

Further HCI

Alan Blackwell and Luke Church

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?

The screenshot shows a web browser window with the URL `192.168.1.55/info_config_network.html?tab=Networking&menu...`. The page title is "HP Color LaserJet M452dn" and the user is logged in as "Luke". The interface features a green header with the HP logo and a navigation menu with tabs for "Home", "System", "Print", "Networking", and "HP Web Services". The "Networking" tab is active, displaying a "Network Summary" page. On the left, a sidebar menu lists various configuration options such as "Network Summary", "Configuration", "Google Cloud Print", "AirPrint", "Security", and "Firewall". The main content area shows network details for both IPv4 and IPv6, including status, IP addresses, subnet masks, gateways, and DNS settings. A "Network Identification" section lists the host name and Bonjour service details. At the bottom, there is a section for "Network Hardware Configuration".

HP Color LaserJet M452dn NPIC7F9E3 192.168.1.55

Home System Print Networking HP Web Services

Network Summary

Configuration

- IPv4 Configuration
- IPv6 Configuration
- Network Identification
- Advanced

Google Cloud Print

- Setup
- Proxy Settings

AirPrint

- Status

Security

- Settings
- Certificates
- HTTPS Enforcement
- SNMP
- Access Control List
- 802.1X Authentication
- Firewall

Shop for Supplies Support

Network Summary

TCP/IP(v4)

Status:	Ready
IPv4 Address:	192.168.1.55
Subnet Mask:	255.255.255.0
Default Gateway:	192.168.1.1
IP Configured By:	DHCP
IP Preferred Address Method:	DHCP
DHCP/BOOTP Server:	192.168.1.1
TFTP Server:	Not Specified
DHCP Expiration Time:	00:23:15 (Days:Hours:Minutes)
WINS Server:	Not Specified
Preferred DNS Address:	212.50.160.100
Alternate DNS Address:	213.249.130.100

TCP/IP(v6)

Status:	Ready
Link-Local Address:	FE80::1A60:24FF:FEC7:F9E3
Stateless (from Router):	Not Specified
Stateful (from DHCPv6):	Not Specified
Preferred DNS Address:	Not Specified
Alternate DNS Address:	Not Specified

Network Identification

Host Name:	NPIC7F9E3
Domain Name (IPv4/IPv6):	
Domain Name (IPv6 only):	
Bonjour Service Name:	HP Color LaserJet M452dn (C7F9E3)
Bonjour Domain Name:	NPIC7F9E3.local.
Bonjour Highest Priority Service:	IPP Printing

Network Hardware Configuration

Installing a family printer in 2017

How would you design this?

Is this a good UI?

How do we know?

Could we improve it?

- General
- Security and login

- Privacy**
- Timeline and taggi...
- Blocking
- Language

- Notifications
- Mobile
- Public posts

- Apps
- Ads
- Payments
- Support Inbox
- Videos

Privacy Settings and Tools

Your activity	Who can see your future posts?	Friends	Edit
	Review all your posts and things you're tagged in		Use Activity Log
	Limit the audience for posts you've shared with friends of friends or Public?		Limit Past Posts
How people can find and contact you	Who can send you friend requests?	Everyone	Edit
	Who can see your friends list?	Public	Edit
	Who can look you up using the email address you provided?	Everyone	Edit
	Who can look you up using the phone number you provided?	Everyone	Edit
	Do you want search engines outside of Facebook to link to your Profile?	Yes	Edit

[About](#) [Create ad](#) [Create Page](#) [Developers](#) [Careers](#) [Privacy](#) [Cookies](#) [AdChoices](#) [Terms](#) [Help](#)

