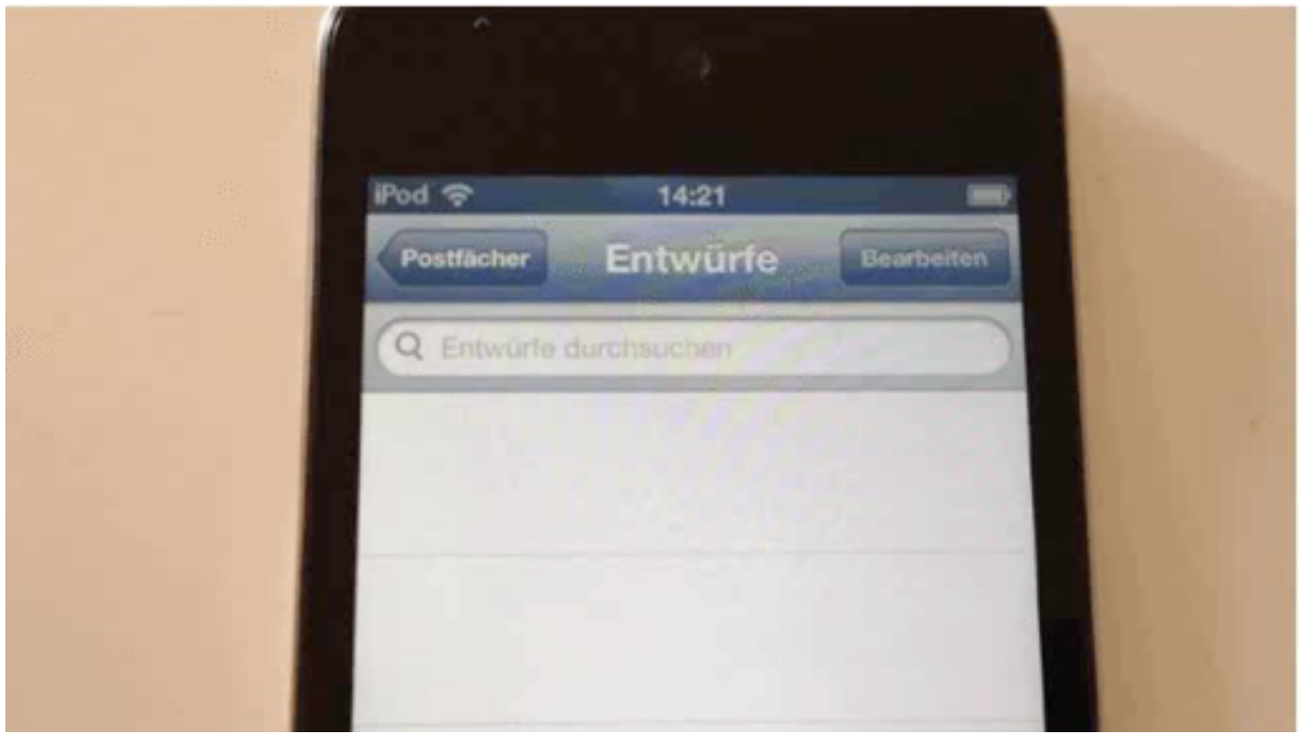

Background Research and Study Design

Lecture 5, Week 3
January 19, 2015
CSC318H1S
Velian Pandeliev

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Announcements

Phase I is due Friday at 6 pm.

Photos are due by e-mail to me by Wednesday at 11 am.

Elevator pitches on Wednesday: what problem space is your group considering?

Groups: if anyone still does not have a group, please contact me ASAP.

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Background Research

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Typical Organization

- Abstract
- Introduction
- Related Work
- Materials / Methods
- Results
- Discussion
- Limitations and Future Work
- Conclusion

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Types of relevant publications

- Human factors (cognition, perception, attention)
- Practices and problems
- New interactions / interfaces
- Prototypes and performance

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Human Factors

Universal characteristics of humans.

- conjecture or hypothesis that expands on some theory of cognition/perception/ physiology
- controlled lab experiment
- results: principle or law about how humans work.

E.g., Fitts's Law (1954)

> *The time required to rapidly touch a target is a function of the ratio between distance to target and diameter of target.*

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Practices and Problems

Uncovers issues and suggests solutions in a particular area of human behaviour or HCI.

