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...

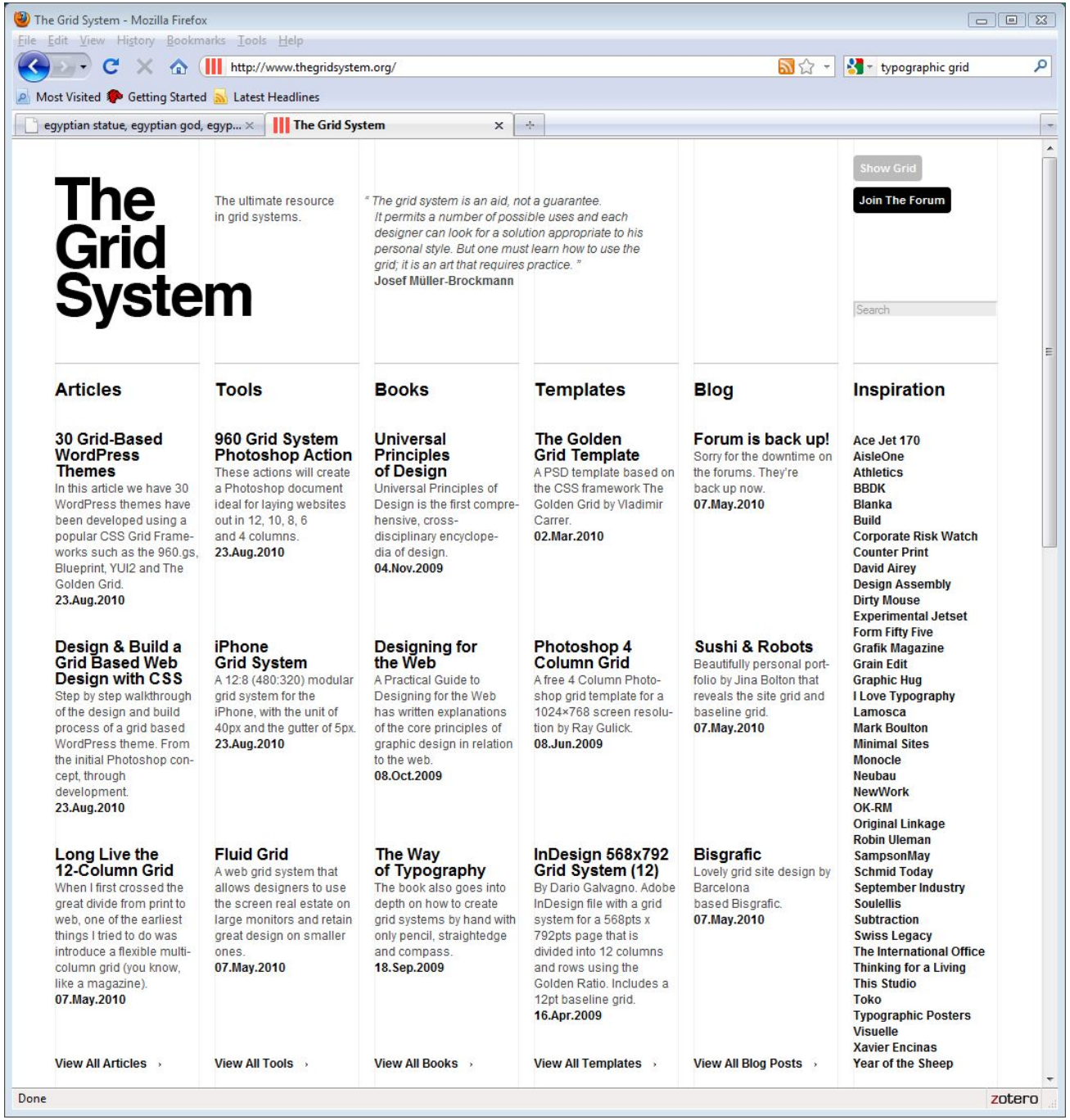
Theory of visual representation:
asking new questions about the ‘obvious’ or familiar

(See: “Visual representation” in “The Encyclopedia of Human Computer Interaction, 2nd Ed for a detailed narrative)

Stream of characters: teletype, .txt file, Turing machine, chat, speech?

1. TYPOGRAPHY AND TEXT

Diagrammatic structure: ways of arranging marks on a 2D plane.



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 is an art that requires practice. "
Josef Müller-Brockmann

Show Grid

Join The Forum

Search

Articles

30 Grid-Based WordPress Themes
In this article we have 30 WordPress themes have been developed using a popular CSS Grid Frameworks such as the 960.gs, Blueprint, YUI2 and The Golden Grid.
23.Aug.2010

Design & Build a Grid Based Web Design with CSS
Step by step walkthrough of 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 crossed the great divide from print to web, one of the earliest things I tried to do was introduce a flexible multi-column grid (you know, like a magazine).
07.May.2010

View All Articles ›

Tools

960 Grid System Photoshop Action
These actions will create a Photoshop document ideal for laying websites out in 12, 10, 8, 6 and 4 columns.
23.Aug.2010

iPhone Grid System
A 12:8 (480:320) modular grid system for the iPhone, with the unit of 40px and the gutter of 5px.
23.Aug.2010

Fluid Grid
A web grid system that allows designers to use the screen real estate on large monitors and retain great design on smaller ones.
07.May.2010

View All Tools ›

Books

Universal Principles of Design
Universal Principles of Design is the first comprehensive, cross-disciplinary encyclopedia of design.
04.Nov.2009

Designing for the Web
A Practical Guide to Designing for the Web has written explanations of the core principles of graphic design in relation to the web.
08.Oct.2009

The Way of Typography
The book also goes into depth on how to create grid systems by hand with only pencil, straightedge and compass.
18.Sep.2009

View All Books ›

Templates

The Golden Grid Template
A PSD template based on the CSS framework The Golden Grid by Vladimir Carrer.
02.Mar.2010

Photoshop 4 Column Grid
A free 4 Column Photoshop grid template for a 1024×768 screen resolution by Ray Gulick.
08.Jun.2009

InDesign 568x792 Grid System (12)
By Dario Galvagno. Adobe InDesign file with a grid system for a 568pts x 792pts page that is divided into 12 columns and rows using the Golden Ratio. Includes a 12pt baseline grid.
16.Apr.2009

View All Templates ›

Blog

Forum is back up!
Sorry for the downtime on the forums. They're back up now.
07.May.2010

Sushi & Robots
Beautifully personal portfolio by Jina Bolton that reveals the site grid and baseline grid.
07.May.2010

