

Research Methods in computer science

Fall 2014

Lecture 9

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Agenda

Research Conference Updates

Sampling Bias

HW5

Sampling Bias

“In statistics, sampling bias is a bias in which a sample is collected in such a way that some members of the intended population are less likely to be included than others. It results in a biased sample, a non-random sample of a population (or non-human factors) in which all individuals, or instances, were not equally likely to have been selected. If this is not accounted for, results can be erroneously attributed to the phenomenon under study rather than to the method of sampling.” -- wikipedia

Types of sampling bias

Self selection bias

Pre-screening

Exclusion

etc.

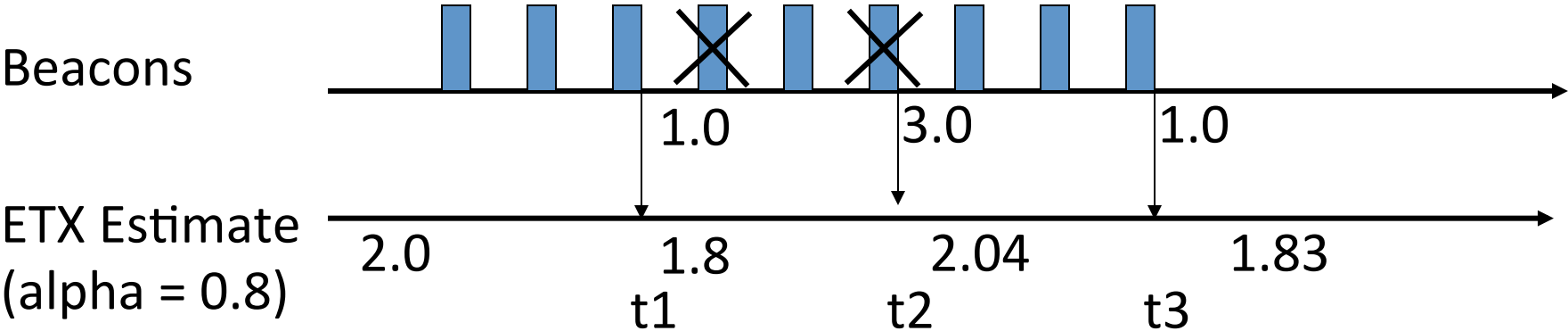
[from wikipedia]

Using signal strength for link quality estimation can introduce sampling bias.

