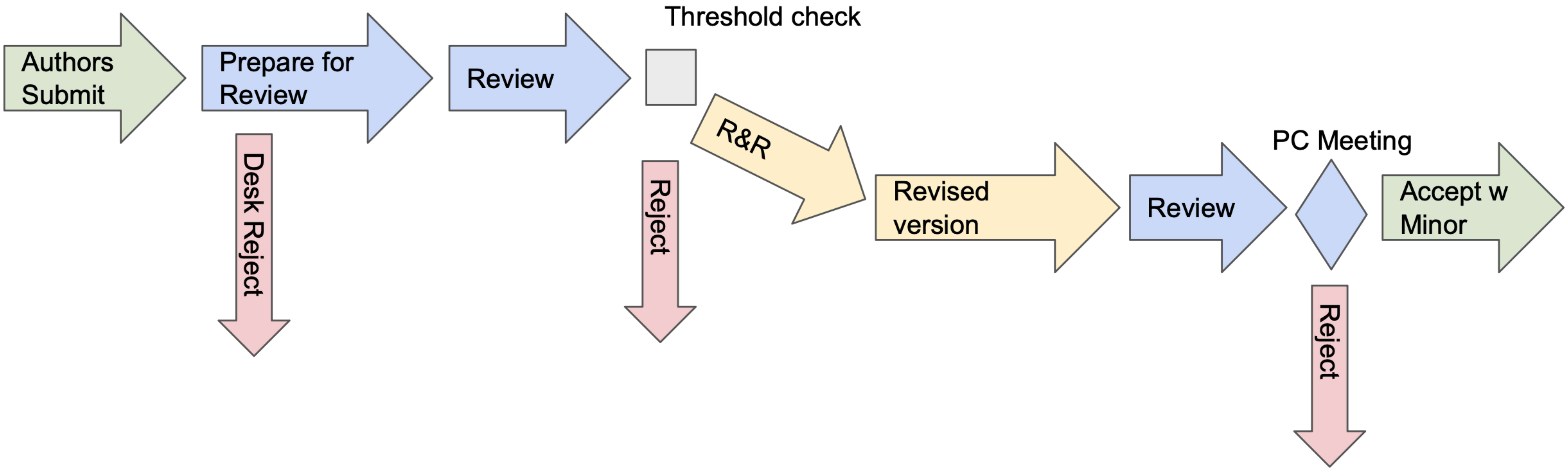
Summary

Details

The Revise and Resubmit Process

- Giving authors a chance to directly improve and resubmit their paper
- Common for journals
- Recently also introduced for some conferences like CHI
- Initial decisions may include reject, revise and resubmit, or accept with minor revisions