Bisgrafic
Lovely grid site design by Barcelona based Bisgrafic.
07.May.2010

View All Blog Posts ›

Inspiration

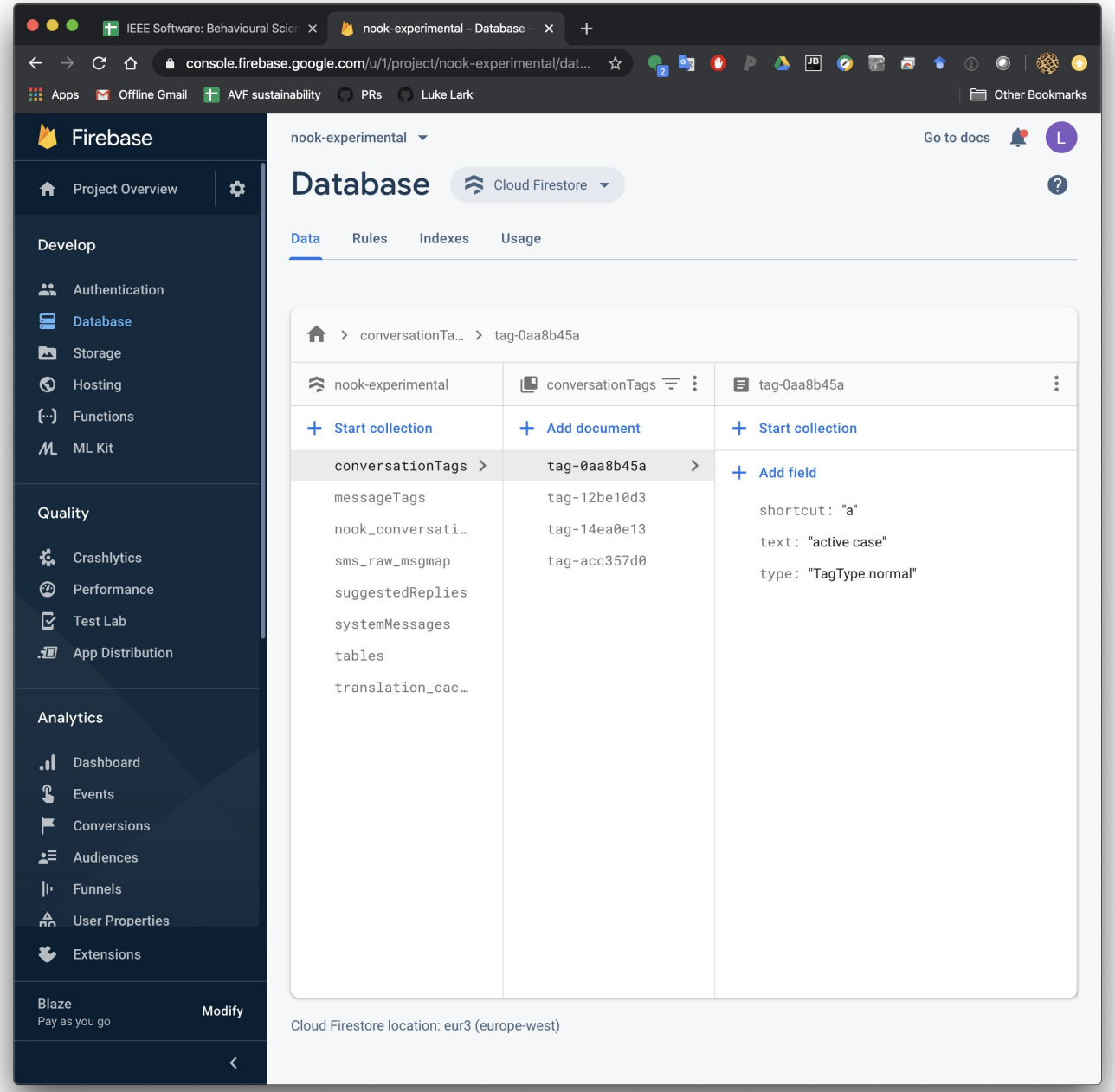
Ace Jet 170
AisleOne
Athletics
BBDK
Blanka
Build
Corporate Risk Watch
Counter Print
David Airey
Design Assembly
Dirty Mouse
Experimental Jetset
Form Fifty Five
Grafik Magazine
Grain Edit
Graphic Hug
I Love Typography
Lamosca
Mark Boulton
Minimal Sites
Monocle
Neubau
NewWork
OK-RM
Original Linkage
Robin Uleman
SampsonMay
Schmid Today
September Industry
Soulellis
Subtraction
Swiss Legacy
The International Office
Thinking for a Living
This Studio
Toko
Typographic Posters
Visuelle
Xavier Encinas
Year of the Sheep

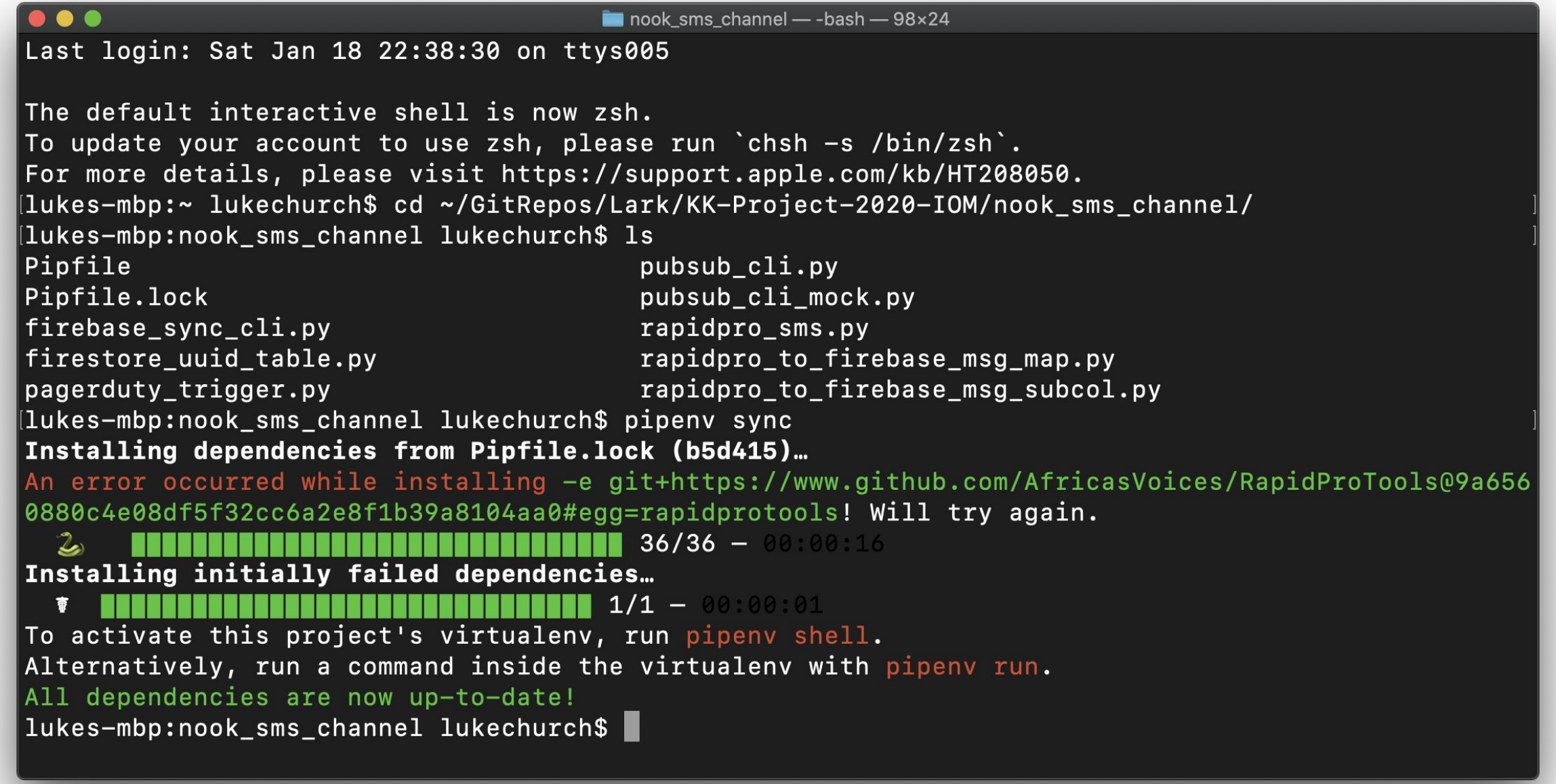
Incipit epistola sancti ihesonimi ad paulinum presbiterum de omnibus diuine hystorie libris-capitulū primū.