- concerned with particular activities
- studies users in the wild
- results: design considerations or suggestions for improvement

E.g., Thayer et al. (2011)

> *Academic reading requires support for annotation and non-linear navigation, which e-readers cannot provide, which leads to slow and reluctant adoption.*

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New Interactions / Interfaces

Proposed with the idea of solving a problem or enabling new types of interactions

- respond to a problem or limitation of current interfaces

- users participate in informing the design

- new interface/interaction is often compared to existing techniques

- results: new interface adopted and/or inspires further design.

E.g., Vogel and Casiez (2011)

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Conté (Vogel & Casiez 2011)

Conté:
Multimodal Input Inspired by an Artist's Crayon

Daniel Vogel[1,2] and Géry Casiez[1]

[1]LIFL & INRIA Lille
University of Lille, FRANCE

[2]Cheriton School of Computer Science
University of Waterloo, CANADA

Proceedings of UIST 2011

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Prototypes and performance

Pushes the capabilities of hardware to enable support for better interactions in the future.

- improves on current technology on some specific metric or adds entirely new capabilities

- applications of the improved hardware not always obvious

- results: technical knowledge and more advanced hardware

E.g., TeslaTouch (2011)

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TeslaTouch

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TeslaTouch

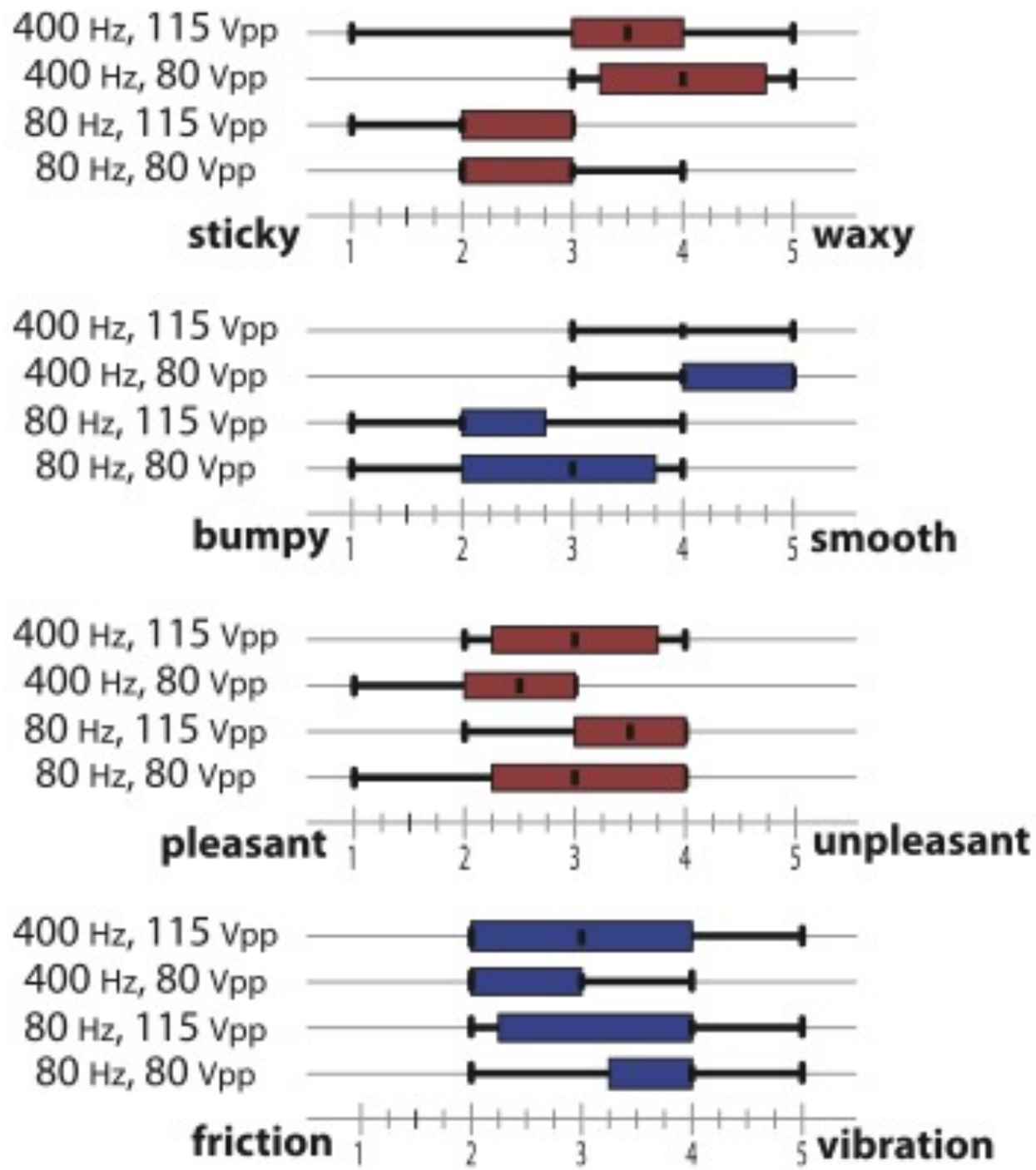

Figure 4: Ratings of stickiness, smoothness, pleasure and level of friction vs. vibration.

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Good & Bad Design

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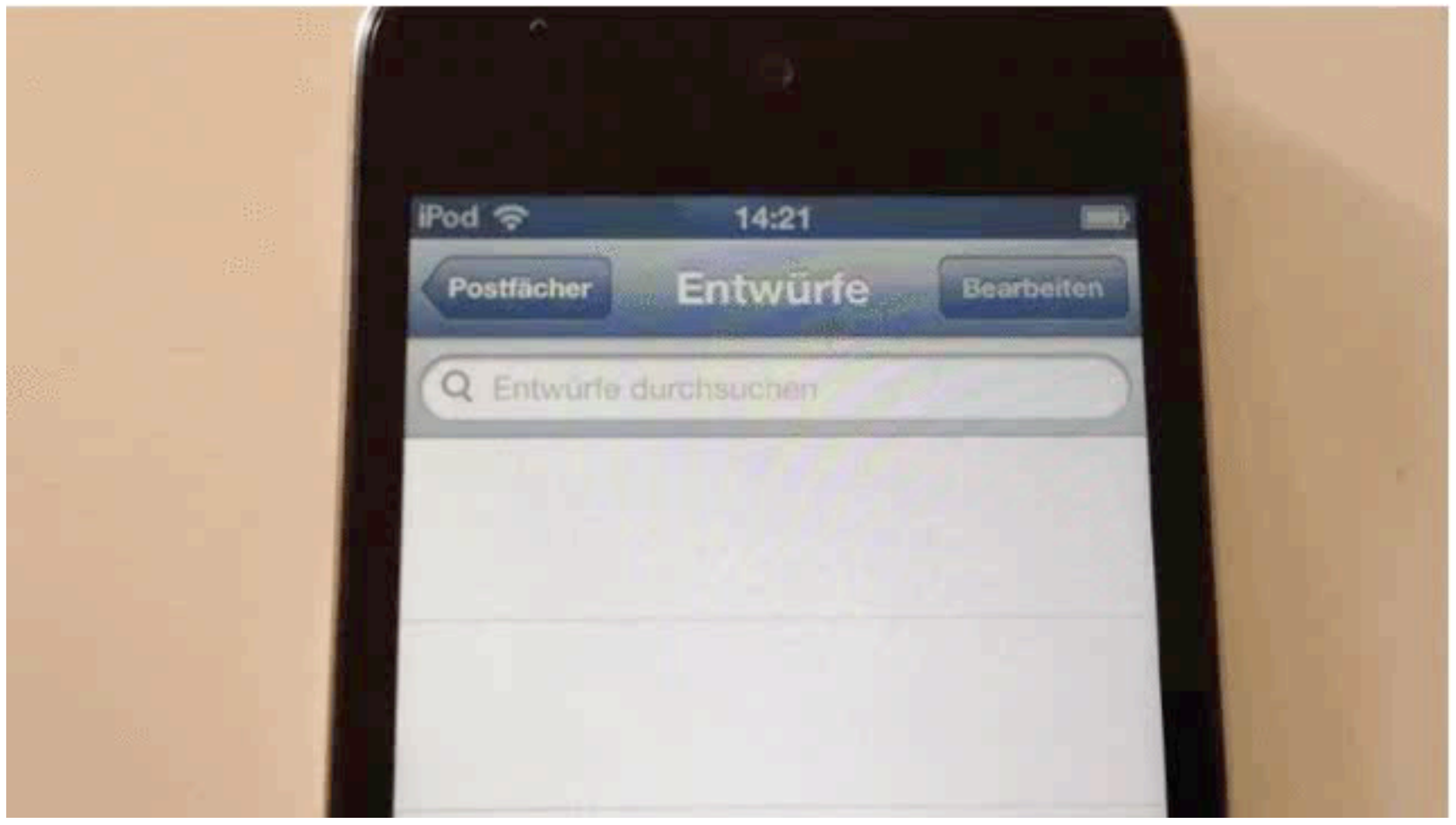
Pull-to-refresh?



