Lecture 2: Visual representation
Overview of the course

• Theory driven approaches to HCI
• **Design of visual displays**
• Goal-oriented interaction
• Designing smart systems
• Designing efficient systems
• Designing meaningful systems (guest lecturer)
• Evaluating interactive system designs
• Designing complex systems
Why talk about visual design?

Visual design questions are often where discussions about HCI start

“What colour should this be?”
“Should it be 5 pixels or 7?”
“Will this work for colour blind people?”

These conversations are a lot more complicated than they seem...
The range of visual representations

TYPOGRAPHY AND TEXT
The Grid System

The ultimate resource in grid systems.

"The grid system is an aid, not a guarantee. It permits a number of possible uses and each designer can look for a solution appropriate to his personal style. But one must learn how to use the grid, it’s an art that requires practice."

Joseph Mollen-Brockmann

Articles

30 Grid-Based WordPress Themes

Articles were of WordPress themes that have been developed using popular CSS Grid Frameworks such as the 960 grid, Blueprint, YUI and The Saxon Grind.

23 Aug 2010

Design & Build a Grid Based Web Design with CSS

This step-by-step tutorial helps you understand the design and build process of a grid based WordPress theme from the initial Photoshop concept through development.

23 Aug 2010

Long Live the 12-Column Grid

When I first created the great divide from grid to web, one of the earliest things I wrote was a tutorial on the 12-column grid (you know, like a magazine).

07 May 2010

Tools

960 Grid System Photoshop Action

Join the forum and get updates on new features and help for your grid systems. Contact us for more information.

23 Aug 2010

Books

Universal Principles of Design

A basic introduction to the 10 principles of design that can help you establish a cohesive look.

04 Nov 2009

Templates

The Golden Grid Template

A PSD template based on the CSS Grid Framework. The Golden Grid by Hradam Greaves.

02 Mar 2010

Blog

Forum is back up!

Sorry for the downtime on the forum. They’re back up now.

17 May 2010

Inspiration

Ace Jet 170

ArticOne

Ibar

BEXK

Blank

Build

Corporate Risk Watch

CounterPrint

David Army

Design Assembly

Dirty Mouse

Experimental Artists

Form Fifty Five

Grafix Magazine

Graphic Hop

I Love Typography

Lamerasca

Mark Doxton

Iternal Sites

Moresco

Ninshau

New Work

CK AI

Original Linkage

Ronin Images

Sampson May

Search Today

September Industry

Subtraction

Suxeri Legacy

The International Office

Thinking for a Living

This Studio

Toko

Typographic Posters

Vavasone

Xavier Encinas

Year of the Sheep
In quantum mechanics, a fundamental equation is the Schrödinger equation:

\[ i\hbar \frac{\partial \Psi}{\partial t} = -\frac{\hbar^2}{2m} \nabla^2 \Psi + V\Psi \]
### Database

**Data**

- **conversationTags**
  - `tag-0aa8b45a`

- **nook-experimental**
  - `tag-0aa8b45a`

- **Start collection**
- **Add document**
- **Start collection**

**conversationTags**

- `messageTags`
- `nook_conversations`
- `sms_raw_sosnap`
- `suggestedReplies`
- `systemMessages`
- `tables`
- `translation_cac`

**Rules**

- `tag-12be1863`
- `tag-14aaab13`
- `tag-acc0357b`

**Indexes**

**Usage**

Cloud Firestore location: eu3 (Europe-West)
Last login: Sat Jan 18 22:38:30 on ttys005

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.