Quam ambrosius tua michi munuscula pferens-desiderii et suauissimas literas-q a principio amicicie-huic pbre iam fidē r vetus amicicie nouas pferebant. Ita res mihi illa necessitudo est r xpi glutino copulata-qm non solitas ex familiaris-nō pua tantum corpori-nō lubrica r palpās adulatiōs-sed diuinarū scripturarū studia conciliant. Legim⁹ in veteribus hystoriis-quosdā lustrasse patriarchas-nouos adysse pphetas-magna māsuetudine eos quos et libris nouerant: cōtēptui videri. Sicut pitagoras memphiticos magos-sic plato egiptiōs r archimēdas caramantū-candoque oram vtrāq; que quondā magna grecia dicebat: laboriosissime petiisse-et ut qui athenis nūq; erat-r pomis-nimiq; doctrinas achademie gignasia plenabāt-hanc pegrinus atq; discipulus-maleo alimina mercede discere: qm sua ignorāt ingerit. Denique nī frēs quasi vero orbe fugientes plequī-capt⁹ a piratis r venūdatus-oriēno crudelissimo parui-ducē⁹ captiuus vinct⁹ r seruus. Tamē quia plius maior cautus se fuit-ad omnium linguā-habitu eloquēcie sonu manuēte de vlixis hispanie galliarūq; finibus-quosdam venisse nobiles legimus-r quos ad exemplaria suī verba nō tacuerat: vm⁹ hoīs fama pduxit. Habuit illa etas inaudita ōnibus seculis celebrandūq; miraculū-ut orbē tantā ingressi: alius grecā urbem quereret. Appollonius⁹ siue ille mag⁹ ut vulgus loquitur-siue phus-ut pitagorici tradunt-intrauit pthas-pērsarū caucasū-albanos-scithas-massagetas-opulentissima indie regna penetrauit-et ad gymnosophistas sanctissimo phylosophorum genere nūquid⁹ pcurrit ad bragmanas-ut brachmanum in chrono scripsit auctor et de ganges fonte potauerit-inter pauc⁹ discipulos: de natura-de moribus-ac de cursu diuq; et sidere audire dignatus. Inde p flamineas-babilonios-chaldeos-medos-assirios-parthos-hyrcanos-phenices-arabes-palestinos-transiit ad alexandriā: perque ad ethiopiā-ut gymnosophistas r famosissimam solis mensam videret in sabulo. Inuenit ille vir ubiq; qd discere-et semp profectus-semp se melior: fuit. Scripsit super hoc plenissime octo voluminibus: phylostratus.

Quid loquar de sancti hominibus-cū apostolus paulus: vas electionis⁹. r magister gentiū-qui de conscientia tām i se hospitis loquebat-dicēs. An experimentū quaritis eius qui in me loquit xp̄s. Post damasci arabiāq; lustratā: adiit iherosolimā ut videret petrū r māsit apud eū dies quindecim. Per cui nutrit hebdomadis et ogdoadis: fuerat⁹ gentiū pdicator instituendus erat. Ruditq; post ānos quatuordecim assumpto barnaba et tito: egressus est cū apostolo evāgeliū-ne forte in vacuum curreret aut cucurrisset. Habet ecclesia sēd lacrimis magis: unus vocis actus-et in aures discipli de auctoris ore manducat: forcius sonāt. Vnde et eschines cū rodi exularet-r legeretur

$$i\hbar\frac{\partial}{\partial t}\Psi = -\frac{\hbar^2}{2m}\nabla^2\Psi + V\Psi$$