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Data Gathering

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5 Key Issues

- **Setting goals**: why are we gathering data?

- **Identifying participants**: who are we gathering data from?

- **Ethics**: are we doing any harm by gathering data?

- **Triangulation**: employing different techniques to answer the same question.

- **Pilot testing**: trial runs of the main study.

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1. Setting Goals

You will conduct two rounds of user research.

In the first your goal will be to understand a problem space and to determine what issues your users are facing.

In the second you will be evaluating how well your new design is working or would work to solve the issues discovered earlier.

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2. Participants

Everyone to whom your question applies belongs to your **population**.

Which members of your population will you study?

- All (saturation sampling)
- A random subset (random sampling)
- A random subset in multiple categories (stratified sampling)
- Whoever you can get your hands on (convenience sampling).

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3. Ethics

Here's a question:

How long can a human being last in freezing cold water before they die?

There are clear and significant issues with finding the answer.

Essential principles of ethical research:

- Respect for participants
- Do no harm
- Informed consent
- Voluntary participation and right to withdraw
- Right to privacy

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3. Ethics: Informed Consent

Typically only adults 18+ are able to give consent.

Elements:

- Disclosure: experimenter explains the purposes of the study and the procedure truthfully
- Capacity: the participant should be able to understand the study and form a reasonable judgment with the information provided
- Voluntariness: free of coersion, manipulation, or bias, non-conditional compensation (!)

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3. Ethics Gone Wrong

- Nazi medical experimentation (1940s)
- The Milgram experiment (1961)
- The Stanford prison experiment (1971)
- Tuskegee syphillis experiment (1932 - 1972)

Accidental awesomeness:

- Phineas Gage (projectile iron rod)
- H.M. (epilepsy treatment)
- K.C. (motorcycle accident)

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4. Triangulation

Probing the same phenomenon using multiple experimental and observation techniques to obtain greater confidence in the results.

5. Pilot Testing

Before you deploy your study to your actual users, make sure you have thoroughly tested all the instruments (questionnaires, scripts, prototypes, etc.) you are using.

Participant time is valuable to them.

Their data is valuable to you.

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Data Gathering

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Evaluation Methods

Sample survey

Obtain a representative sample of a population in order to understand population-wide trends and preferences. Great for **generalizability**.

Laboratory Experiment

Perform fine measurements of user performance in tightly controlled laboratory conditions. Great for **precision**.

Field Study

Understand underlying user needs in the wild by observing them in their environment. Great for **realism**.

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Field Study Techniques

Naturalistic observation: no involvement, observation only

Questionnaires: wide distribution, many responses

Interviews: great detail, adapt to responses

Focus groups and workshops: multiple participants, consensus

Studying documentation: existing process/system

Diaries/logging: details on duration of usage and performance

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This lecture is based on slides and content by:
ILONA POSNER
Materials from:
Interaction Design: Beyond Human-Computer Interaction. Rogers, Sharp and Preece. 2011

References:

- Bau et al. (2010). "*TeslaTouch: Electrovibration for Touch Surfaces*". UIST 2010
- Fitts, Paul M. (June 1954). "*The information capacity of the human motor system in controlling the amplitude of movement*". Journal of Experimental Psychology
- Thayer et al. (2011) "*The imposition and superimposition of digital reading technologies.*" CHI 2011
- Vogel & Casiez. (2011). "*Conté: Multimodal Input Inspired by an Artist's Crayon.*" UIST 2011

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