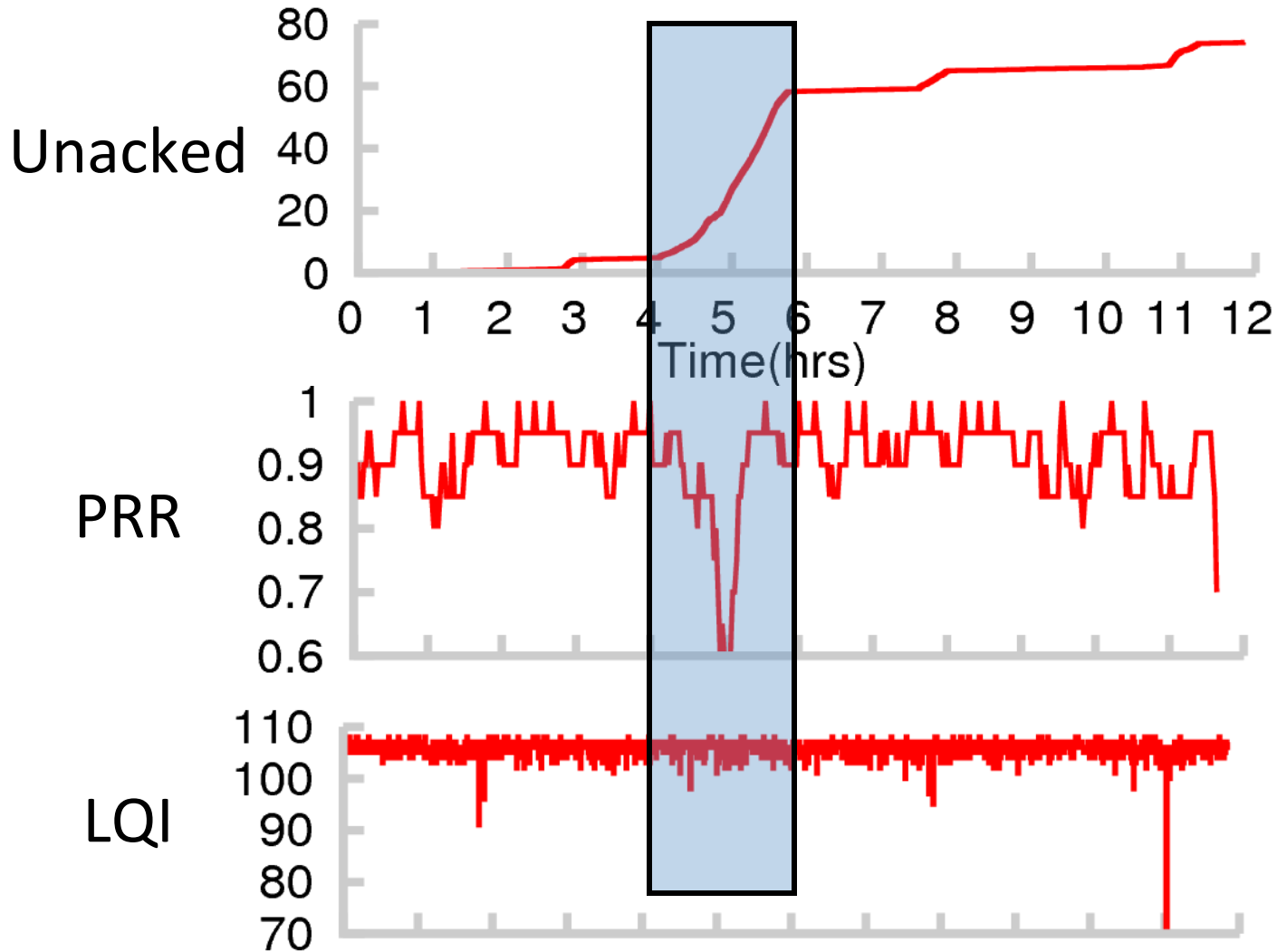
Link quality estimation

Estimate how “good” a link is.
Important for link selection.

ETX Estimation Example



Link Estimation using PHY info

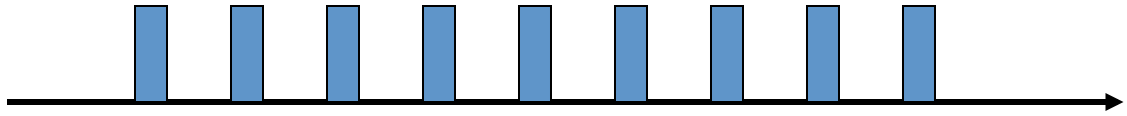


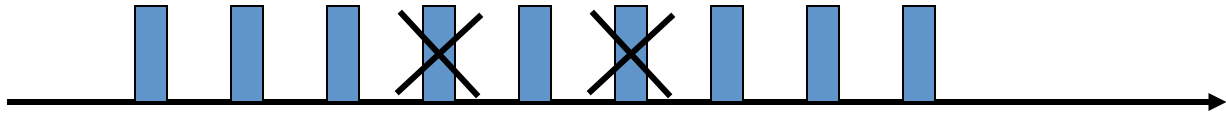
Quality of reception = Signal / Noise

Lot of wireless network research tries to understand performance as some function of SNR

“The Prism 2.5 chip-set provides per-frame measurements called RSSI (receive signal strength indication) and “silence value.” The RSSI reflects the total power observed by the radio hardware while receiving the frame, including signal, interference, and background noise. The silence value reflects the total power observed just before the start of the frame. We found that the accuracy of the RSSI and silence readings was within 4 dB by comparison with a spectrum analyzer. This paper reports signal-to-noise ratios derived from the RSSI and silence values.” – [Aguayo et al. 2004]