Facebook © 2017

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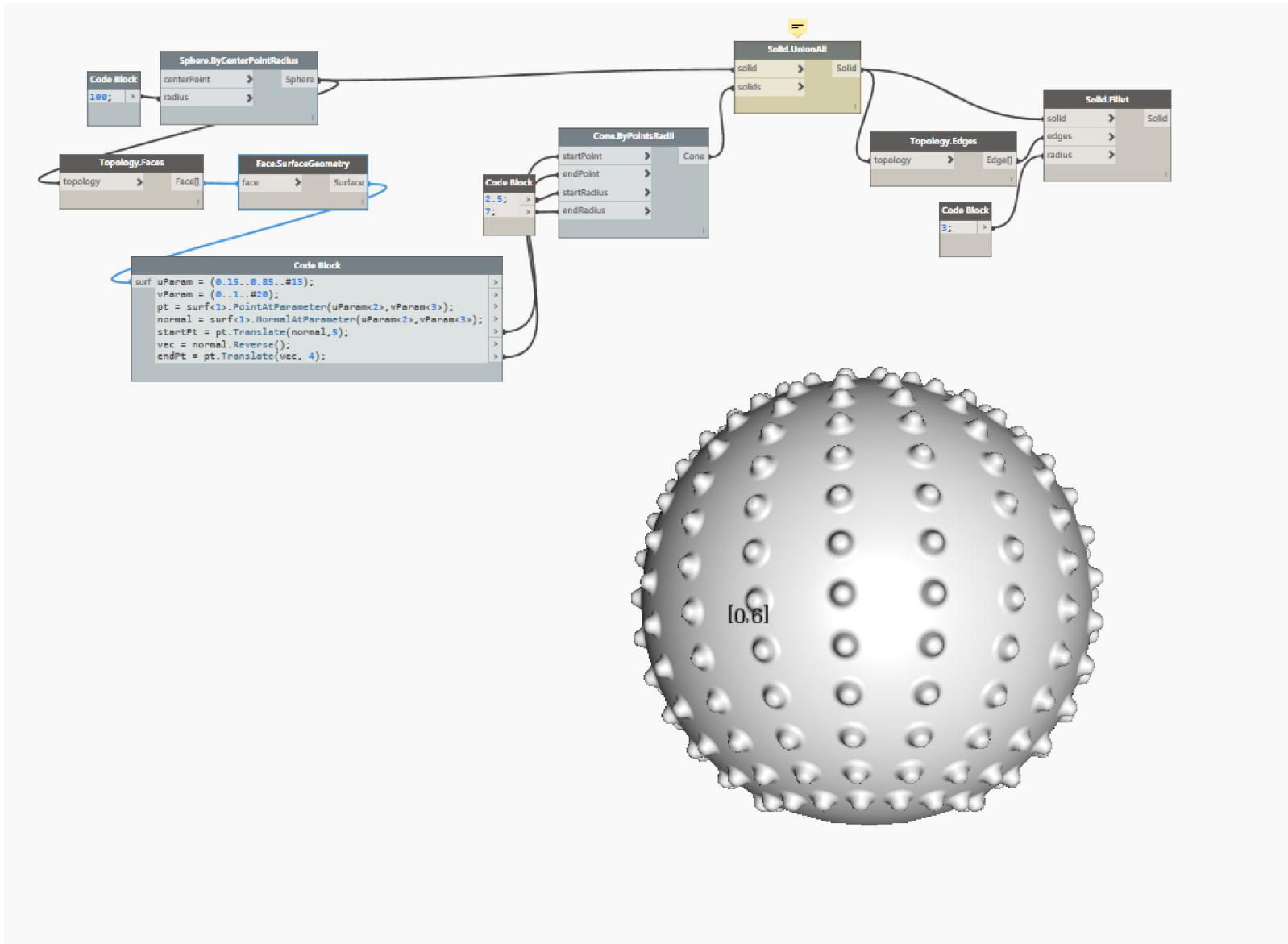
Facebook privacy in 2017

How would you design this?

Is this a good UI?

How do we know?

Could we improve it?



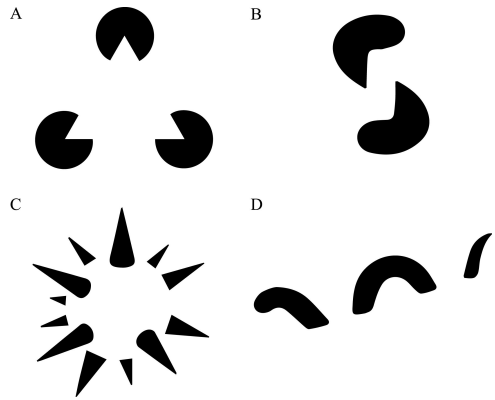
Visual Programming in 2017

How would you design this?

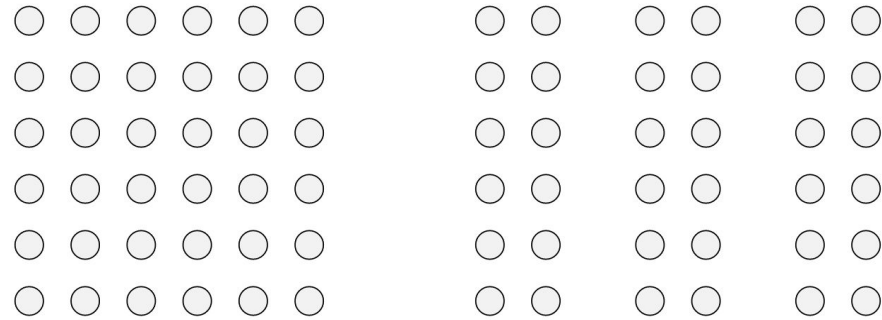
Is this a good programming language?

Theories give a *critical perspective*

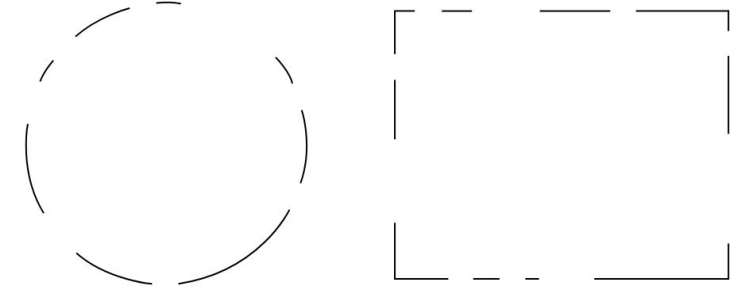
Reminder of a theory: Gestalt theory of perceptual organisation



