Further HCI

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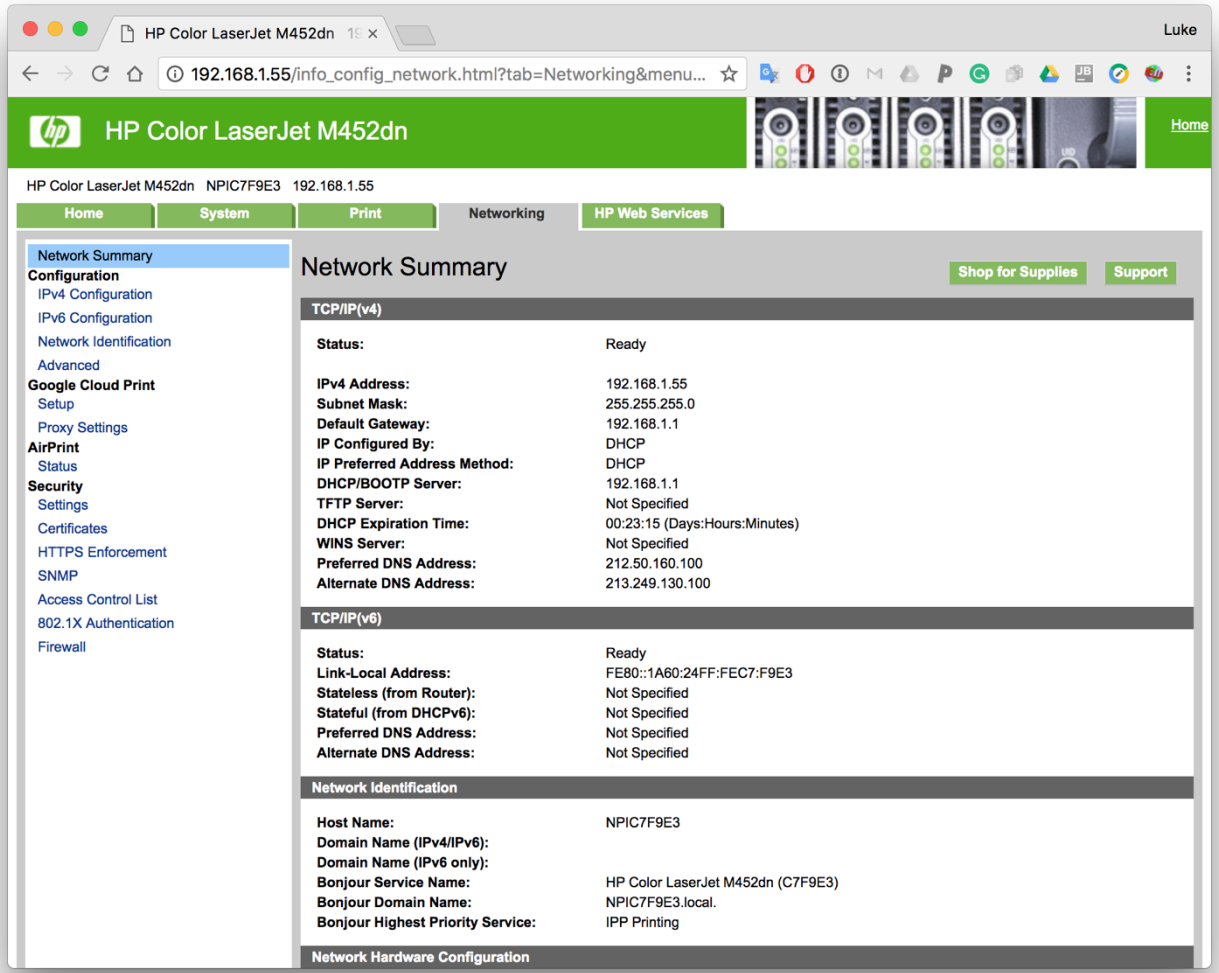
Overview of the course

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

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?