[lukes-mbp:~ lukechurch]$ cd ~/GitRepos/Lark/KK-Project-2020-IOM/nook_sms_channel/
[lukes-mbp:nook_sms_channel lukechurch]$ ls
Pipfile
Pipfile.lock
firebase_sync_cli.py
firestore_uuid_table.py
pagerduty_trigger.py
pubsub_cli.py
pubsub_cli_mock.py
rapidpro_sms.py
rapidpro_tofirebase_msg_map.py
rapidpro_tofirebase_msg_subcol.py

[lukes-mbp:nook_sms_channel lukechurch]$ pipenv sync

Installing dependencies from Pipfile.lock (b5d415)...  
An error occurred while installing -e git+https://www.github.com/AfricasVoices/RapidProTools@9a6560880c4e08df5f32cc6a2e8f1b39a8104aa0#egg=rapidprotools! Will try again.

Instal|ing initially failed dependencies...

1/1 - 00:00:01
To activate this project's virtualenv, run pipenv shell.
Alternatively, run a command inside the virtualenv with pipenv run.
All dependencies are now up-to-date!

[lukes-mbp:nook_sms_channel lukechurch]$
MAPS AND GRAPHS
The EDSAC UI (1950s)
Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780

The bottom line is divided into Years, the right hand line into £10,000 each.

Published in the Act Annual of July 1777. By W. Playfair, London.
SAGE air defense (1960s)
Mappa Mundi (1300s)
Bertin’s *Semiologie Graphique* (1969)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Point features</th>
<th>Line features</th>
<th>Area features</th>
<th>Nominal data</th>
<th>Ordinal data</th>
<th>Interval data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POSITION</strong></td>
<td>![Point features]</td>
<td>![Line features]</td>
<td>![Area features]</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
<tr>
<td><strong>SIZE</strong></td>
<td>![Point features]</td>
<td>![Line features]</td>
<td>![Area features]</td>
<td>Not Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
<tr>
<td><strong>VALUE</strong></td>
<td>![Point features]</td>
<td>![Line features]</td>
<td>![Area features]</td>
<td>Not Effective</td>
<td>Effective</td>
<td>Marginally Effective</td>
</tr>
<tr>
<td><strong>TEXTURE</strong></td>
<td>![Point features]</td>
<td>![Line features]</td>
<td>![Area features]</td>
<td>Effective</td>
<td>Marginally Effective</td>
<td>Not Effective</td>
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<td>![Area features]</td>
<td>Effective</td>
<td>Marginally Effective</td>
<td>Not Effective</td>
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<tr>
<td><strong>ORIENTATION</strong></td>
<td>![Point features]</td>
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<td>![Area features]</td>
<td>Effective</td>
<td>Not Effective</td>
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<tr>
<td><strong>SHAPE</strong></td>
<td>![Point features]</td>
<td>![Line features]</td>
<td>![Area features]</td>
<td>Marginally Effective</td>
<td>Not Effective</td>
<td>Not Effective</td>
</tr>
</tbody>
</table>

Figure 1. The visual variables and their effectiveness in signifying the three levels of measurement of data (after Bertin [1983]).
SCHEMATIC DRAWINGS
Sutherland’s Sketchpad (1963)
The London Underground Map (1920)
Henry Beck’s London Underground Diagram (1931)
NODE-AND-LINK DIAGRAMS
ICONS AND SYMBOLS
VISUAL METAPHOR
XEROX 8010 Star Information System

Star provides integrated text and graphics. A variety of type sizes and styles may be used.

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td>$0.30</td>
</tr>
<tr>
<td>Boxes</td>
<td>$0.50</td>
</tr>
</tbody>
</table>
PICTURES
WAYS OF SEEING
JOHN BERGER

Seeing comes before words. The child looks and recognizes before it can speak.
But there is also another sense in which seeing comes before words. It is seeing which establishes our place in the surrounding world, we explain that world with words, but words can never undo the fact that we are surrounded by it. The relation between what we see and what we know is never settled.

The Surrealist painter Magritte commented on this always-present gap between words and seeing in a painting called The Key of Dreams.