Continuity

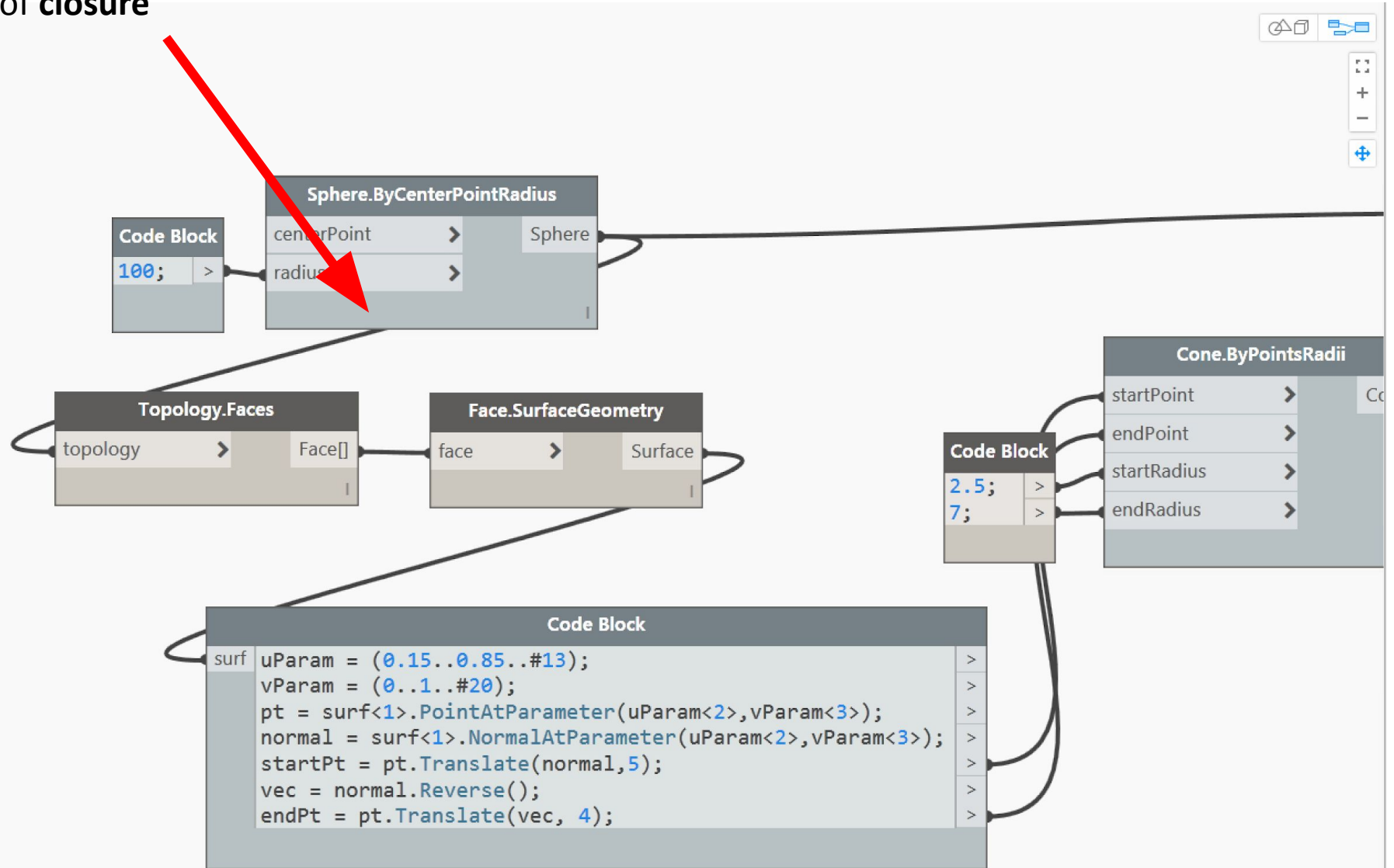


Similarity



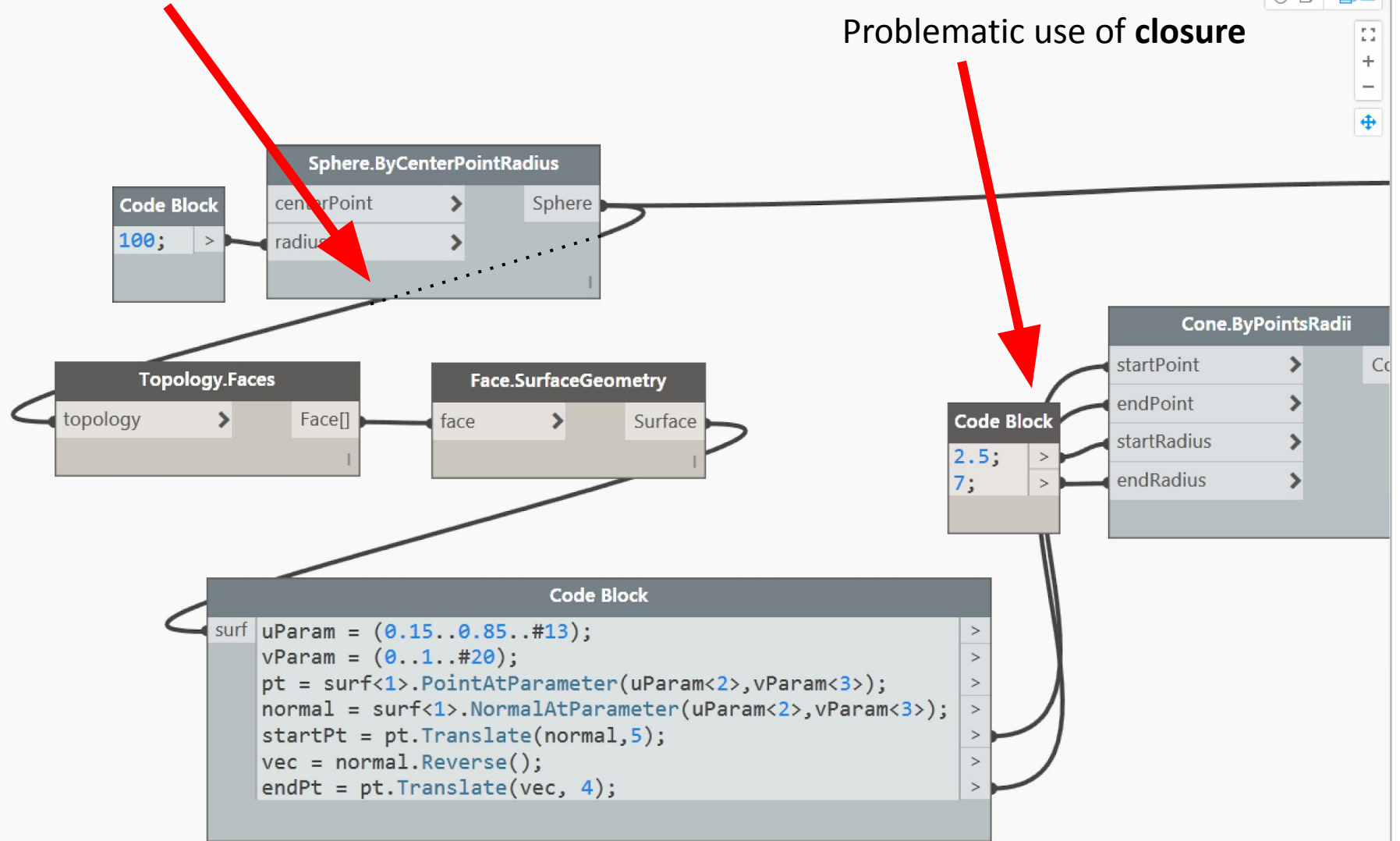
