Further HCI

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Overview of the course

- Theory driven approaches to HCI
- Design of visual displays
- Goal-oriented interaction
- Designing efficient systems
- Designing smart systems
- Designing meaningful systems (guest lecturer)
- Evaluating interactive system designs
- Designing complex systems as interaction spaces
Lecture 1: Theory driven approaches to HCI

What is a theory in HCI? Why take a theory driven approach to HCI?
Why theory in HCI?
How would you design this?

Is this a good UI?

How do we know?

Could we improve it?

Installing a family printer in 2017
### Facebook privacy in 2017

How would you design this?

Is this a good UI?

How do we know?

Could we improve it?

<table>
<thead>
<tr>
<th>Privacy Settings and Tools</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Your activity</strong></td>
<td></td>
</tr>
<tr>
<td>Who can see your future posts?</td>
<td>Friends</td>
</tr>
<tr>
<td>Review all your posts and things you’re tagged in</td>
<td></td>
</tr>
<tr>
<td>Limit the audience for posts you’ve shared with friends of friends or Public?</td>
<td></td>
</tr>
<tr>
<td><strong>How people can find and contact you</strong></td>
<td></td>
</tr>
<tr>
<td>Who can send you friend requests?</td>
<td>Everyone</td>
</tr>
<tr>
<td>Who can see your friends list?</td>
<td>Public</td>
</tr>
<tr>
<td>Who can look you up using the email address you provided?</td>
<td>Everyone</td>
</tr>
<tr>
<td>Who can look you up using the phone number you provided?</td>
<td>Everyone</td>
</tr>
<tr>
<td>Do you want search engines outside of Facebook to link to your Profile?</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Visual Programming in 2017

How would you design this?

Is this a good programming language?

Derived from: http://dynamoprimer.com/en/05_Geometry-for-Computational-Design/5-6_solids.html
Theories give a *critical perspective*
Reminder of a theory:
Gestalt theory of perceptual organisation

Use of closure

```csharp
surf uParam = (0.15..0.85..#13);
vParam = (0..1..#20);
pt = surf1.PointAtParameter(uParam<2>, vParam<3>);
normal = surf1.NormalAtParameter(uParam<2>, vParam<3>);
startPt = pt.Translate(normal, 5);
vec = normal.Reverse();
endPt = pt.Translate(vec, 4);
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Use of closure

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```
Use of closure

Problematic use of closure
No use of continuity
Problematic Similarity

Do users think these are the same?
Summary of gestalt theory application

• Took a candidate design (Dynamo UI)
  • Predicted some properties that probably work well
  • Predicted some properties that might cause problems

• Over the course of the lectures you’ll see many theories like this

• How do we make use of critique?
Critique your way to a design

Iterative Design

20+ ideas

Creative Disruption

Coarse Medium Fine

Convergence Divergence Convergence Divergence Convergence

Derived from Pugh ‘56
Example of convergence

- Merge features from two candidate designs to produce a better one
- Discard ideas that poorly fit the desired outcome

Grasshopper image: http://www.rhino3dhelp.com/wp-content/uploads/2010/02/jk-0x0.png
Example of divergence

- Generate new designs from existing one
- Use any creative technique, e.g. ‘gestalt swapping’, ‘reduction to absurdity’ or exploring metaphors (e.g. what happens if we replace connectedness with similarity)

Variables as emoji from Seymour, Kasibatla and Warth, 2017

Cone.ByPointsRadii

<table>
<thead>
<tr>
<th>startRadius</th>
<th>endRadius</th>
</tr>
</thead>
<tbody>
<tr>
<td>🐔 = 2.5</td>
<td>🍋 = 2.5</td>
</tr>
</tbody>
</table>
Why theory in HCI?

• We’ve interested in making interaction with computers faster, more productive, more creative, more social, more fun, somehow ‘better’.

• Theories give us ways of criticising proposed designs and toolkits for inventing new ones
Three waves of HCI

• First wave (1980s):
  • Theory from Human Factors, Ergonomics and Cognitive Science

• Second wave (1990s):
  • Theory from Anthropology, Sociology and Work Psychology

• Third wave (2000s):
  • Theory from Art, Philosophy and Design
Apollo-Soyuz controls 1975

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Photo: Jonathan H. Ward 2009
First wave: HCI as engineering “human factors”

• The “user interface” (or MMI “man-machine interface”) is a separate module, designed independently of the main system.
• Design goal is efficiency (speed and accuracy) for a human operator to achieve well-defined functions.
• Use methods from cognitive science to model users’ perception, decision and action processes and predict usability.
How would you design this?

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How do we know?

Could we improve it?

An information system

Photo: ZeeNews India, 2017
Second wave: HCI as social system

• The design of complex systems is a socio-technical experiment
  • Take account of other information factors including conversations, paper, and physical settings
• Study the context where people work
  • Use Ethnography and Contextual Inquiry to understand other ways of seeing the world
• Other stakeholders are integrated into the design process
  • Prototyping and participatory workshops aim to empower users and acknowledge other value systems
How would you design this?
Is this a good UI?
How do we know?
Could we improve it?

Blood bag radio

Photo: Dunne & Raby, 2009
Third wave: HCI as culture and experience

- Ubiquitous computing affects every part of our lives
  - It mixes public (offices, lectures) and private (bedrooms, bathrooms)
- Outside the workplace, efficiency is not a priority
  - Usage is discretionary
  - User Experience (UX), includes aesthetics, affect,
- Design experiments are speculative and interpretive
  - Critical assessment of how this is meaningful
Specialist topics not covered here:

• Graphics and VR - elsewhere in CS Tripos
• Digital media studies - CRASSH
• Game design - Anglia Ruskin University
• Social network analysis - elsewhere in CS Tripos
• Computer music - elsewhere in CS Tripos
• Security - elsewhere in CS Tripos
• Educational technology - Faculty of Education
• Information Systems - Judge Business School
Alternative perspectives

• Positive computing (e.g. Calvo & Peters 2014)
  • Wellbeing, flow, empathy, mindfulness, altruism

• Inclusion and accessibility (e.g. CWUAAT #1-9)
  • Physical and sensory capabilities, ageing, low income and human rights

• Feminist utopianism (e.g. Bardzell 2010)
  • Diagnostic critique of hegemonic research and practice, combined with practice-led participatory processes of anticipation that amplify marginalized voices
Supervisions

• 2 supervisions after lecture 4 and lecture 8, recommend completing all the lectures before the last supervision
Textbooks

  • Practical professional methods, with good summary of theory
• Carroll (Ed.) *HCI Models, Theories and Frameworks: Toward a multidisciplinary science* 2003
  • Expert introductions to different theoretical traditions
Toward original research

We look at user interfaces and software systems through the lens of programming languages. We think this approach illuminates a lot of the important properties of the system.

This is an advanced perspective, but especially relevant to Cambridge students, and to future innovation (the GUI was originally a programming language!)

See Alan’s new book *Moral Codes: Designing software without surrender to AI* for an extended version of this argument: [https://moralcodes.pubpub.org](https://moralcodes.pubpub.org)

For now, we’d love you to give us examples of systems you’d like to talk with us about during the course.
Which systems shall we talk about?

- Powerpoint
- Art programs (MS Paint?)
- Travel planning
- Moodle
- Crypto trading
- Twitter
- Human learning process
- Text editors
- Tax returns