The way we see things is affected by what we
Theories of visual design
<table>
<thead>
<tr>
<th>Graphic Resources</th>
<th>Correspondence</th>
<th>Design Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marks</strong></td>
<td><strong>Literal (visual imitation of physical features)</strong></td>
<td><strong>Mark position, identify category (shape, texture, colour)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Mapping (quantity, relative scale)</strong></td>
<td><strong>Indicate direction (orientation, line)</strong></td>
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<td><strong>Figurative (metonym, visual puns)</strong></td>
<td></td>
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<td><strong>Connotative (professional and cultural association)</strong></td>
<td></td>
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<td></td>
<td><strong>Acquired (specialist literacies)</strong></td>
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<tr>
<td><strong>Regions</strong></td>
<td><strong>Containment</strong></td>
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<td><strong>Separation</strong></td>
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<td><strong>Layering</strong></td>
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<tr>
<td><strong>Surfaces</strong></td>
<td><strong>Literal (map)</strong></td>
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<td><strong>Euclidean (scale and angle)</strong></td>
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<td></td>
<td><strong>Metrical (quantitative axes)</strong></td>
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<tr>
<td></td>
<td><strong>Juxtaposed or ordered (regions, catalogues)</strong></td>
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**Graphic Resources**
- Shape
- Orientation
- Size
- Texture
- Saturation
- Colour
- Line

**Correspondence**
- Literal (visual imitation of physical features)
- Mapping (quantity, relative scale)
- Conventional (arbitrary)
- Simple symbols and colour codes

**Design Uses**
- Mark position, identify category (shape, texture, colour)
- Indicate direction (orientation, line)
- Express magnitude (saturation, size, length)
- Simple symbols and colour codes
Use 1: Usability analysis

- Analyse a design using this taxonomy
  (e.g. Uses connotative correspondence)

- Determine if the uses are appropriate
  (e.g. do people think that blue is ‘off’ or ‘cold’?)

Cases where the visual analysis implies one connection but the operation implies another will create substantial usability problems
Use 1: Usability analysis
Use 1: Usability analysis

Mapping, Categorical: Off, cold, warm, hot

Mapping, Magnitude, Colder -> Warmer
Use 1: Usability analysis

Mapping, Categorical: Off, cold, warm, hot

Mapping, Magnitude, Colder $\rightarrow$ Warmer
Mapping, Direction(!!!), Colder $\rightarrow$ Warmer
Use 2: Generating divergent designs

- Topological linking
  =>

- Arbitrary conventional
Use 3: Design systems

Color usage

Color helps express hierarchy, establish brand presence, give meaning, and indicate element states.

CONTENTS
Hierarchy
Brand
Meaning
State

(http://material.io)
Analysing visual representation in a UI

Look more carefully at familiar things …
Analysing visual representation in a UI

Shaded regions define separate functional contexts

White foreground region for user’s “WYSIWYG” content

Shaded region groups all controls
Analysing visual representation in a UI

Coordinate space for quantitative calculation of grid layout
Blue coloured border:
1. Corporate identity (cf IBM)
2. Context within Office suite - Excel docs have green borders, PPT are orange.
Analysing visual representation in a UI

How do we read these?

Difficult standards:
When the designer’s mental model differs from the user’s mental model

= ?
The programming analogy challenge 2023: text editors
The programming analogy challenge 2023: text editors

Repeating text at the press of a button

Menu options:
- AutoCorrect Options...
- Check Accessibility
- Track Changes
- Combine Documents...
- Block Authors
- Unblock All of my Blocked Areas
- Protect Document...
- Envelopes...
- Labels...
- Macro
- Templates and Add-ins...
- Customise Keyboard...
- Macros...
- Stop Recording
- Visual Basic Editor
The programming analogy challenge 2023: text editors

Microsoft Visual Basic - Normal

Normal - NewMacros (Code)

(General)

Sub Test()
    ' Test Macro
    '
    Selection.TypeText Text:="Repeating text at the press of a button"
    Selection.TypeParagraph
End Sub
The programming analogy challenge 2023: text editors