Closure

Use of closure

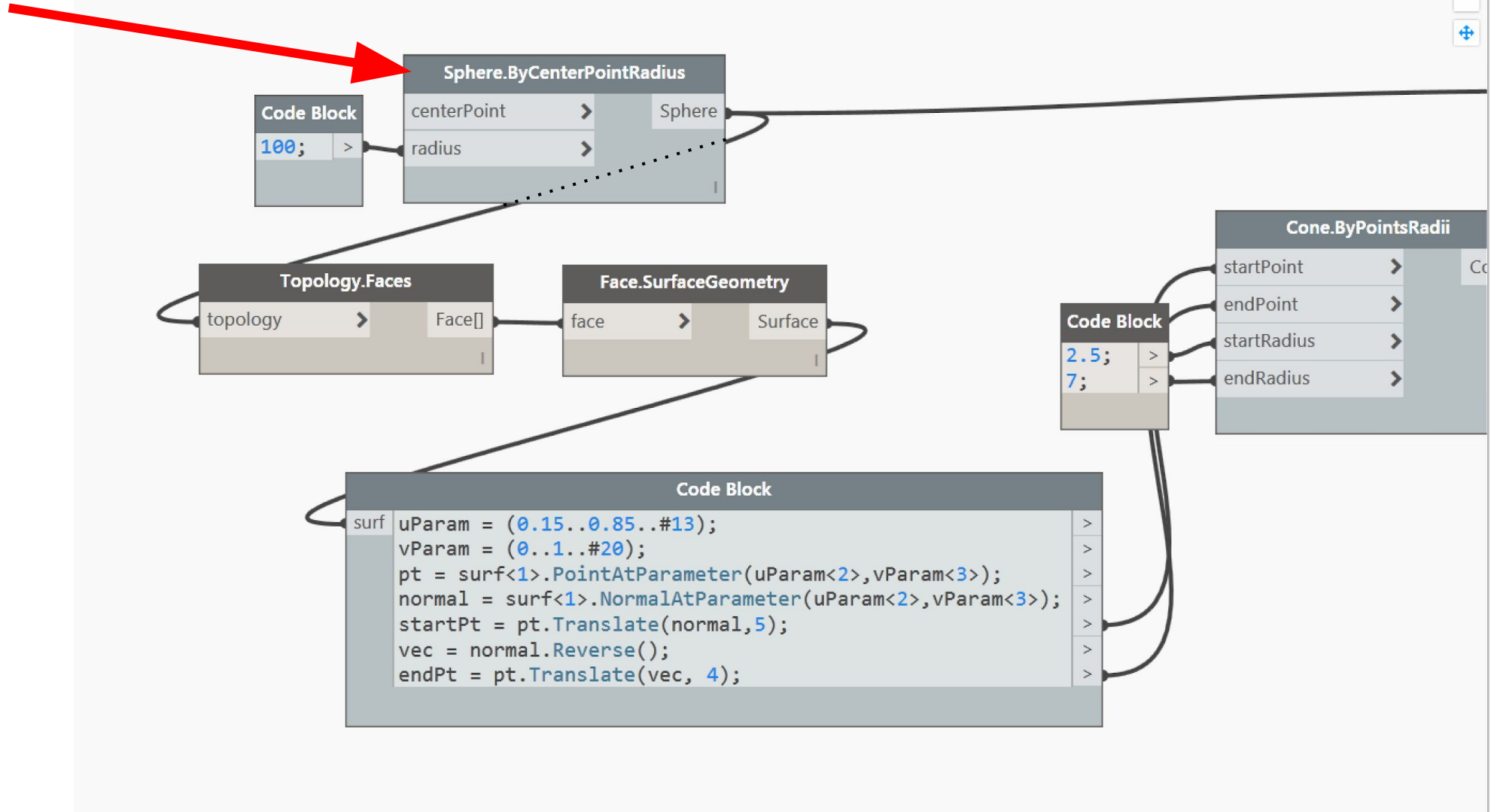


Use of closure

Problematic use of closure