Quality of reception = Signal / Noise



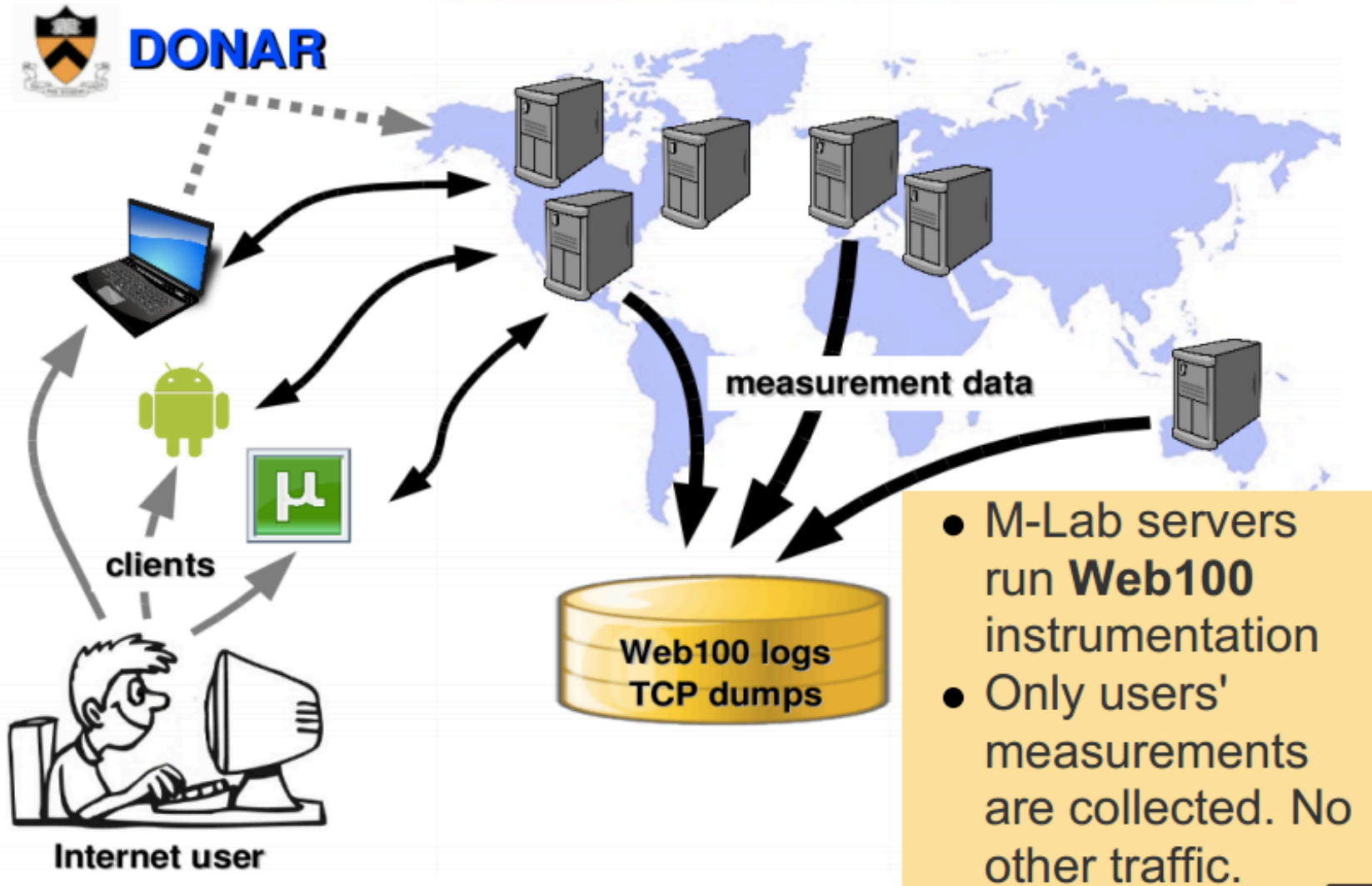


How to select participants
for an HCI study?

