About the conference

- ACM Conference on Human Factors in Computing Systems
- Most prestigious conference in human-computer interaction
- Acceptance rate 2009 was 25%
  - Has been 16%-30% last 20 years
- ~2000 attendees
- Four days, 10+ tracks per day
- I participated in a workshop the day before
# Conference at a Glance

## SUN
- **Room 311**
  - **10:00-10:30**
    - Paper: **New Non-Novelty Input and Output Technologies**
      - **10:00-10:30**
      - Session: **(Session) Design Realization: On the Table**
      - **10:30-10:45**
      - Poster Session: **(Poster Session) New Reality, Old Trends**

## MONDAY
- **Room 311**
  - **10:00-10:30**
    - Paper: **New Non-Novelty Input and Output Technologies**
      - **10:00-10:30**
      - Session: **(Session) Design Realization: On the Table**
      - **10:30-10:45**
      - Poster Session: **(Poster Session) New Reality, Old Trends**

## TUESDAY
- **Room 311**
  - **10:00-10:30**
    - Paper: **New Non-Novelty Input and Output Technologies**
      - **10:00-10:30**
      - Session: **(Session) Design Realization: On the Table**
      - **10:30-10:45**
      - Poster Session: **(Poster Session) New Reality, Old Trends**

## WEDNESDAY
- **Room 311**
  - **10:00-10:30**
    - Paper: **New Non-Novelty Input and Output Technologies**
      - **10:00-10:30**
      - Session: **(Session) Design Realization: On the Table**
      - **10:30-10:45**
      - Poster Session: **(Poster Session) New Reality, Old Trends**

## THURSDAY
- **Room 311**
  - **10:00-10:30**
    - Paper: **New Non-Novelty Input and Output Technologies**
      - **10:00-10:30**
      - Session: **(Session) Design Realization: On the Table**
      - **10:30-10:45**
      - Poster Session: **(Poster Session) New Reality, Old Trends**
Challenges in evaluation of RBI

• Challenges in the Evaluation of Usability and User Experience in Reality Based Interaction
• Traditional methods for evaluation interaction cannot cope with the richness of RBI
  – Emerging technologies make researchers come up with new, different, methods of evaluation
  – A common framework for comparison is lacking
• The goals were to share experiences, present possible solutions and discuss a common framework
Best paper – Gray

- Why milliseconds matter
- Subjective present – self-awareness
  - Divides timescale into three parts
    - Around 3 seconds, and longer/shorter than 3 seconds
  - Interactive routines – typically unaware, familiar procedures
- The Extended Mind – cognitive impartiality principle
  - No functional distinction between knowledge-in-the-head versus knowledge-in-the-world
- Soft constraints hypothesis
  - Selection depends on utility, cost and uncertainty
  - The paradox of the active user – satisficing selections
- Avoid Naïve Realism
  - Perception is remarkably complex, error-prone and sparse
- RBI is a good ”applied problem” for cognitive science
BCI – Hirshfield

• Give up reality only with motivation
• How do we say it’s better?
• Using fNRIS (functional Near InfraRed Spectrography) to measure and classify workload
  – More later (also full paper at conference)
Summary of others

• Heldal – social interaction and cooperation in VR
  – Different setups make a big difference

• Dias – compare VR and desktop
  – Better performance with desktop, training helps, accelerated head-rotation preferred

• Christou – Knowledge based user evaluation
  – Where is the knowledge the user needs? In the head, in the system or nowhere?

• Dow – Facada, an ”interactive AR story”
  – To realistic can be uncomfortable

• Green – Philips research
  – Wants a general/common way to compare different interactions
Some conclusions

• **Familiarity** is the key aspect of "reality" here
• Tradeoffs along the path from what the user is directly familiar with (reality based interaction) to expert interaction that is adapted to the task and has to be learned
  – Capture and describe the details so that tradeoffs are made with proper awareness of what is gained and lost in each case
Professionally useful?