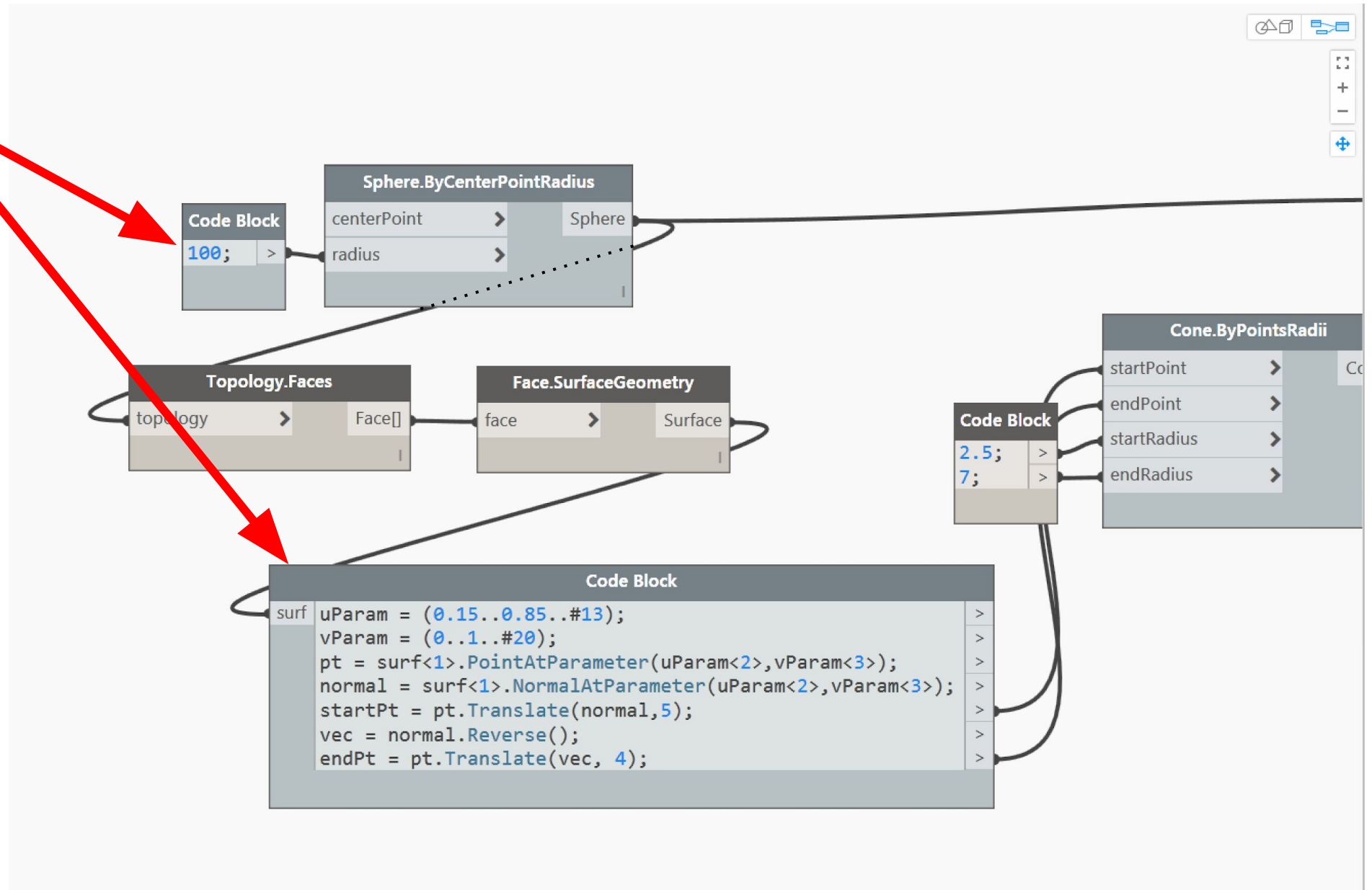


No use of **continuity**



Problematic Similarity

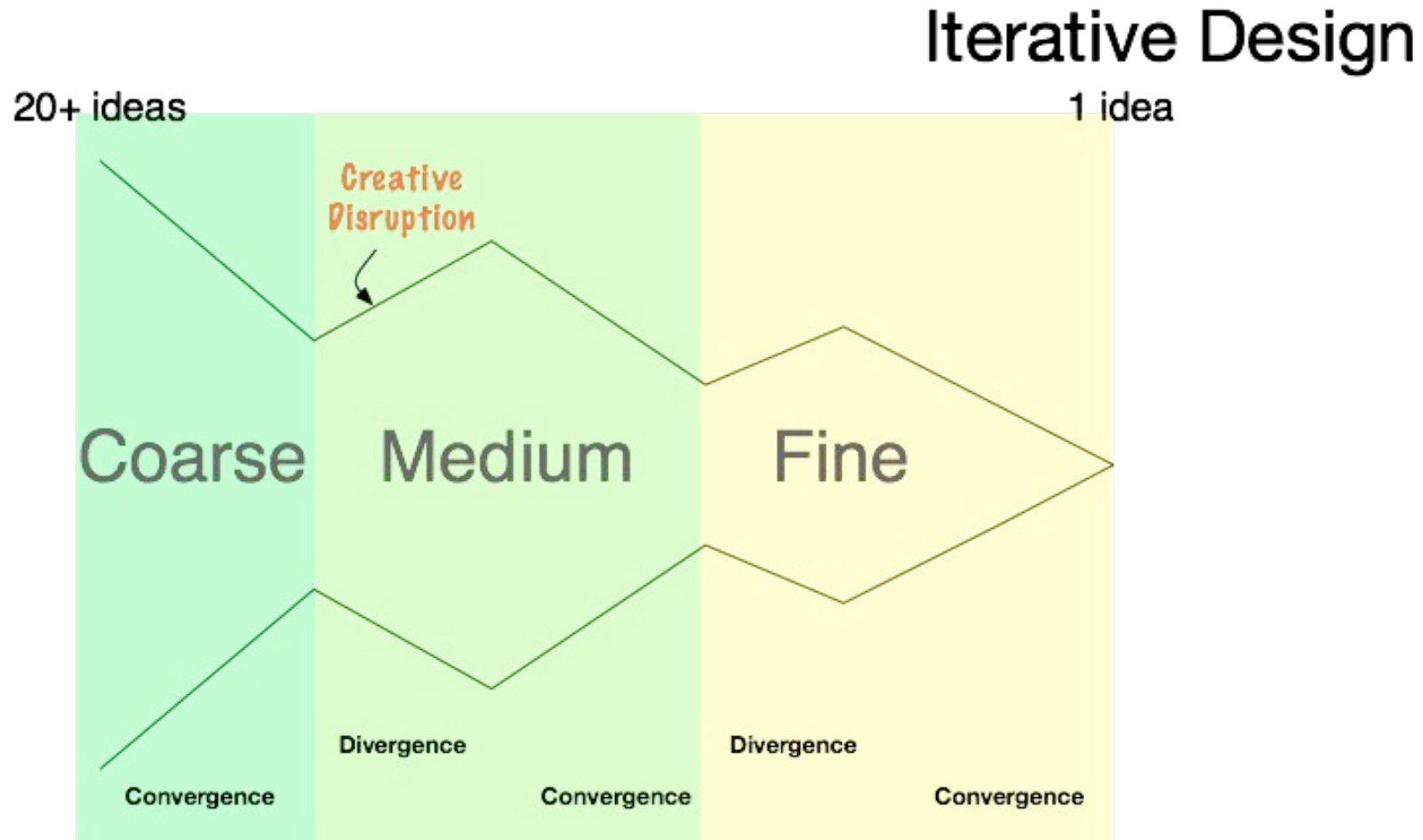
Do users think these are the same?



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?