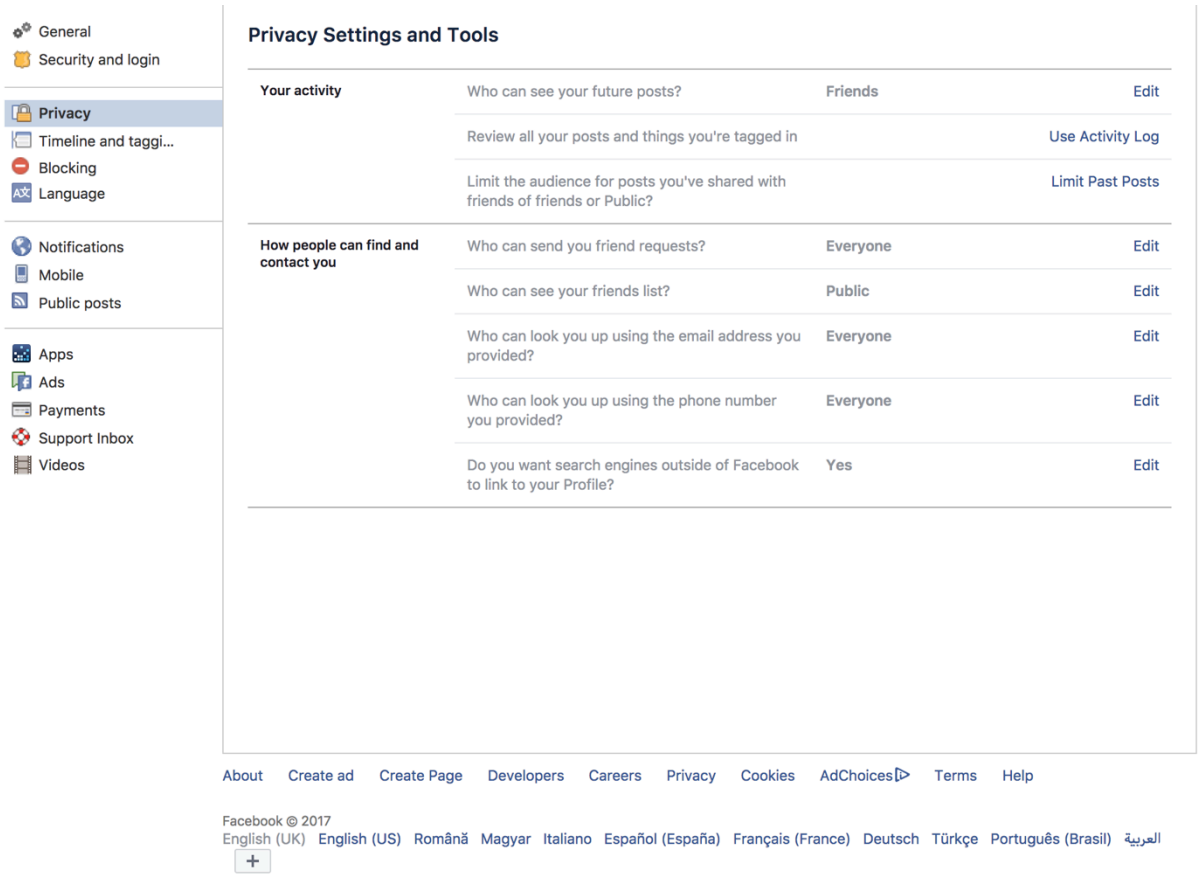
Installing a family printer in 2017

How would you design this?

Is this a good UI?

How do we know?

Could we improve it?



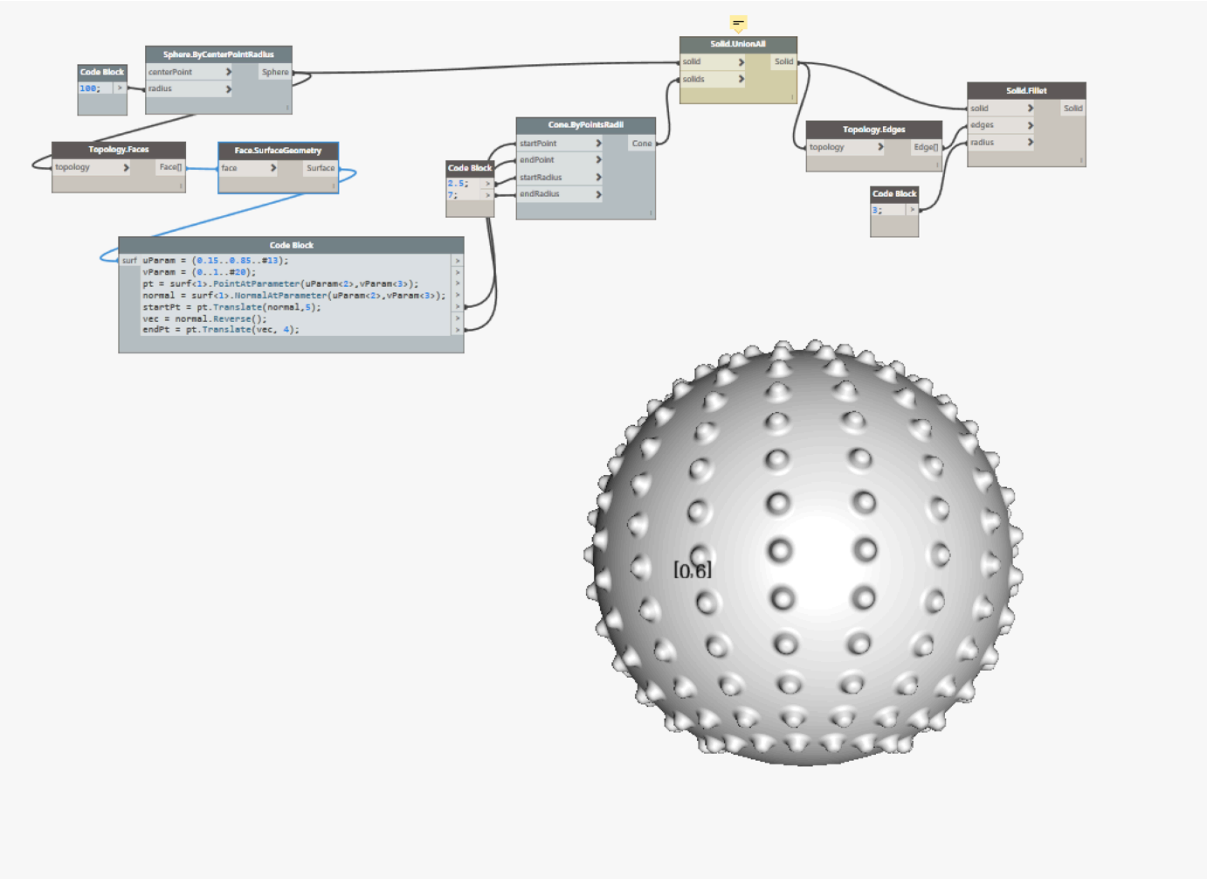
Facebook privacy in 2017

How would you design this?

Is this a good UI?

How do we know?

Could we improve it?



Visual Programming in 2017

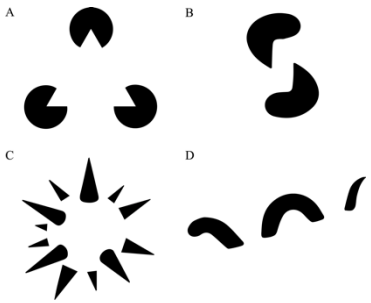
How would you design this?