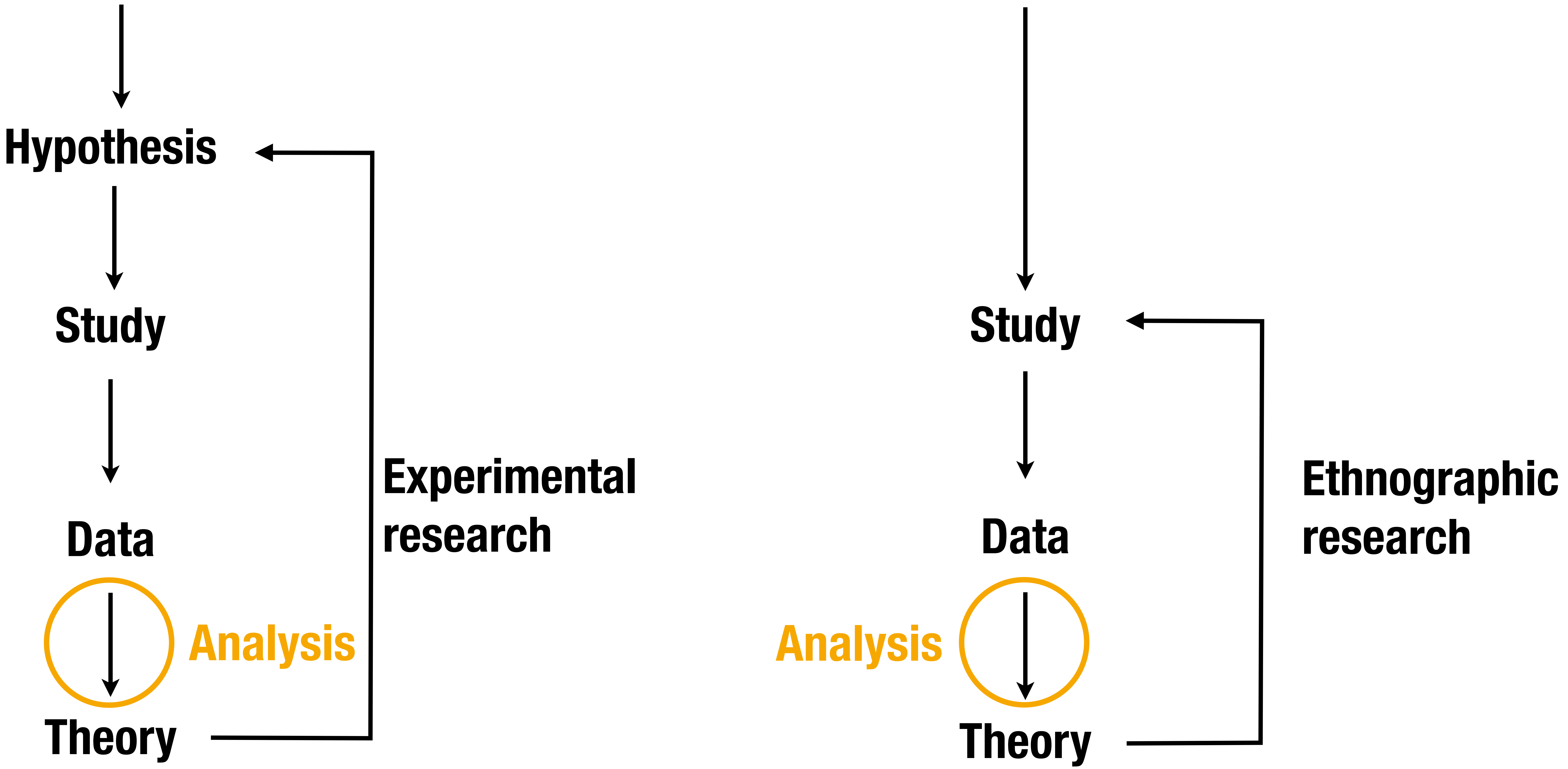
Example: The CHI'24 Process



CHAPTER 11

Quantitative Analyses

Recap: Experimental Research and Ethnography

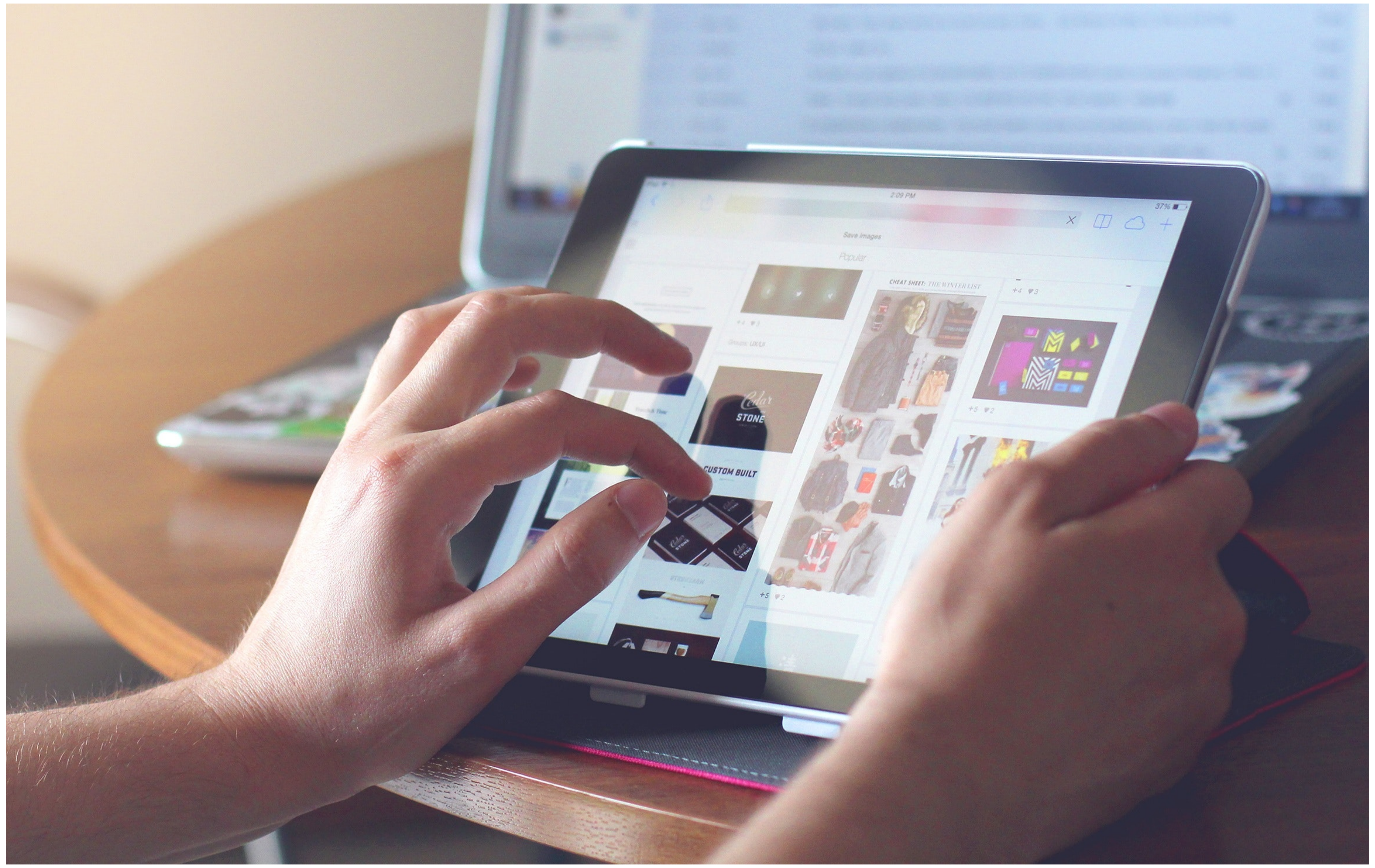


Quantitative vs. Qualitative Analyses

Quantitative	Qualitative
Use numbers to present a research finding	Use text, videos, or pictures to present a research finding
Used to confirm theories and assumptions—mostly in empirical research	Used to understand people and processes—mostly in ethnography