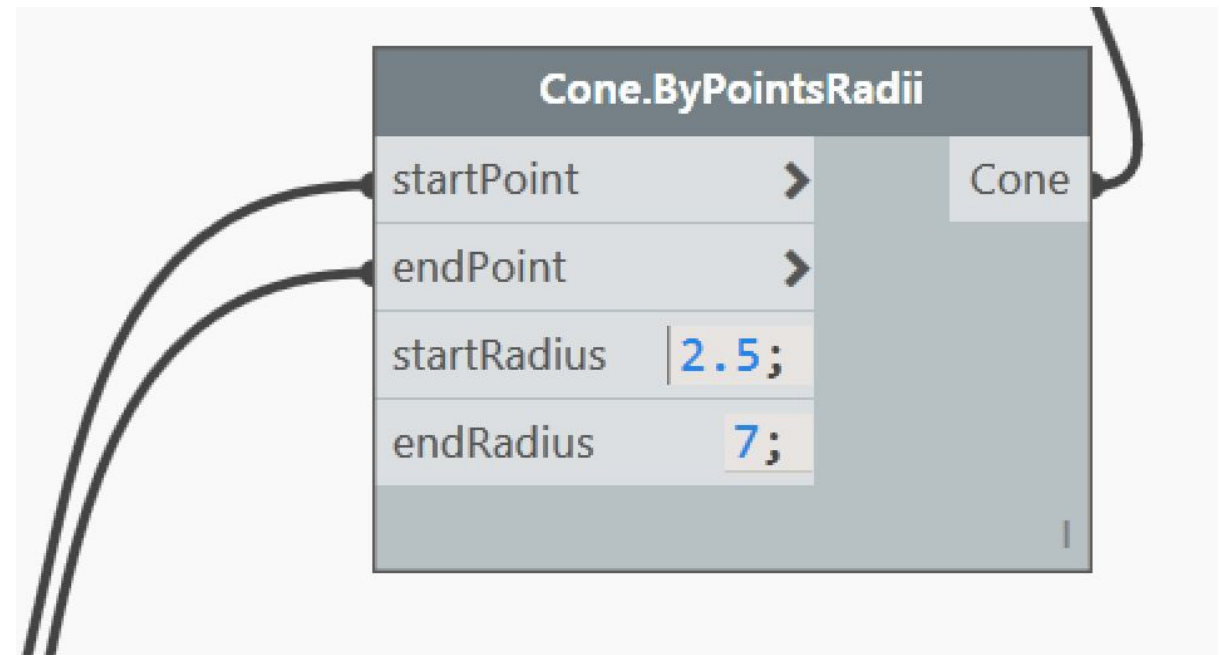
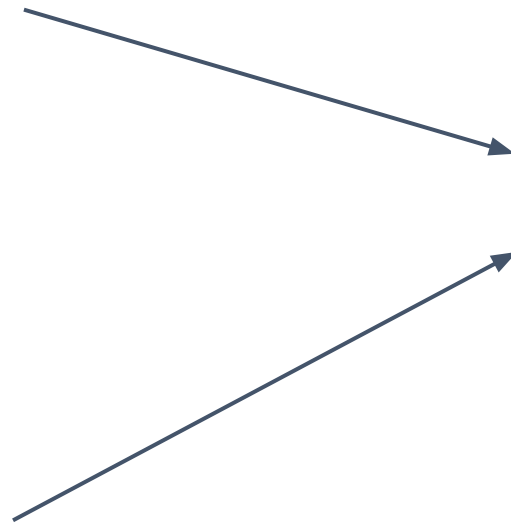
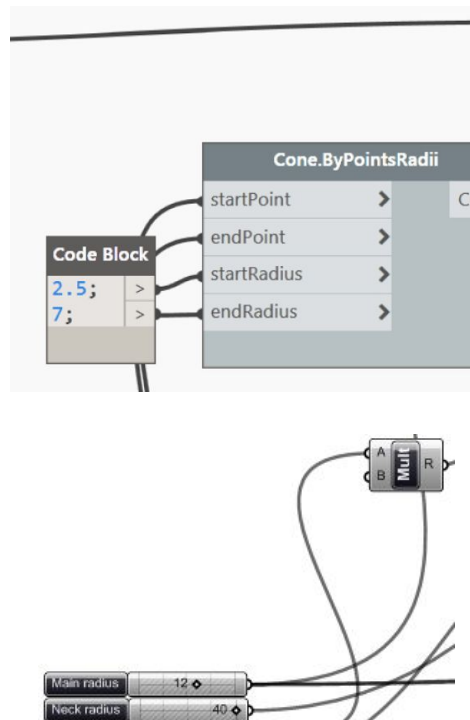
Critique your way to a design



Derived from Pugh '56

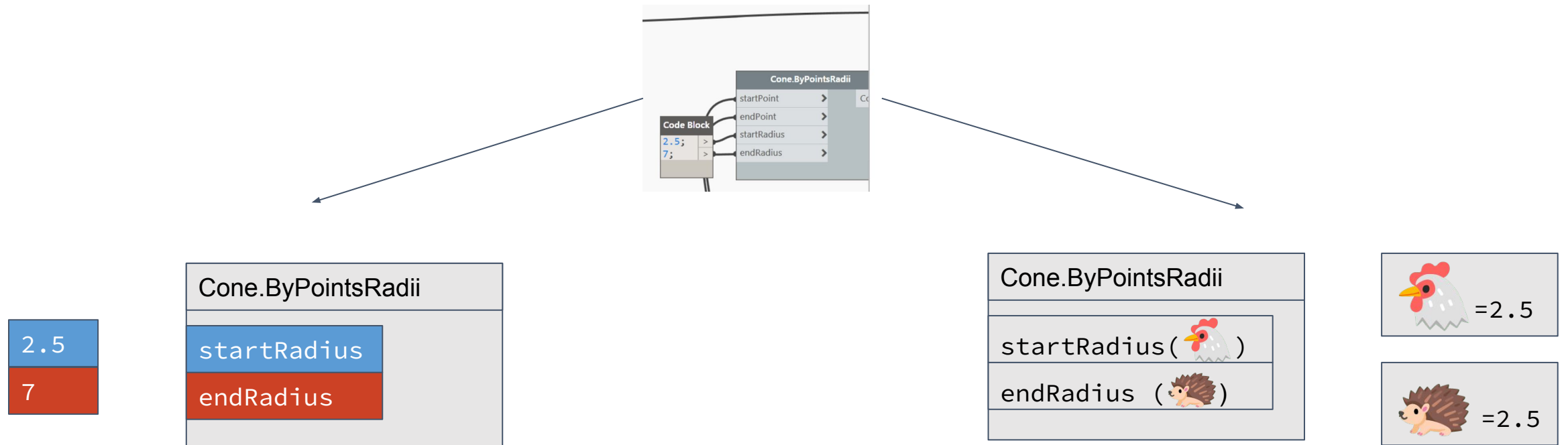
Example of convergence

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



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)