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



Continuit
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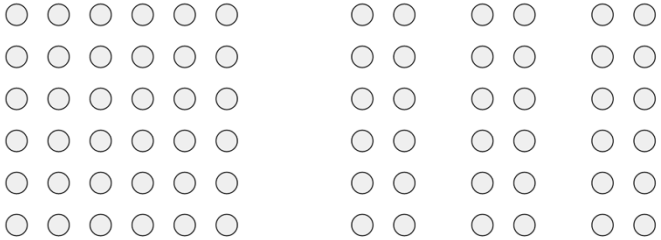
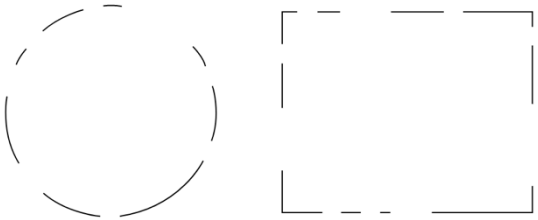


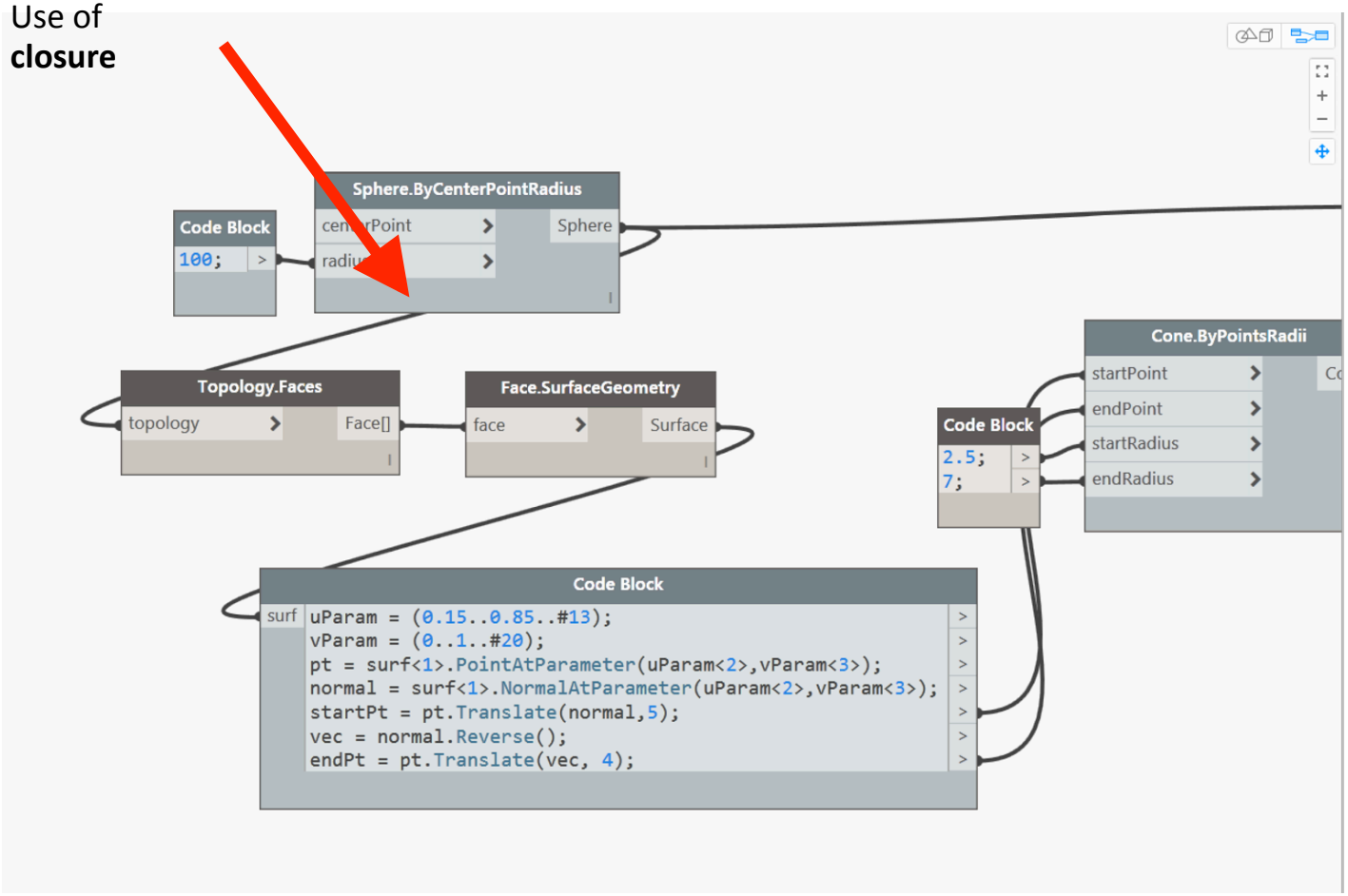
Similarit
y



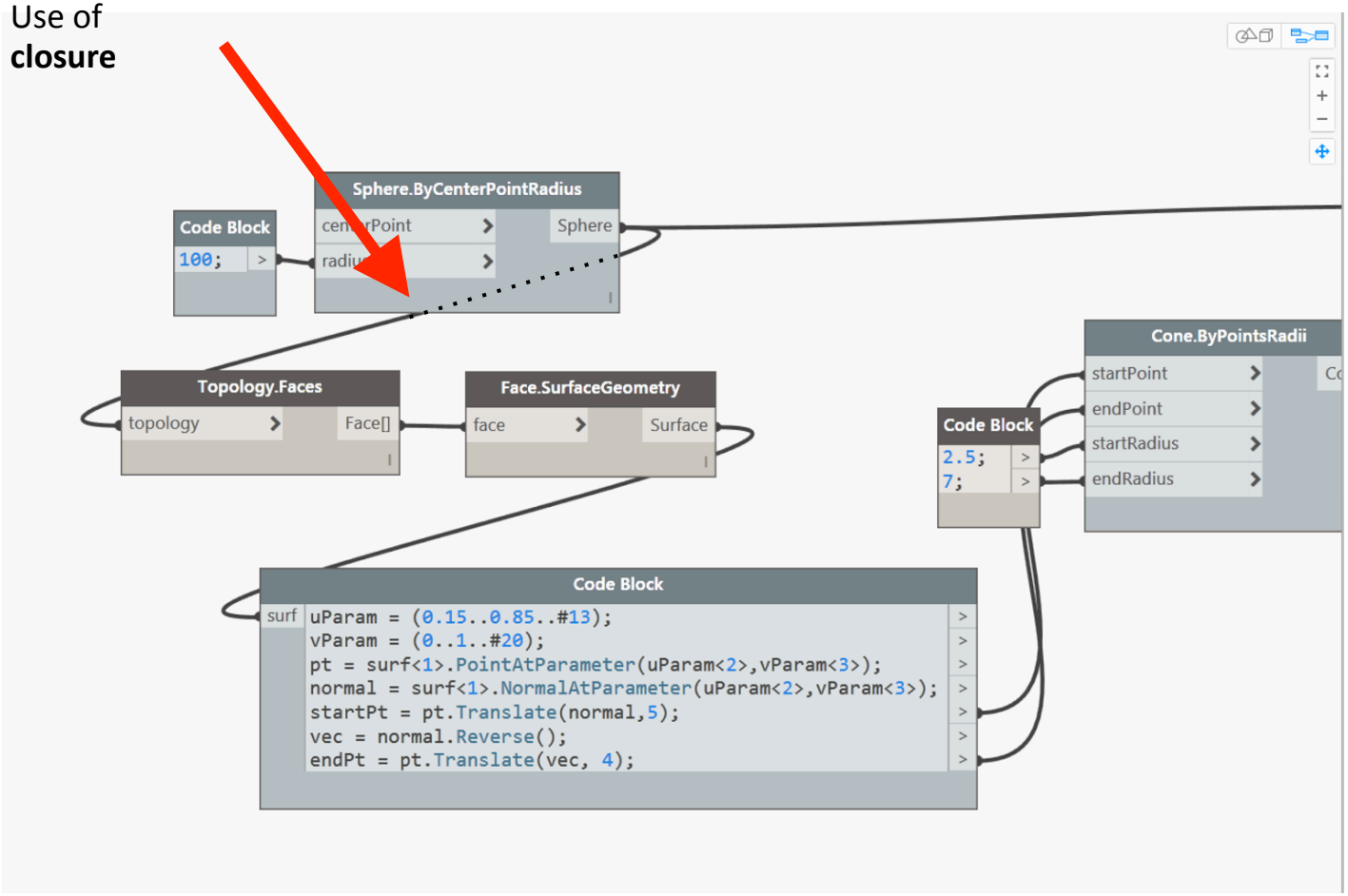
Closur
e

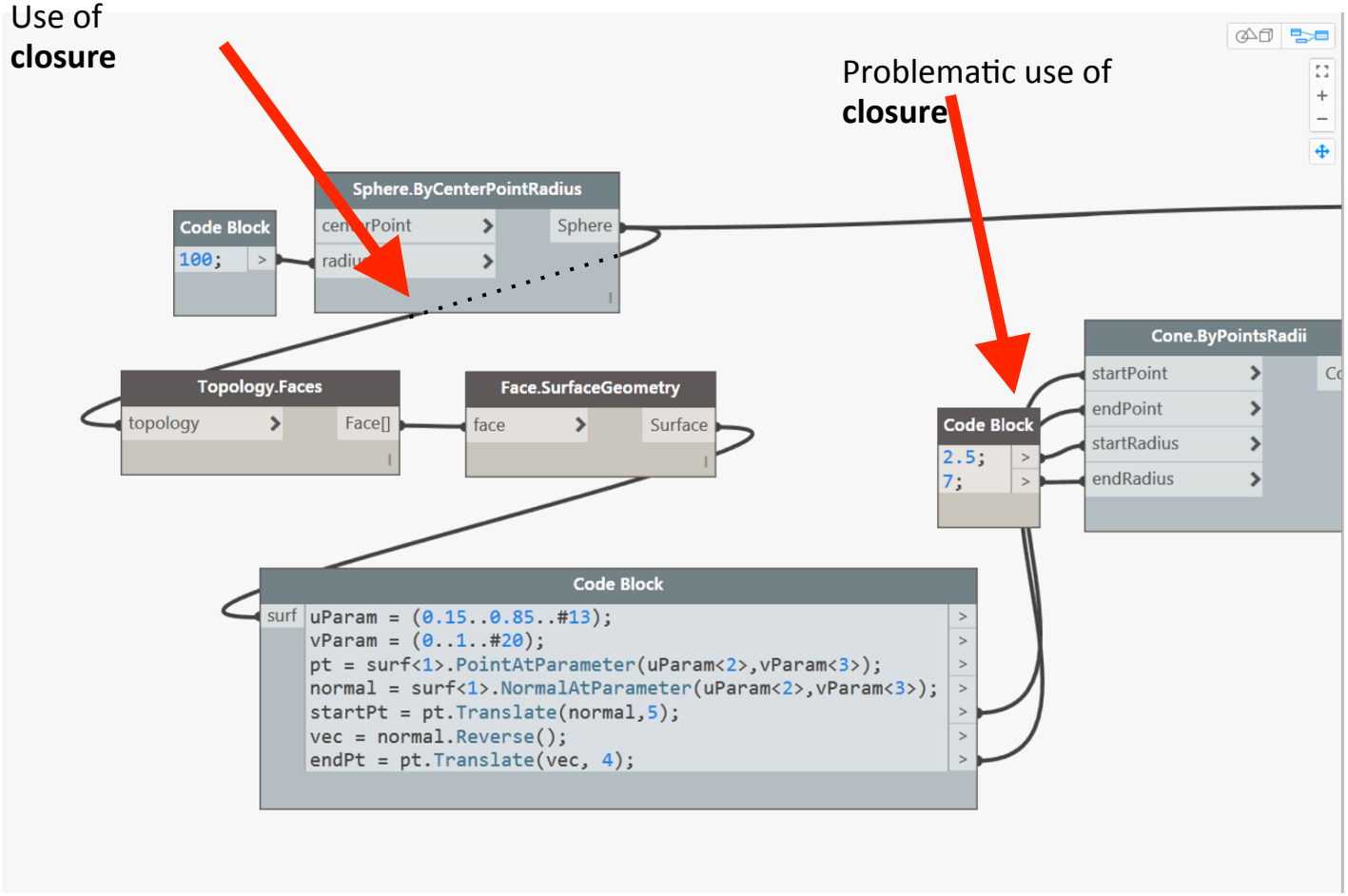
Images from: https://en.wikipedia.org/wiki/Gestalt_psychology