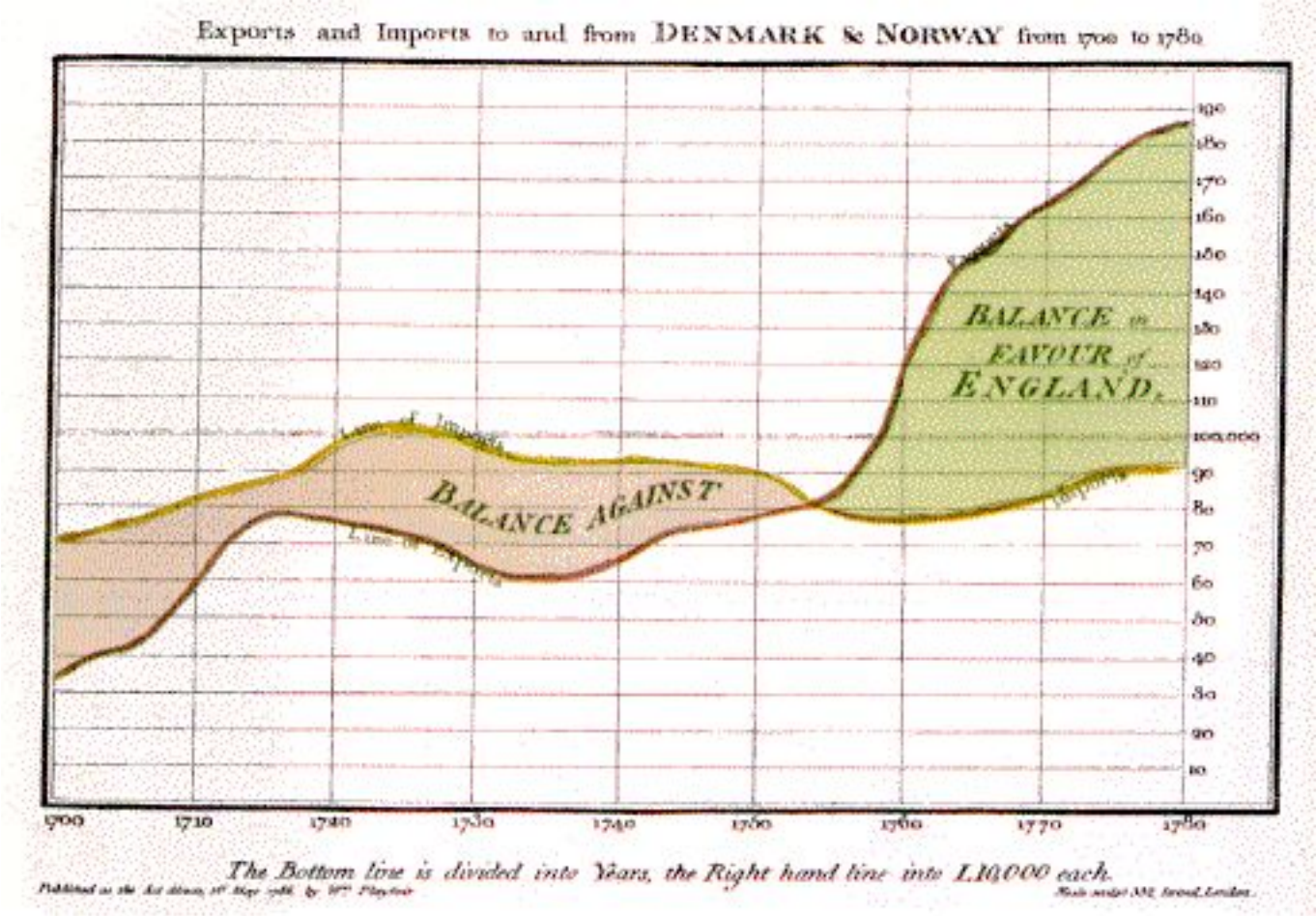

IEEE Software: Behavioural Scie
nook-experimental – Database -
console.firebase.google.com/u/1/project/nook-experimental/dat...
Apps
Offline Gmail
AVF sustainability
PRs
Luke Lark
Other Bookmarks
Firebase
Project Overview
Develop
Authentication
Database
Storage
Hosting
Functions
ML Kit
Quality
Crashlytics
Performance
Test Lab
App Distribution
Analytics
Dashboard
Events
Conversions
Audiences
Funnels
User Properties
Extensions
Blaze
Pay as you go
Modify
nook-experimental
Go to docs
Database
Cloud Firestore
Data
Rules
Indexes
Usage
conversationTa...
tag-0aa8b45a
nook-experimental
conversationTags
tag-0aa8b45a
Start collection
Add document
Start collection
conversationTags
messageTags
nook_conversati...
sms_raw_msgmap
suggestedReplies
systemMessages
tables
translation_cac...
tag-0aa8b45a
tag-12be10d3
tag-14ea0e13
tag-acc357d0
Add field
shortcut: "a"
text: "active case"
type: "TagType.normal"
Cloud Firestore location: eur3 (europe-west)


nook_sms_channel — -bash — 98×24
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 pubsub_cli.py
Pipfile.lock pubsub_cli_mock.py
firebase_sync_cli.py rapidpro_sms.py
firestore_uuid_table.py rapidpro_to_firebase_msg_map.py
pagerduty_trigger.py rapidpro_to_firebase_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.
36/36 — 00:00:16
Installing 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$

2. MAPS AND GRAPHS

The EDSAC UI (1950s)

William Playfair (1795)



SAGE air defense (1960s)

Mappa Mundi (1300s)

Bertin's *Semiologie Graphique* (1969)

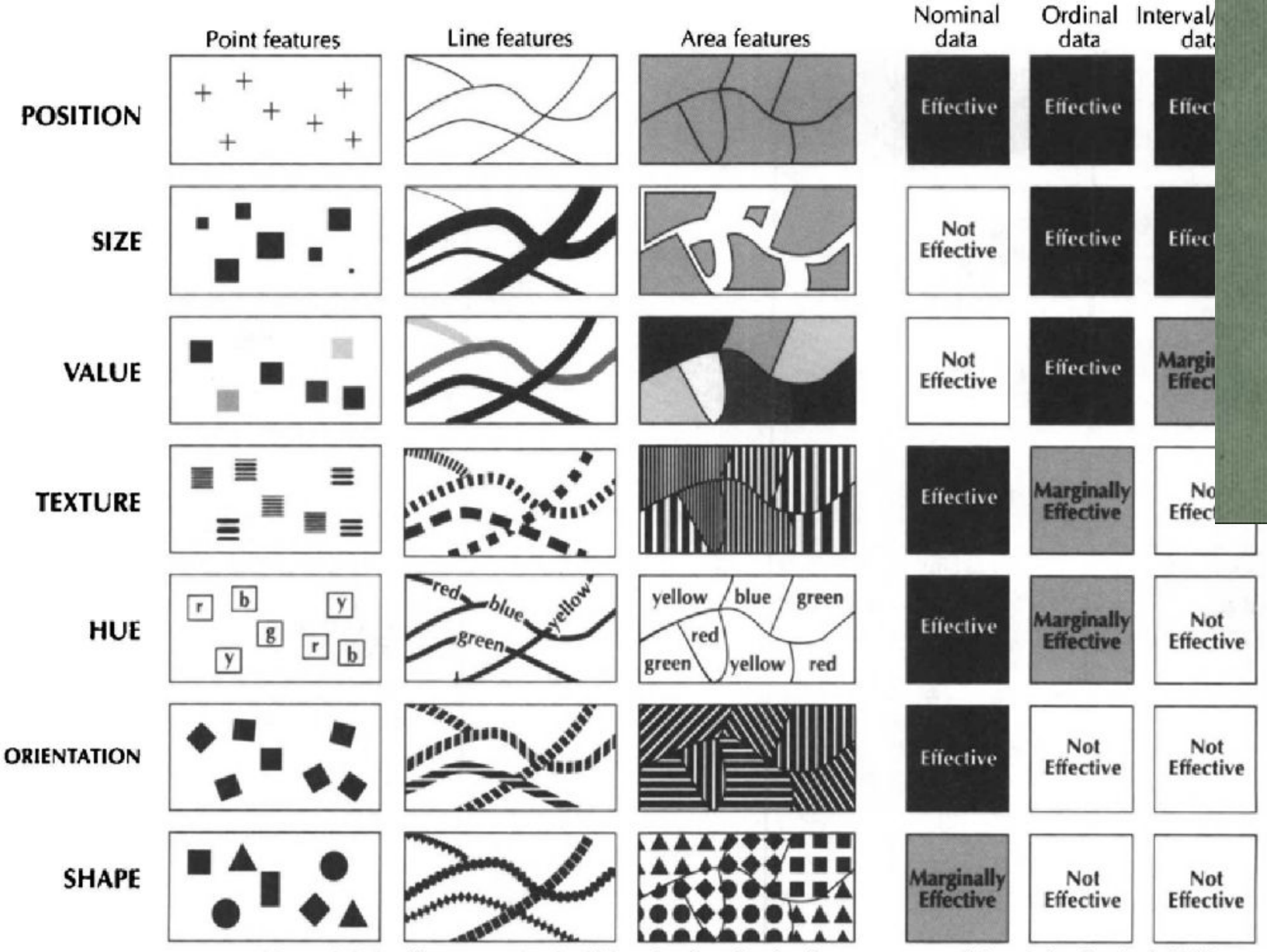
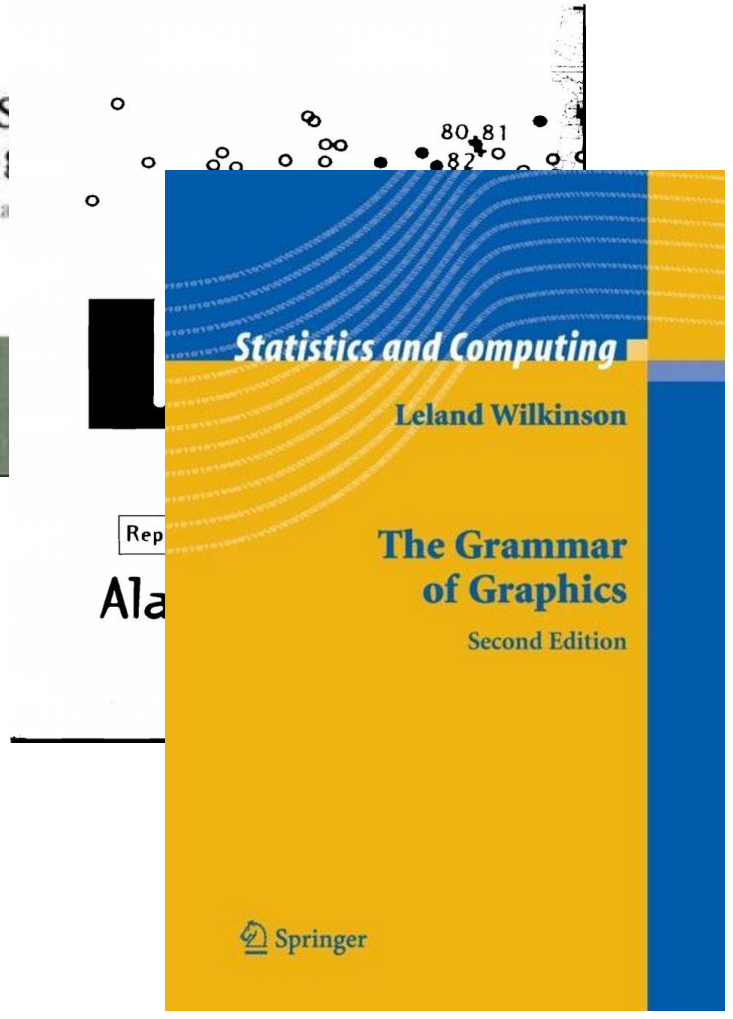
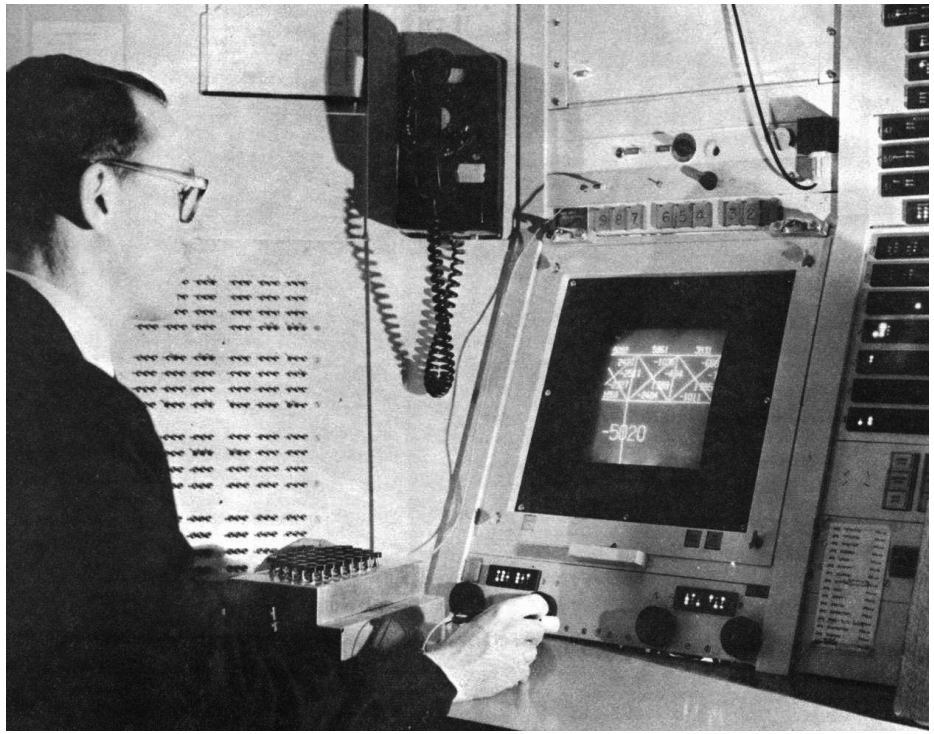