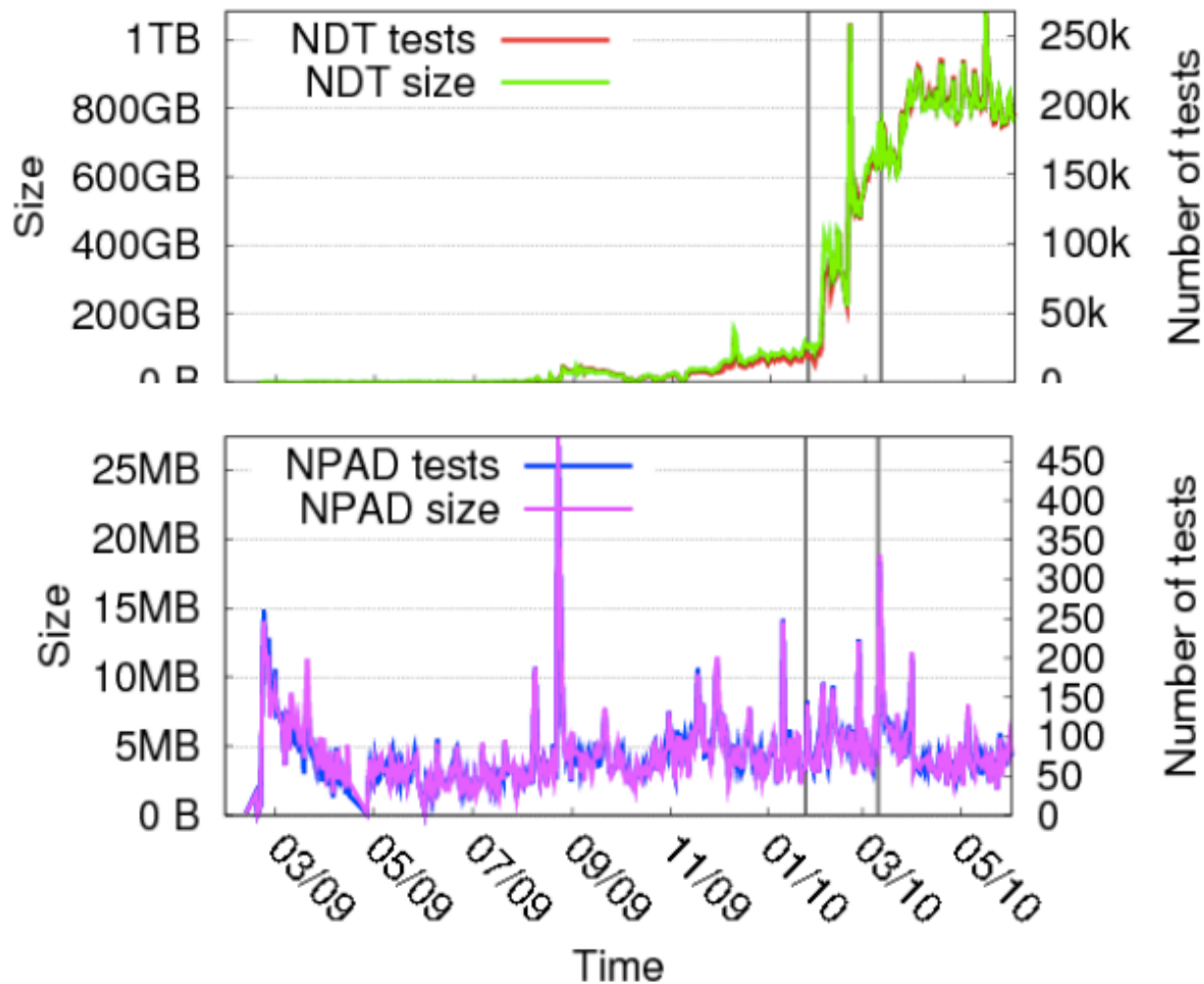
What is the possibility of
sampling bias?

Example of bias due to a
significant change in mixture of
data source

Measurement & Data collection



How much data? How many tests?



Jan 25 2010
uTorrent launch
Mar 11 2010
FCC launch

NDT

Tot tests: 22M

Tot size: 93TB

NPAD

Tot tests: 34K

Tot size: 2GB

HW5

Lucid dreaming is a learnable, but difficult skill.

Consequently, we have sought methods for helping dreamers to realize that they are dreaming by means of external cues applied during REM sleep, which if incorporated into dreams, can remind dreamers that they are dreaming. Here we report on an experiment testing the validity and effectiveness of a portable computerized biofeedback device (DreamLight) designed to deliver light cues during REM sleep. The 14 subjects used DreamLights on 4 to 24 nights. They were unaware

that the DreamLights were specially programmed to deliver cues only on alternate nights. Eleven subjects reported 32 lucid dreams, 22 from nights with light cues, 10 from nights without cues. All lucid dreams scored (by judges blind to DreamLight condition) as being "cued" by the DreamLight's stimuli occurred on nights when the DreamLight was actually delivering cues. Subjects reported seeing in their dreams what they believed to be DreamLight cues significantly more often on light cue nights (73 total) compared to nights without

light cues (9). The conclusion is that cueing with sensory stimuli by the DreamLight appears to increase a subject's probability of having lucid dreams, and that most of the resulting lucid dreams are due to the specific effect of light cues rather than general "placebo" factors.