Use of
closure

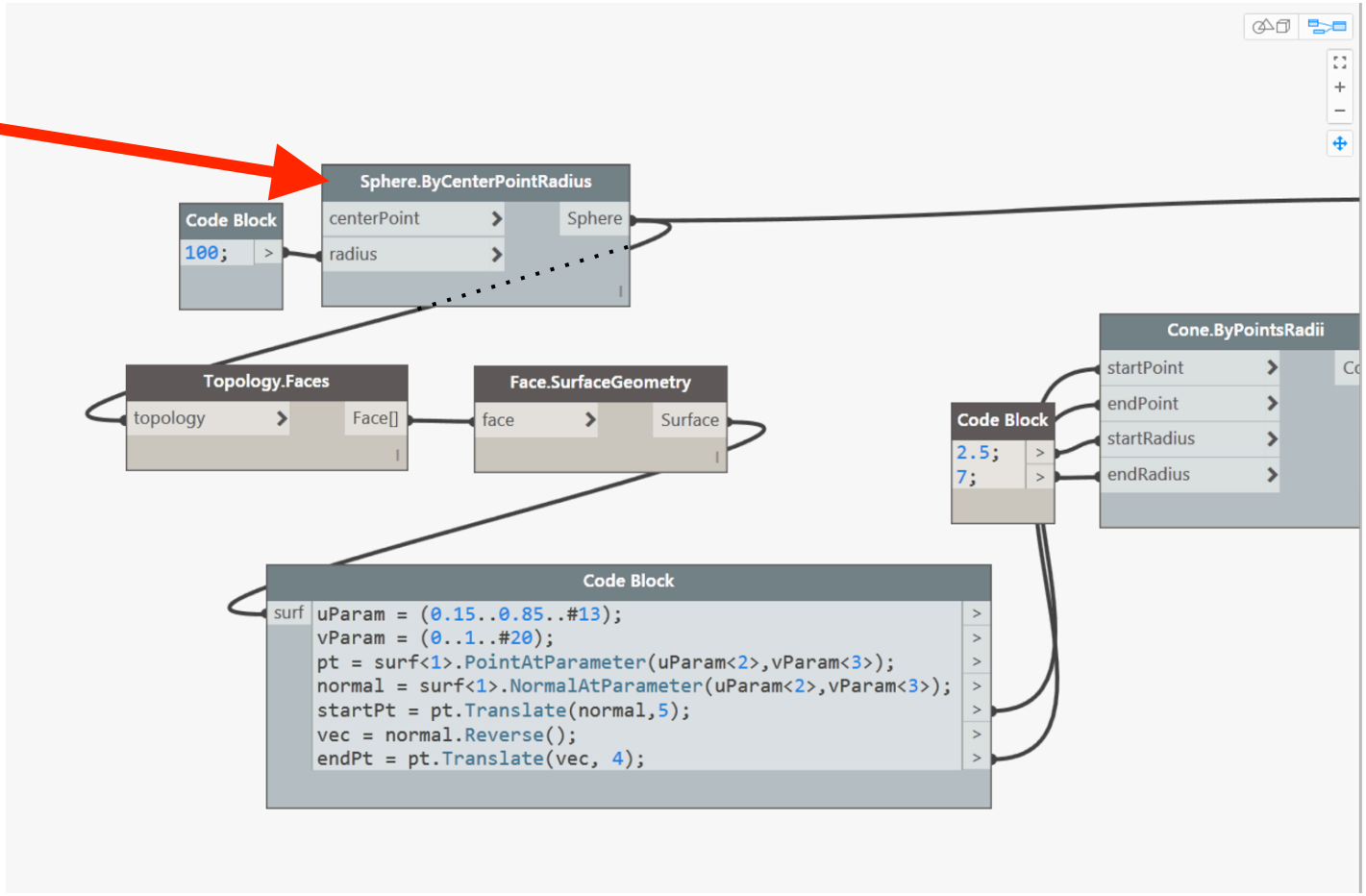


Use of
closure



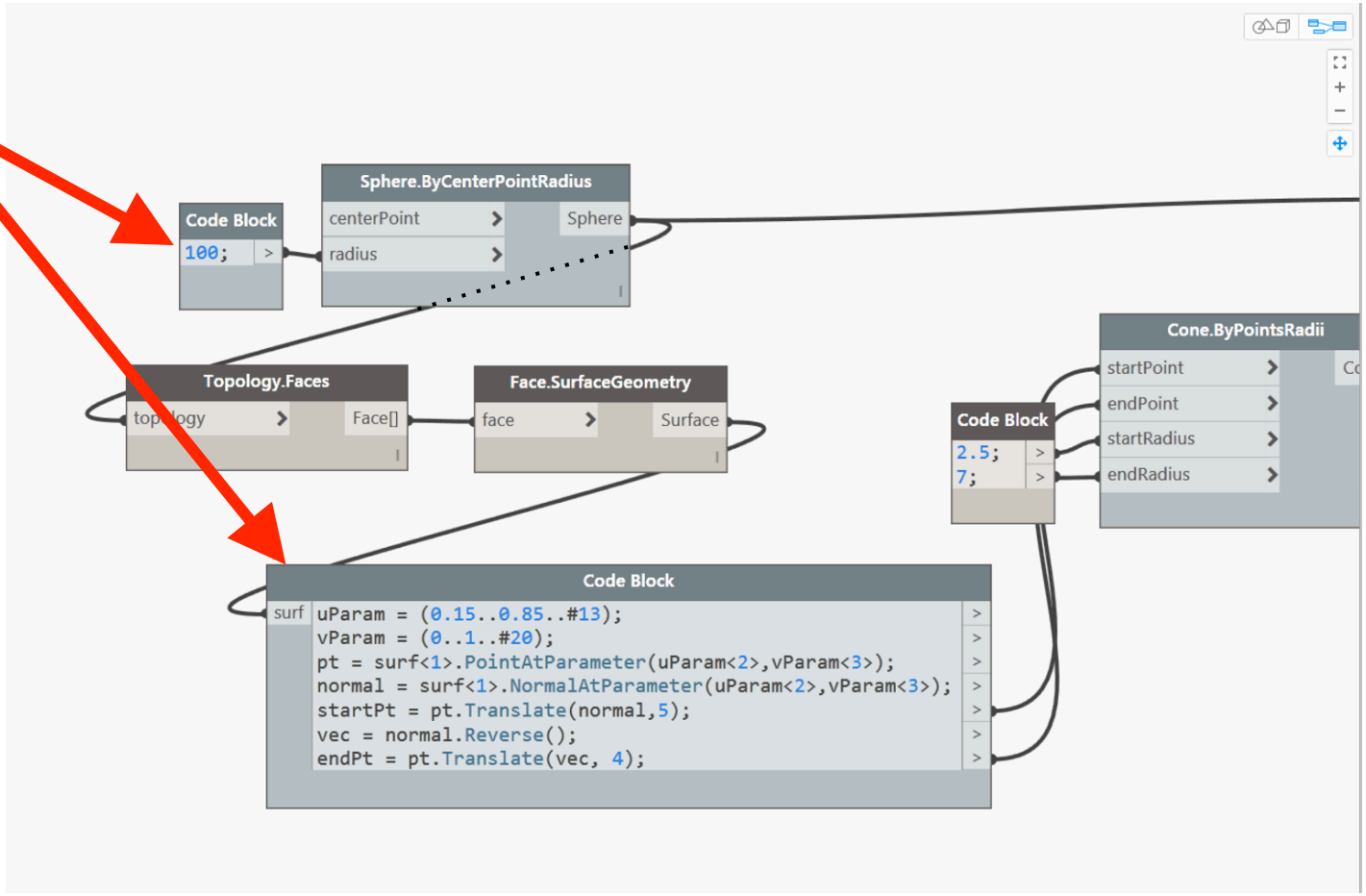

Use of
closure
Problematic use of
closure
Sphere.ByCenterPointRadius
Code Block
100;
Sphere
Topology.Faces
topology
Face[]
Face.SurfaceGeometry
face
Surface
Cone.ByPointsRadii
startPoint
endPoint
startRadius
endRadius
Code Block
2.5;
7;
Code Block
surf
uParam = (0.15..0.85..#13);
vParam = (0..1..#20);
pt = surf<1>.PointAtParameter(uParam<2>,vParam<3>);
normal = surf<1>.NormalAtParameter(uParam<2>,vParam<3>);
startPt = pt.Translate(normal,5);
vec = normal.Reverse();
endPt = pt.Translate(vec, 4);