Data collection through lab experiments and surveys	Data collection through interviews, observations, and diary studies
Data analysis through significance testing, regression models, Bayesian analysis, etc.	Data analysis through grounded-theory, affinity diagramming, etc.

In reality, you often mix *aspects* of quantitative and qualitative analyses.

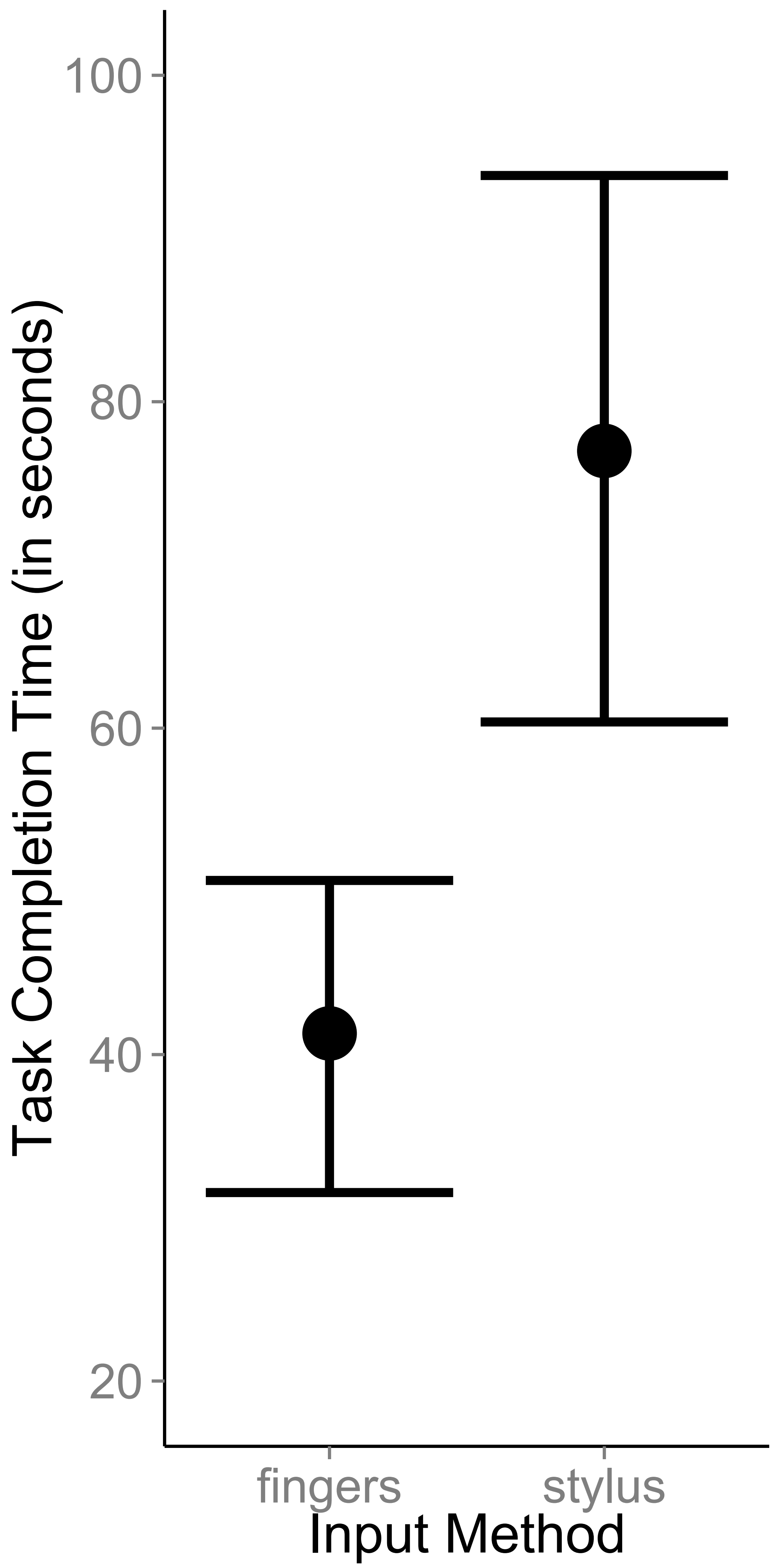
Example from Empirical Research: Comparing Input Methods for Typing