- Compare to instant messaging? Team building?
- A study of users in Second Life
- A Multi User Virtual Environment (MUVE)
  - Not a MMORPG
- Harder than expected to introduce users
- Five challenges
  - Initial motivation (replace face to face, it’s a game)
  - Technical difficulties (hardware, client-server, etc)
  - Interacting competently (moving, handling objects)
  - Becoming socially proficient (social signaling, real or fantasy)
  - Finding compelling activities (SL – empty and boring)
- One possible application – virtual (in part) conferences
  - Attending a real conference virtually
Avatars

- 3 different worlds studies
- Users generally have several avatars but 90% consider one to be their "main" character
- Three common themes
  - Idealized self
  - Standing out
  - Like an idol/celebrity
- Idealized characters – younger, fitter
- The personality difference
Situated Visualization

• SiteLens
• AR with tablet, gyro, GPS, AR-toolkit
• See data in context – spot casual relationships
  – I.e., pollution and cars at a red light
• Freeze the seen to dig into data
• Smoke is one good visualization
VR in mental health care

- Privacy is fundamental
- Solutions focused therapy
- Need to have a triangle with all involved
  - Client, therapist and the game
- Useful as an icebreaker – and more!
- Literacy is a problem
- Role playing has great potential
Lightweight tags

• Tagging for everyday use
  – Can it be lightweight enough?
• Tagging ”resources” in normal work
  – I.e., files in a filesystem, links, meetings, etc
• Two different modes of use
  – Tags first – as placeholders
  – Resources first – need for tags are discovered
    • Threshold effect, number of resources needed
• Replicating a folder hierarchy takes many tags
  – Adding many tasks may be to cumbersome
Remembrance and tags

• Use tags to organize and categorize your memories

• Study of tagging on the net – compares clicking and typing to add tags
  – Different ”costs” to tag
  – How does this affect our remembrance?

• Clicking increases tagging and recognition of facts from tagged texts
  – Memory traces are strengthed by repeated readings of relevant words
Misc tags, etc

- **FacetLens**
  - Navigate large datasets by applying filters visually

- **Tag clouds**
  - What arrangement is the best?
    - Alphabetic, random, semantic
    - Semantic is slower than alphabetic
Misc tags, etc

- Social tagging
  - sparTag.us
  - mrtaggy.com
- Filter search incrementally by adding search tags and bad tags
Brain measurements for adaptive intercafes

• Using fNIRS to detect differences in mental workload and brain activity with different user interfaces
  – Uncovering “syntactic workload”
• Study comparing user interfaces with known differences in brain activation
  – Spatial vs verbal memory
• Future cooperation!
Stress cam

• Thermal imaging of the face to determine workload and stress
  – Detects the bloodstream in the face and forehead

• Used to adapt the level of difficulty in a game
  – Important for motivation and enjoyment
  – And for optimal training in serious gaming!

• Still expensive equipment
BCI, EEG and P300

• P300 – positive peak (EEG) after 300 ms
• Corresponds to rare but expected stimuli
  – Can be used for brain-computer interfaces, e.g., by flashing objects randomly and detecting which object the user is interested in by which flashes she reacts to
• No previous model to predict interaction
• Presents a model for prediction using Markov chains
Pupils and search-result relevance

• Big pupils – overall interest
  – Extra input channel, don’t need to communicate interest explicitly – can be more efficient

• Use an eyetracker to get what you are looking at and how big your pupils are

• Evaluation comparing people looking at relevant and irrelevant search results
  – Worked for text but not images in first study
  – More irrelevant images in second study worked
Slap Widgets

• Combining the tangible and physical with a dynamic table display
• Link widget to object dynamically (pairing)
• Doesn’t require visual attention
  – Outperform virtual controls in accuracy and interaction time
• No electronics
  – Cheap, but cannot be updated from the application
  – Inexpensive, battery-free, and untethered
Tangible programming

• Symbols/images representing instructions attached to train-track-blocks
  – Interpreted by a camera

• Comparison to virtual versions at a museum
  – More inviting
    • Girls interacting went from 35% to 85%
  – More collaboration
  – Motivating children
  – Apprehendable
    • No significant difference
Tabletop mouse emulation