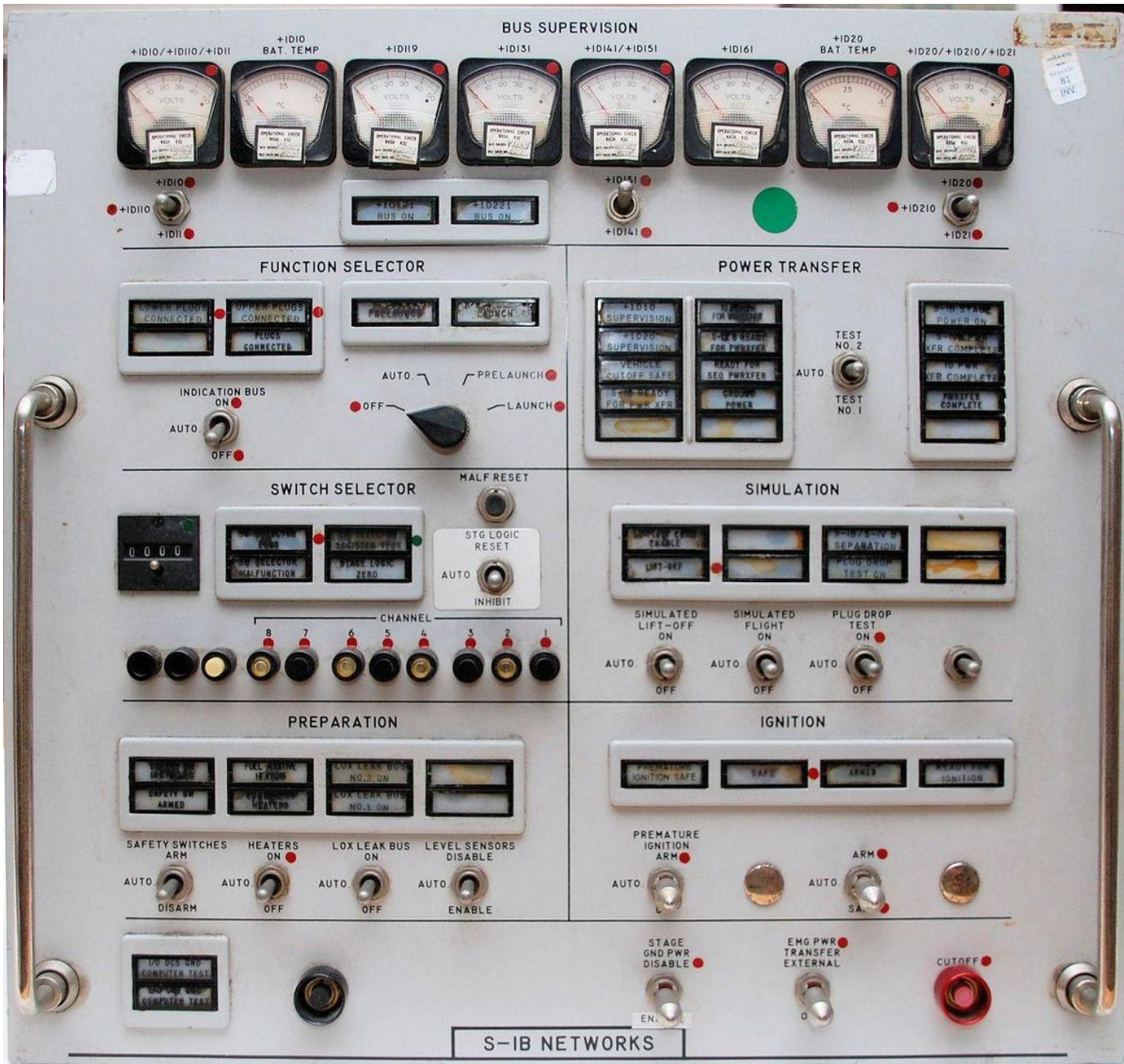


Why theory in HCI?

- 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?

First wave: HCI as engineering “human factors”

- The “user interface” (or MMI “man-machine interface”) is a specialist 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 and ergonomics 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?

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?

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 - Cambridge Digital Humanities
- Game design - Anglia Ruskin University
- Social network analysis - elsewhere in CS Tripos
- Computer music - elsewhere in CS Tripos, Centre for Music & Science
- 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* - (5th edition 2019)
 - Practical professional advice, with good summaries of relevant theories and research methods
 - Any edition is useful, and there are many copies in Cambridge libraries
- Carroll (Ed.) *HCI Models, Theories and Frameworks: Toward a multidisciplinary science* 2003
 - Expert introductions to the different theoretical traditions of the first and second waves (noting that the third wave is more practice-based, beyond purely academic theory)

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>

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?

- The UI of a game
- ex-Twitter
- Moodle
- Note taking applications
- Windows
- ChatGPT
- Debugger / Notional machine