Fingers

Stylus

How This May Be Reported In a Research Paper



“The input method (*Finger*, *Stylus*) had a significant effect on the task completion time, $t(20) = 4.03$, $p < .001$.

Finger (*M* = 42.03 s; 95% CI [31.78, 52.22]) was faster than *Stylus* (*M* = 76.21 s; 95% CI [59.40, 93.02]).

The difference between the means was 34.18 s.”

Steps in Empirical Research

1. Formulate hypothesis
2. Design experiment by identifying the dependent and independent variables while limiting extraneous variables
3. Recruit participants
4. Run the experiment to collect experimental data
5. Perform quantitative analysis on experimental data to accept or reject hypothesis

1. **Formulate hypothesis**
2. Design experiment, pick dependent & independent variables, and limit extraneous variables
3. Recruit subjects
4. Run experiment (to collect data which you will analyze)
5. Perform statistical analysis on the collected data to accept or reject hypothesis

- Null hypothesis (H_0): The typing speed when using fingers is not different from the typing speed when using a stylus.
- Alternative hypothesis (H_1): The typing speed when using fingers is different from the typing speed when using a stylus.

1. Formulate hypothesis
2. **Design experiment, pick dependent & independent variables, and limit extraneous variables**
3. Recruit subjects
4. Run experiment (to collect data which you will analyze)
5. Perform statistical analysis on the collected data to accept or reject hypothesis

- Experimental design: Between-groups design
- Variables
  - Independent variable (IV): Input method with levels *fingers* and *stylus*
  - Dependent variable (DV): Task completion time (in seconds)
- Control other variables (user experience, model of the smartphone/tablet, etc.)