No use of
continuity



Problematic
Similarity

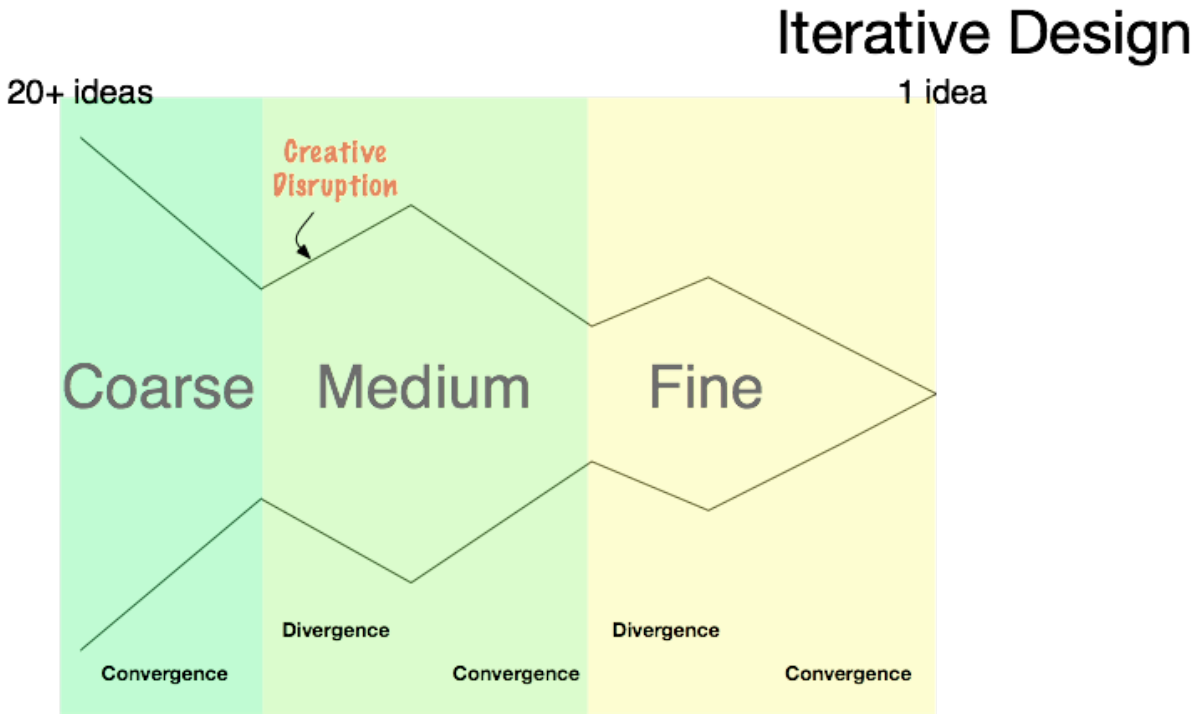
Do users think
these
are the same?



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 many theories like this
- How do we make use of critique?