- Exploring different ways of simulating a standard mouse for interaction with a multi-touch tabletop display
  - Needed to support standard applications in an efficient manner on tabletop interfaces
- Possible solutions involve different combinations of side, distance, gestures and chording
Pathfinder

- Pathfinder moves “citizen science” beyond collecting data and support citizens in discussing and analyzing data as a scientific process
  - Support questions, hypothesis, evidence with references, conclusions, etc
- Preferred to wiki by users
Fly

- Planar presentation – compare to brain map
- Like what I’m using now
  – I got this plugin from their paper
- Get an overview of the presentation
- The presentation is a path on the plane
- Preparation time might "feel" longer
Shared lies (VibraPass)

- Using the cellphone vibrator to secure PIN-codes
  - Enter extra digits that are lies, cued via bluetooth
- Bad lies is one problem
- Users do prefer security – it is worth the bother
- Vibrations can be noticed by observers
  - Tested with movies (with sound) of a fake ATM
Visualization for Classifiers

• Focus on visualizing the **confusion matrix**
  – Works for any classifier
  – Requires ground truth

• Work with colors to spot problems and reordering to reveal structure (e.g., clusters)
  – Partition (vertical lines) to create better classifiers

• Humans can create very good **ensemble classifiers** in just a few minutes!
  – Linear combinations of different classifiers
The Why-line

- Focus on output and make it possible to ask "Why?" about any output and follow the *causes* backward in time
- Impressive!
- Implemented for Java
  - Tested on project with ~150,000 lines
- Works by recording everything that happens
  - Ok for event-driven applications, not for simulations with an update loop
Misc cognition

- Self interruption
  - 50% of all interruptions are "self interruptions"
- Multitasking
  - Time scale continuum
Misc visualization

• Visualizing time series data
  – The goal is to increase information density
  – Horizon graphs
  – Evaluation of mirroring, offsetting and banding
    • Mirroring is ok!
    • No more than 4 bands

• Graph Sketcher
  – Speed up the creation of "Quantitative Concept Diagrams"
Gaze typing with adjustable speed

- Make it possible to adjust the typing speed (i.e., the "dwell time") dynamically
- Works well for most users
Visual gesture/noise feedback

• Seamful design
  – Display "seams" (noise/distortions) to allow the user to adapt
• Need to distinguish between random and regular seams (true noise or predictable distortions)
  – Truly random noise cannot be "learned"
• Filtered feedback is best for gestures
Ninja/rake cursors

• Several cursors are moving with the mouse
  – Small movements
  – Faster interaction
• The trick is to select which is active
  – Eye tracking is evaluated here
• Grabbed objects can jump to the active cursor
• The extra motion on the screen is tiring for your attention
Designers in Open Source

- How can we motivate designers to get involved?
  - ”Scratching an itch” is rarely in play
  - More research needed
- Give opportunity to contribute ”cool ideas”
  - I.e., submitting mockups to a ”UX workspace”
Online Collective Intelligence

- What is the cost of coordination?
- There is an interaction between number of editors and the concentration of work
  – They support each other to give the best effect
- Compare to GINI-number (equality)
Misc programming

• Fisheye – display related code automatically
• Opportunistic programming
  – A study of how people use the web as a reference and to find code snippets
Fitts Law revisited

- \( MT = a \times \log_2(D/W+1) + b \)
- \( a \) and \( b \) define the efficiency of an interaction technique
- Only valid within the optimal range
Spore takeouts
SiteLens

<table>
<thead>
<tr>
<th>CO ppm</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>112</td>
</tr>
<tr>
<td>0-17</td>
<td>22</td>
</tr>
<tr>
<td>18-29</td>
<td>21</td>
</tr>
<tr>
<td>30-64</td>
<td>45</td>
</tr>
<tr>
<td>65-</td>
<td>12</td>
</tr>
</tbody>
</table>

Spheres representing CO data
Slap Widgets
Slap Widgets