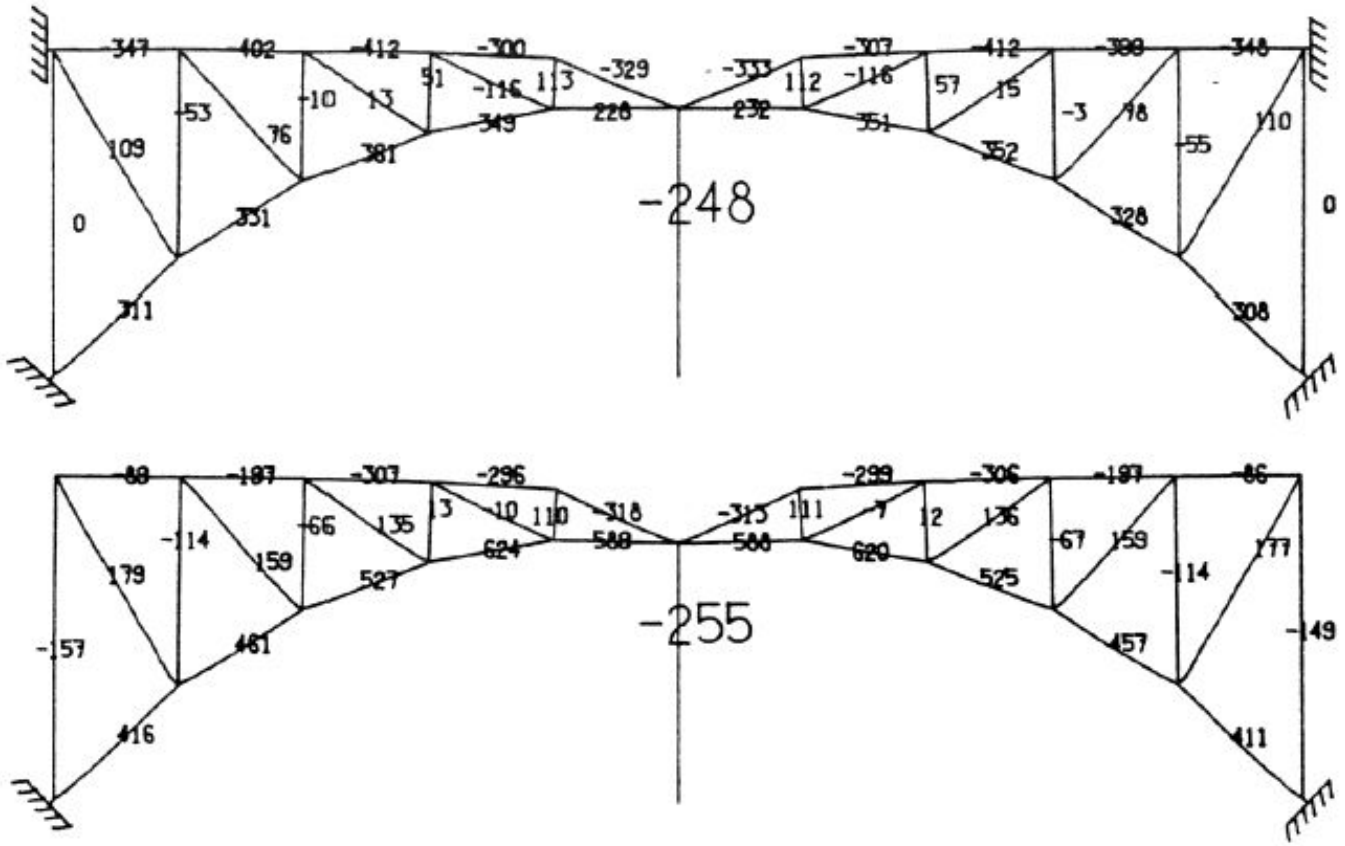
Figure 1. *The visual variables and their effectiveness in signifying the three levels of measurement of data (after Bertin [1983]).*