1. Formulate hypothesis
2. Design experiment, pick dependent & independent variables, and limit extraneous variables
3. **Recruit subjects**
4. Run experiment (to collect data which you will analyze)
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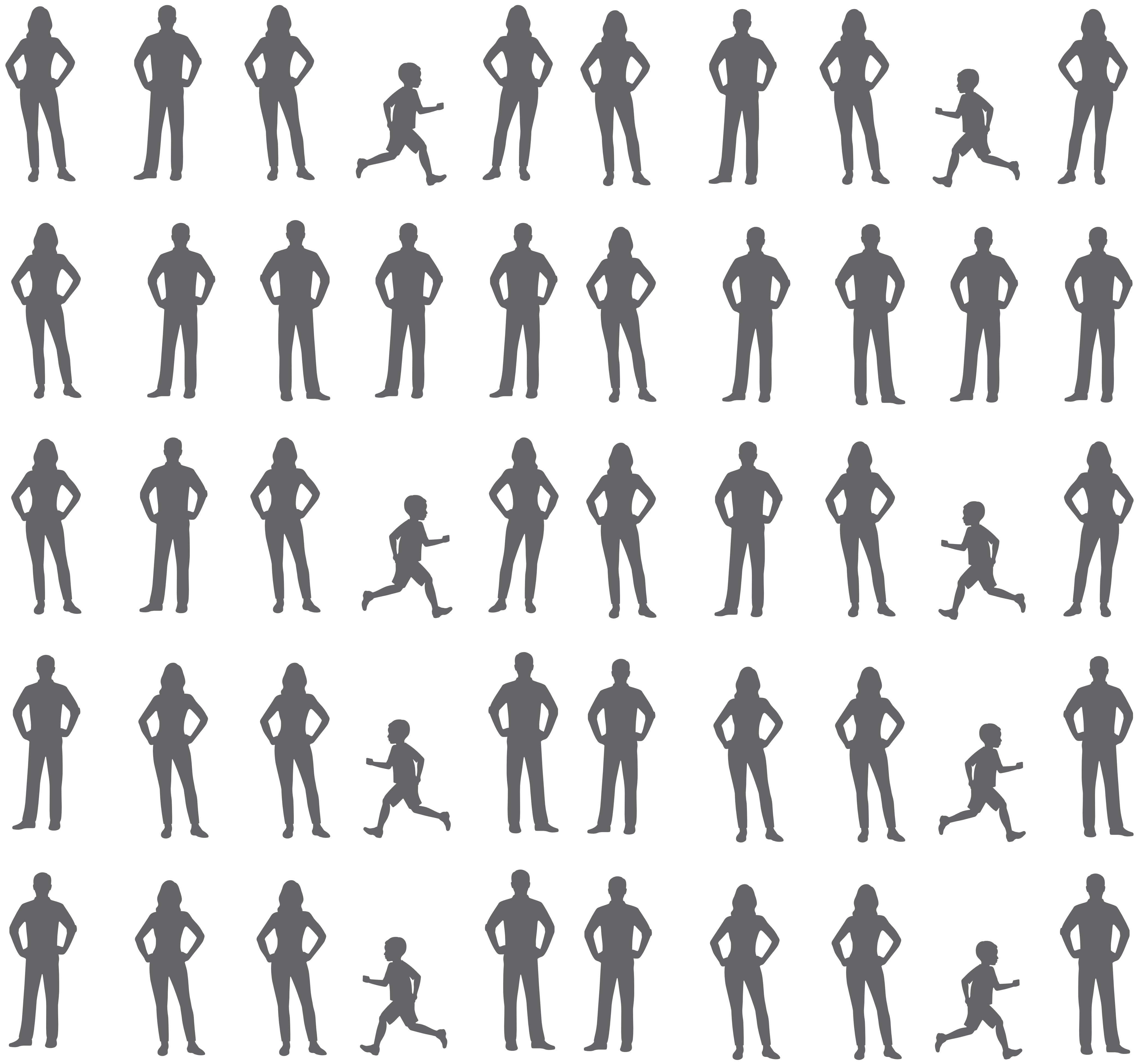
- Select a representative sample