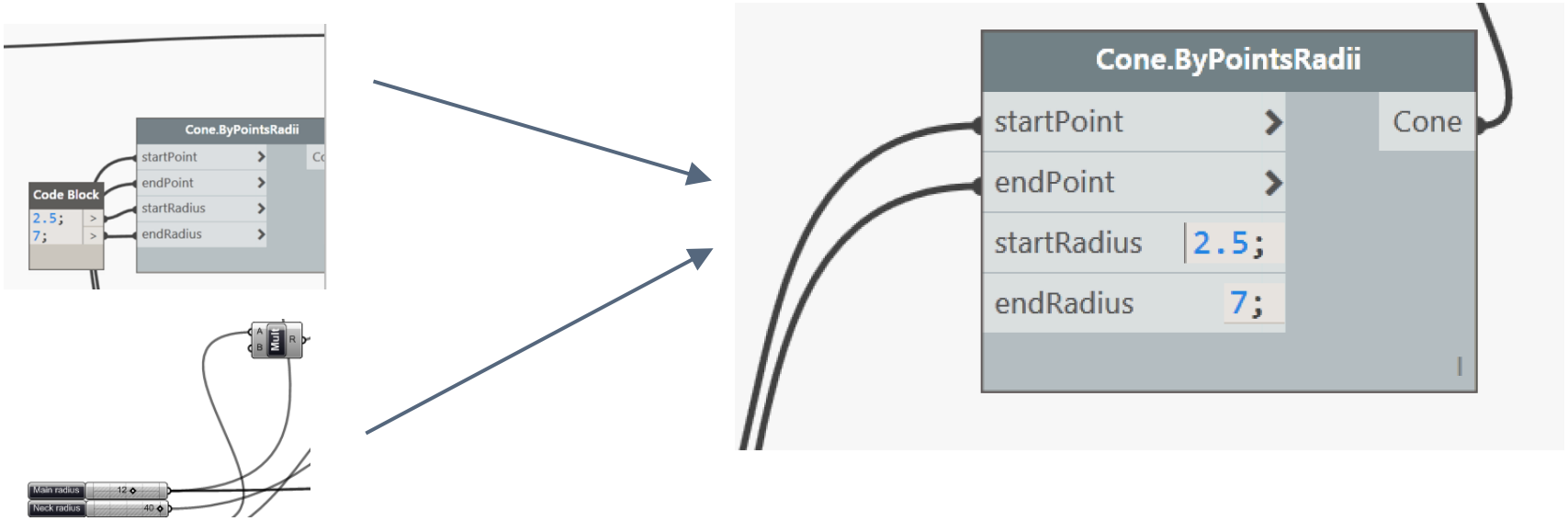
Critique your way to a design



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

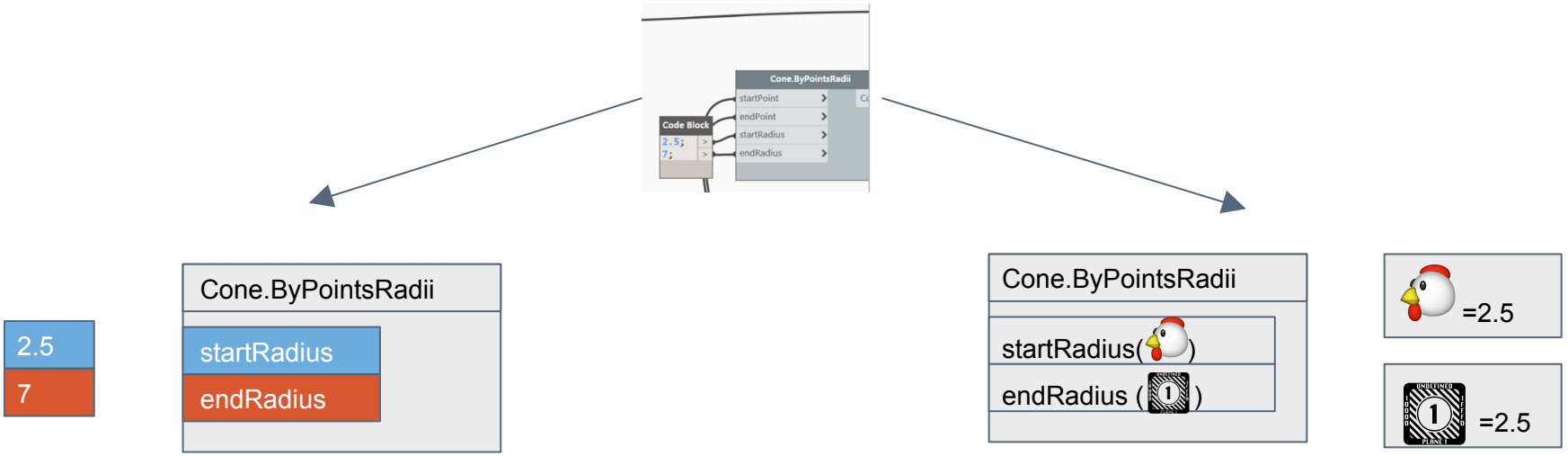


Grasshopper image: http://www.rhino3dhelp.com/wp-content/uploads/2010/02/jk-0x0.png

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)

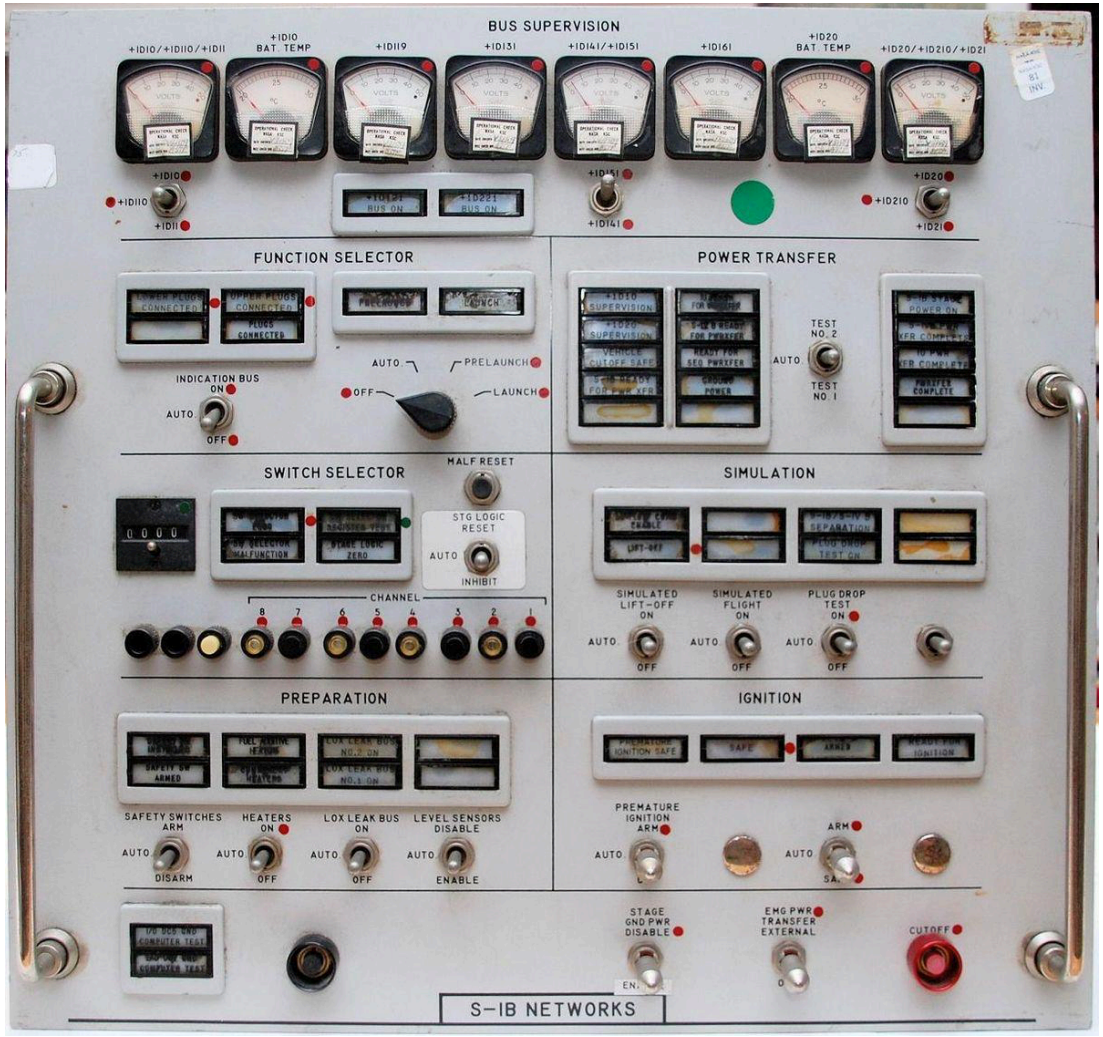
Why theory in HCI?

- 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

How would you design this?

Is this a good UI?

How do we know?

Could we improve it?

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.

An information system

How would you design this?

Is this a good UI?

How do we know?

Could we improve it?

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

Blood bag radio

How would you design this?

Is this a good UI?

How do we know?

Could we improve it?

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

- Preece, Sharp & Rogers *Interaction Design: Beyond human-computer interaction* 4th Edition 2015
  - 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

Exam structure

- 2 of the 8 questions in Paper 7 focus on Further HCI
  - Candidates answer 5 questions out of 8