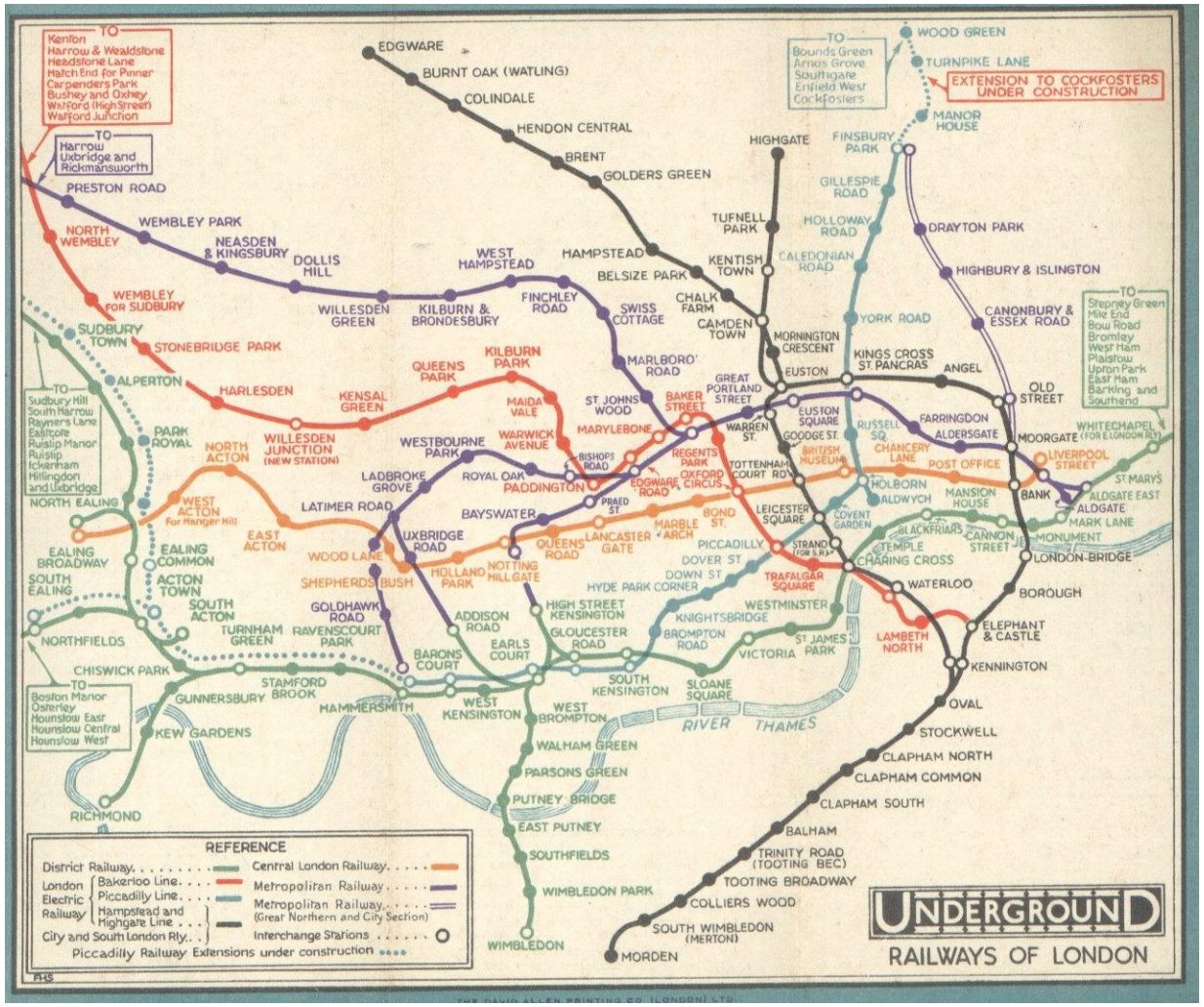
3. SCHEMATIC DRAWINGS

Sutherland’s Sketchpad (1963)

