Every baby knows the scientific method!

1 Make an observation.

2 Form a hypothesis.

3 Perform the experiment.

4 Analyze the data.

5 Report your findings.

6 Invite others to reproduce the results.

http://www.technigirl.com/product-p/nb-scientific-method-poster.htm

CTHCI Lab 3
Designing a User Study

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User Study Protocol*

- A document that explicitly states why a research project is being conducted and how

- Purpose:

  - Clearly state the research question and hypotheses

  - Plan the research procedure in details

  - A guide for all involved personal

  - Monitor research progress

*(O'Brien and Wright, 2002) How to write a protocol

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Protocol Structure:
The Research Problem

- Title - "Evaluating the performance of a new keyboard layout"

- Research problem - "We intend to find if our new keyboard layout performs faster and with less errors than the QWERTY keyboard. The new layout would lead to smaller form factors."

- Context - "There have been many new layouts that appear to perform faster than QWERTY but lead to fatigue [X, Y, Z]"

- Aim (derived from context)

- Hypotheses - "There is no difference in typing speed between the new layout and QWERTY"

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Protocol Structure:
The Research Method 1/2

- Independent variables & dependent variables (levels, operational definition, measurement scale and unit)

- Task - "The user will perform a composition task using statements from MacKenzie et al. (CHI 2003). The participant will do the following activities to complete the task…"

- Subjects/Participants (number, main characteristics, criteria to include or exclude them)

- Experimental design (within or between groups and how the conditions will be assigned)

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Protocol Structure:
The Research Method 2/2

- Experiment setup and/or apparatus (such as hardware or special features in the testing space)

- Experiment procedure (what the experimenter will do to setup the testing space)

- Data analysis methods

- References

- Include images or sketches if informative

- Write this section in future tense

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In-class Exercise: Reconstruct a Protocol

- Watch paper video

- Look at the User Study section in the given paper

- Reconstruct the protocol

- Evaluate against the authors' protocol

- How did the paper attempt to establish internal and external validity?

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Protocol Evaluation Check List

- Is the research question stated clearly?

- Is there any alternative interpretation of the question?

- Suppose you can accept the stated hypotheses, does it contribute to the understanding of the research question?

- Are variables defined clearly on the operational level?

- Is there more than one possible interpretation for the variables?

- Is the experimental design chosen carefully with consideration of the trade-offs?

- Are the statistical methods specified?

- Are the resources needed to conduct the experiment stated?

- Is the duration of the experiment appropriate?

- Ultimate question: If you had no idea about the experiment before, could you pick up this protocol, set up, and conduct the experiment? (Replicability)

Reading Assignment

- Required means content from this paper is examinable

- Assignments so far

  - Last week: (MacKenzie, 2007) *Evaluation of Text Entry Techniques*

  - This week:

    - (LaToza, T. D., & Myers, B. A., ICSE 2010) *Developers ask reachability questions*

    - (McGrath, 1995) *Methodology matters.* **Read before the next lab!**

- A02 will be on our public website today