Sample vs. Population



Sample vs. Population

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QUANTITATIVE ANALYSIS

Statistical Significance Testing

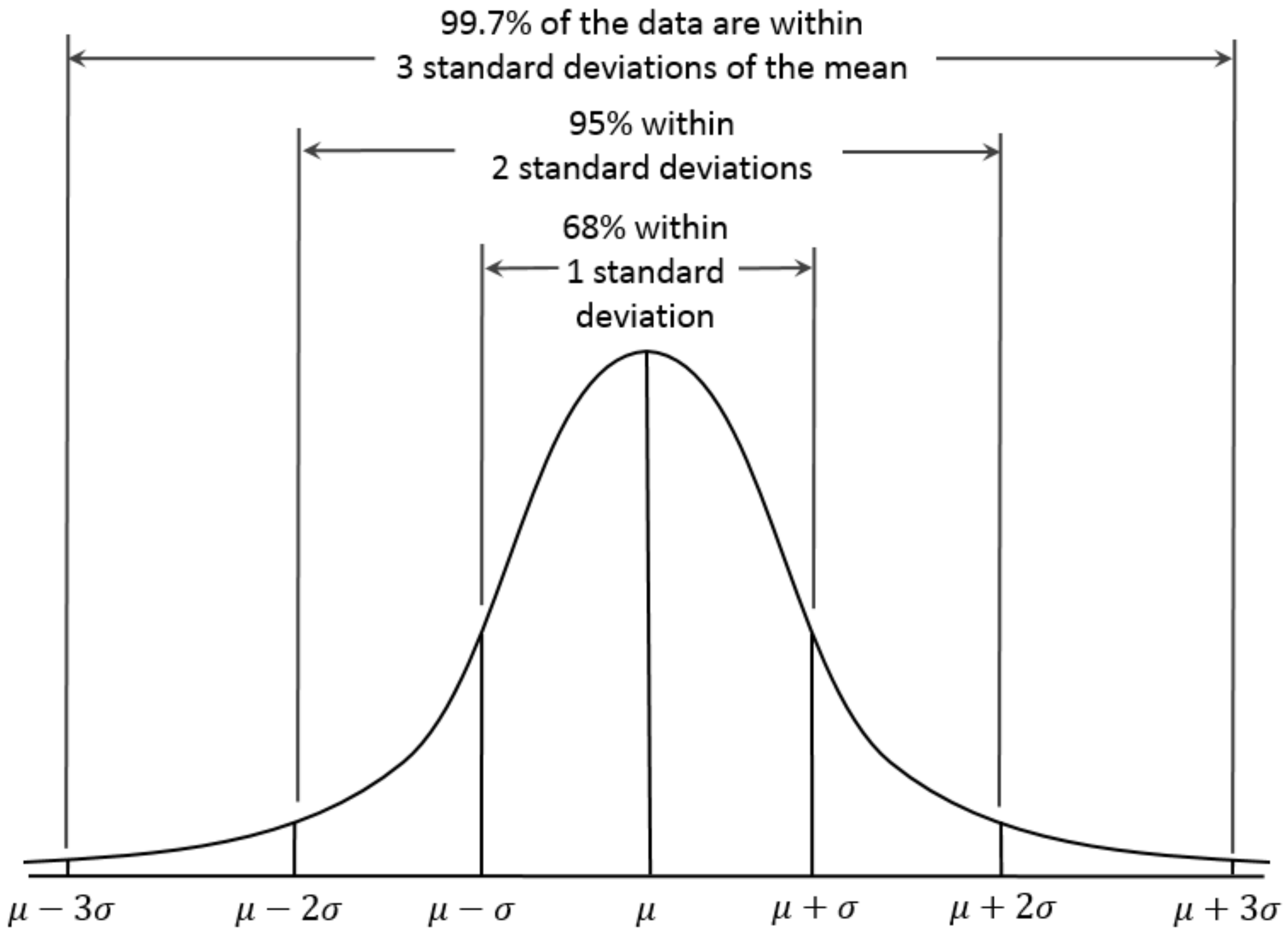
Significance Testing

- Difference in means between sampled distributions can be due to
    - an actual difference between conditions in the population
    - no actual difference in the population; observed difference in means is due to a sampling error
- Significance tests can tell these two apart

Significance Testing

- Assume H_0 to be true (i.e., no difference at the population level)
- Conduct the experiment and collect data
- Fit a statistical model to the data (e.g., *t*-distribution, F-distribution)
- Compute ***p*-value**, which is defined as:
  - **"The chances of obtaining the experimental data we've collected assuming the null hypothesis is true"**

How p-Values Work



- The **68–95–99.7 rule**, a characteristic of Gaussian distributions

p-Value

- *p*-value gives us confidence in accepting or rejecting the null-hypothesis (i.e., no difference between distributions)
  - $p = 0 \Rightarrow$ There is no chance that the null hypothesis is true, which means that the alternate hypothesis is true (there is a difference between distributions)
  - $p = 1 \Rightarrow$ The means of the samples' distributions are the same
- Remember: *"If p-value is low, H_0 has to go!"*
- In HCI, use a cut-off of 0.05
  - **$p \leq 0.05 \Rightarrow$ reject** H_0 (and accept H_1)
  - **$p > 0.05 \Rightarrow$ cannot reject** H_0

What's next?

- Complete and upload Milestone 2 by 18:00 this evening
- Continue conducting your research in Milestone 03 (Deadline Tuesday, 11.06., 18:00)

KW 18	KW 19	KW 20	KW 21	KW 22	KW 23	KW 24	KW 25	KW 26	KW 27	KW 28
M1: Research Topic	**M2:** Research Plan			**M3**: Conducting Research		**M4**: Data analysis			**M5**: Prepare Presentation	