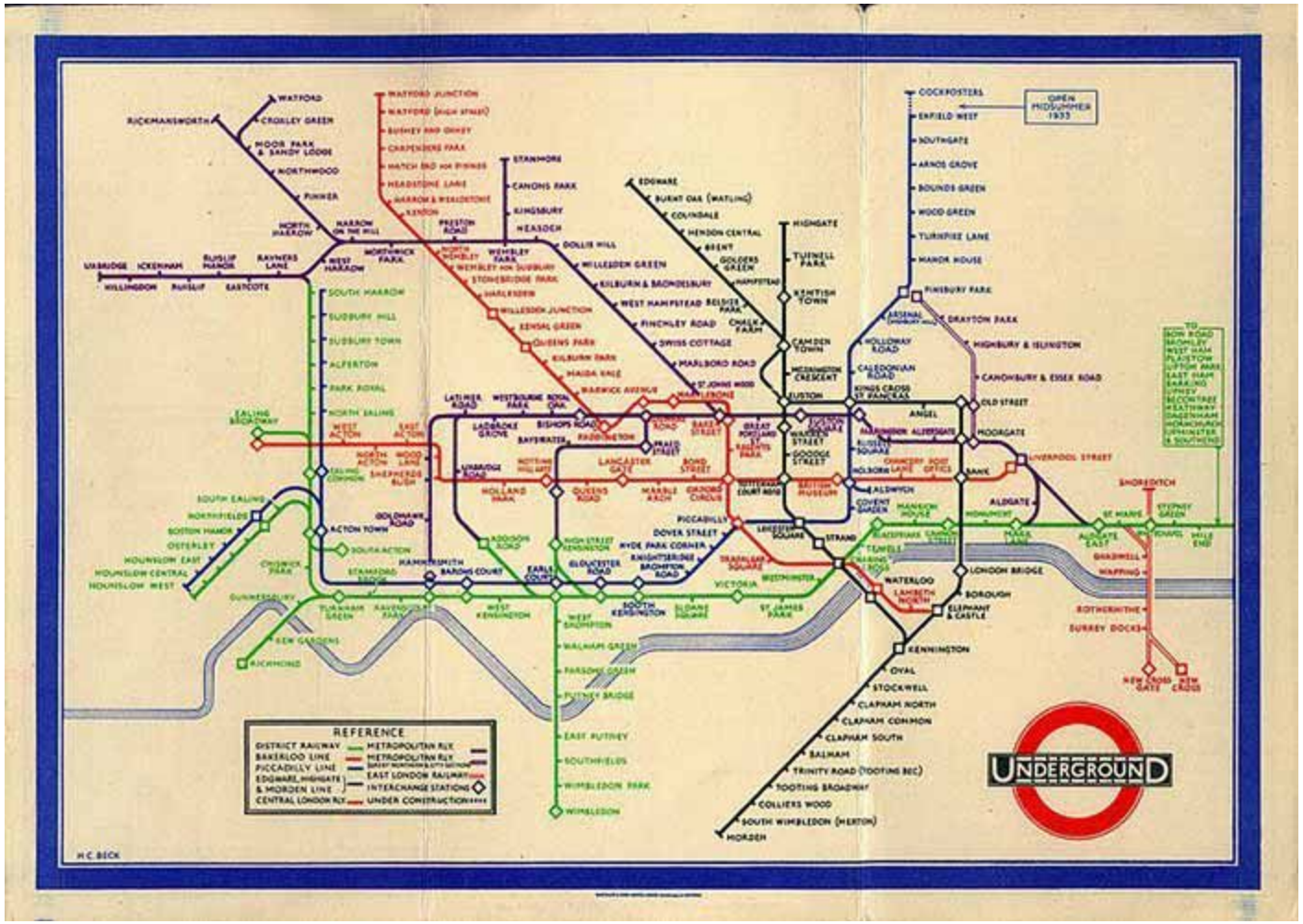


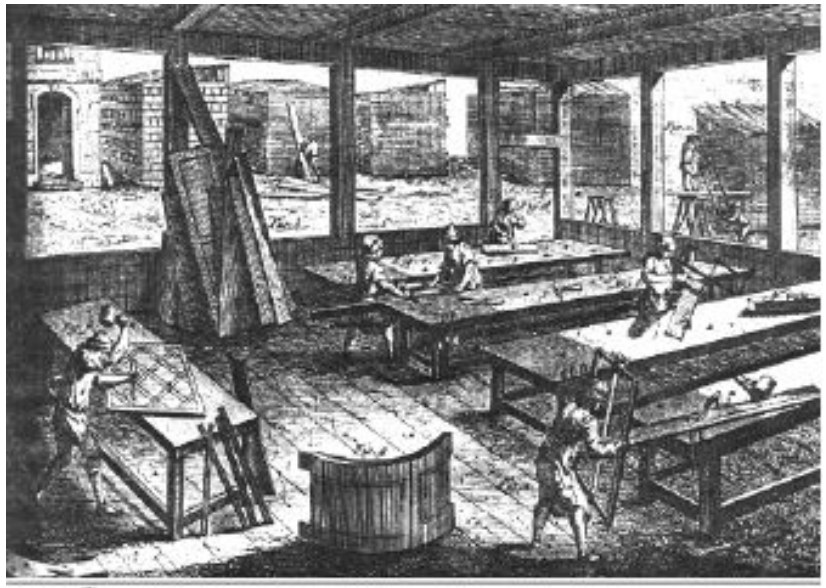


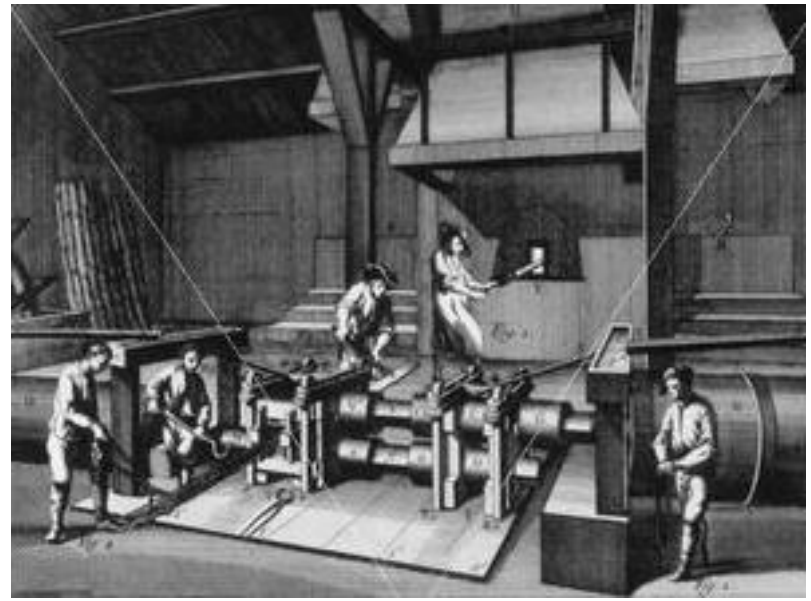
The London Underground Map (1920)

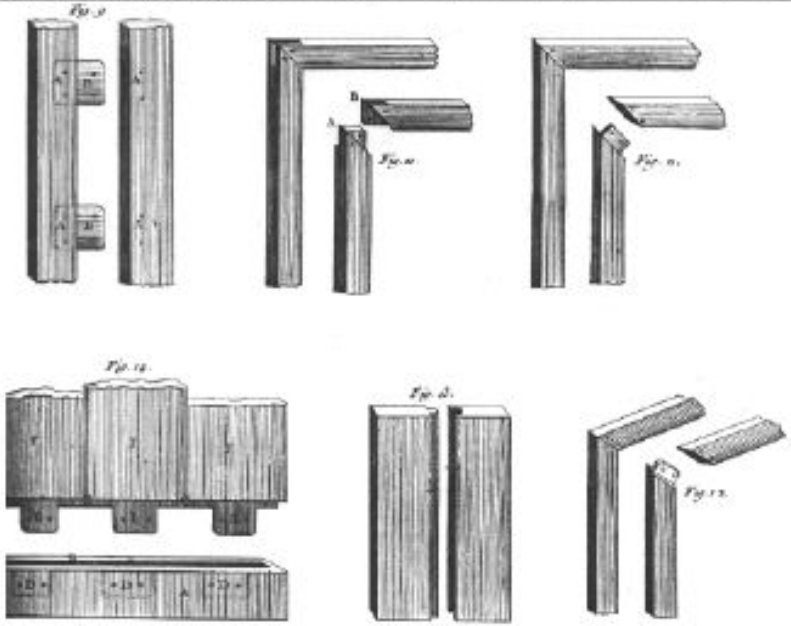


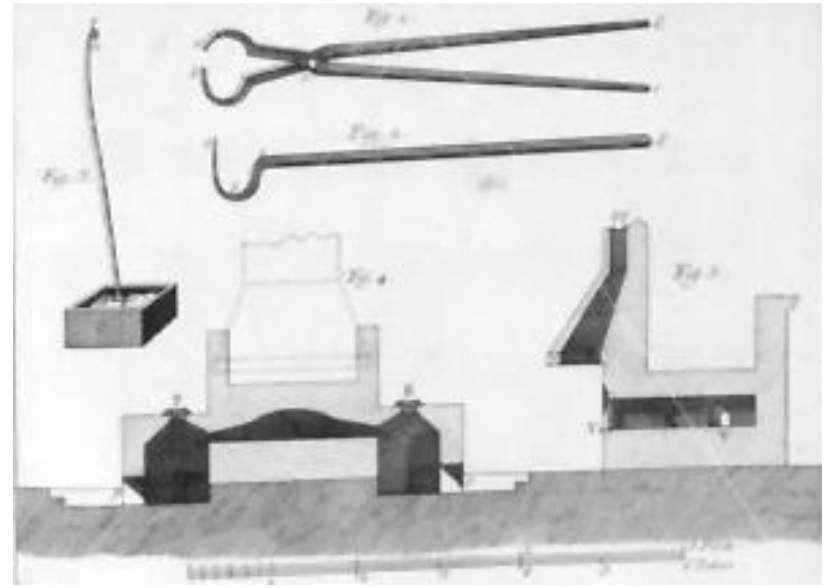
Henry Beck’s London Underground Diagram (1931)



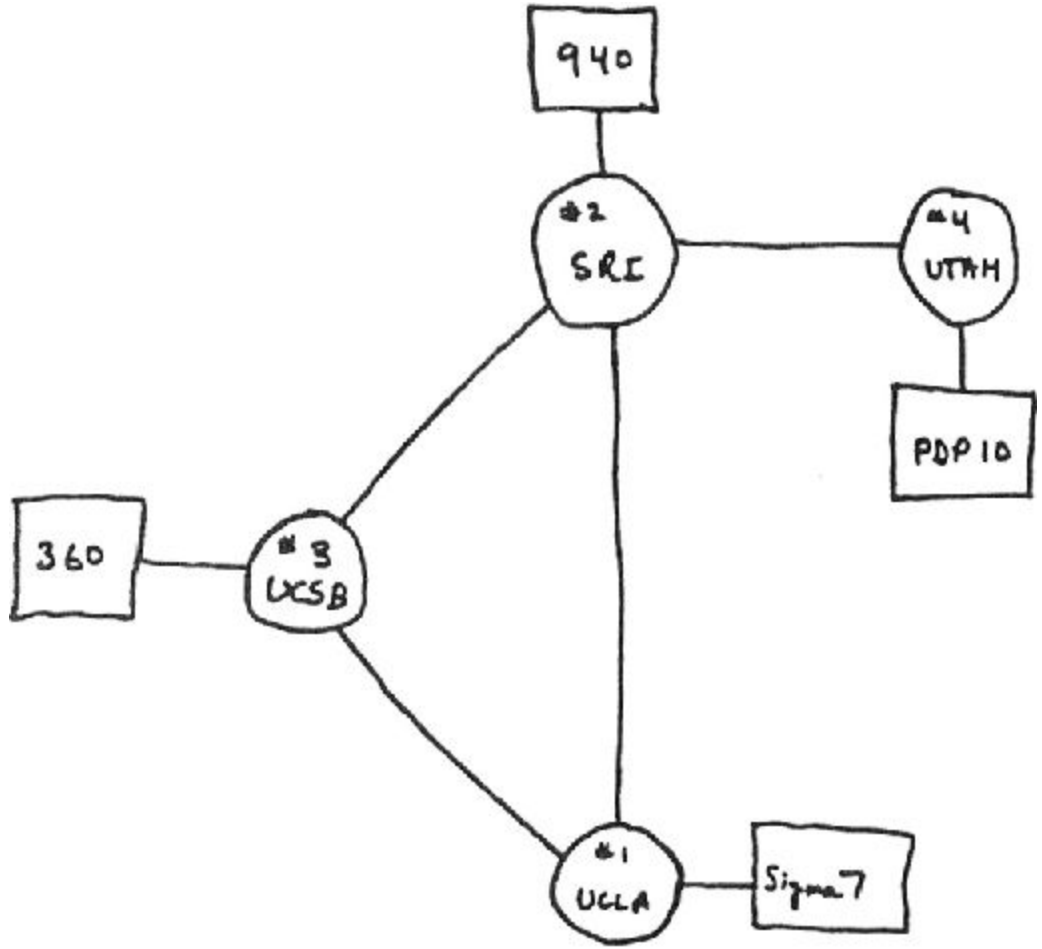




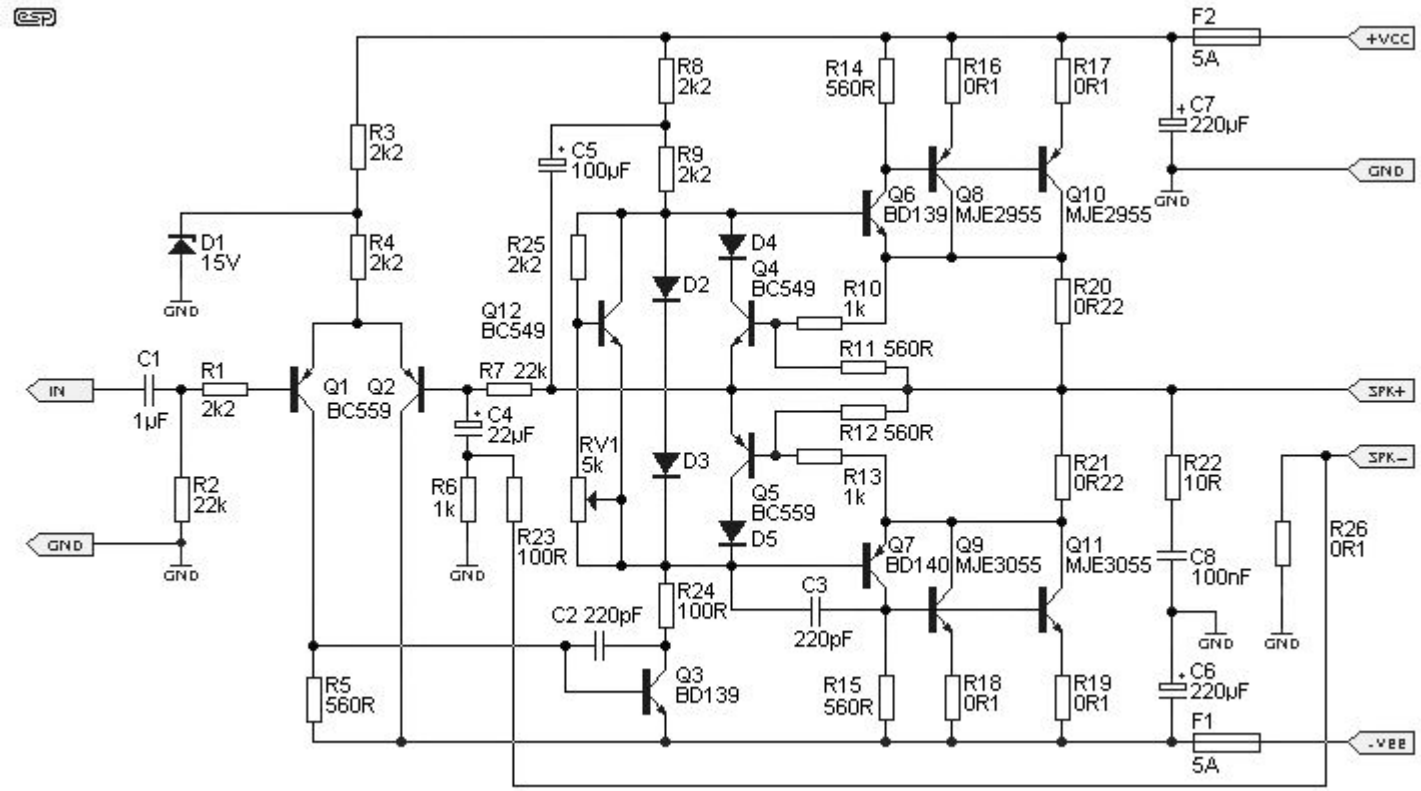




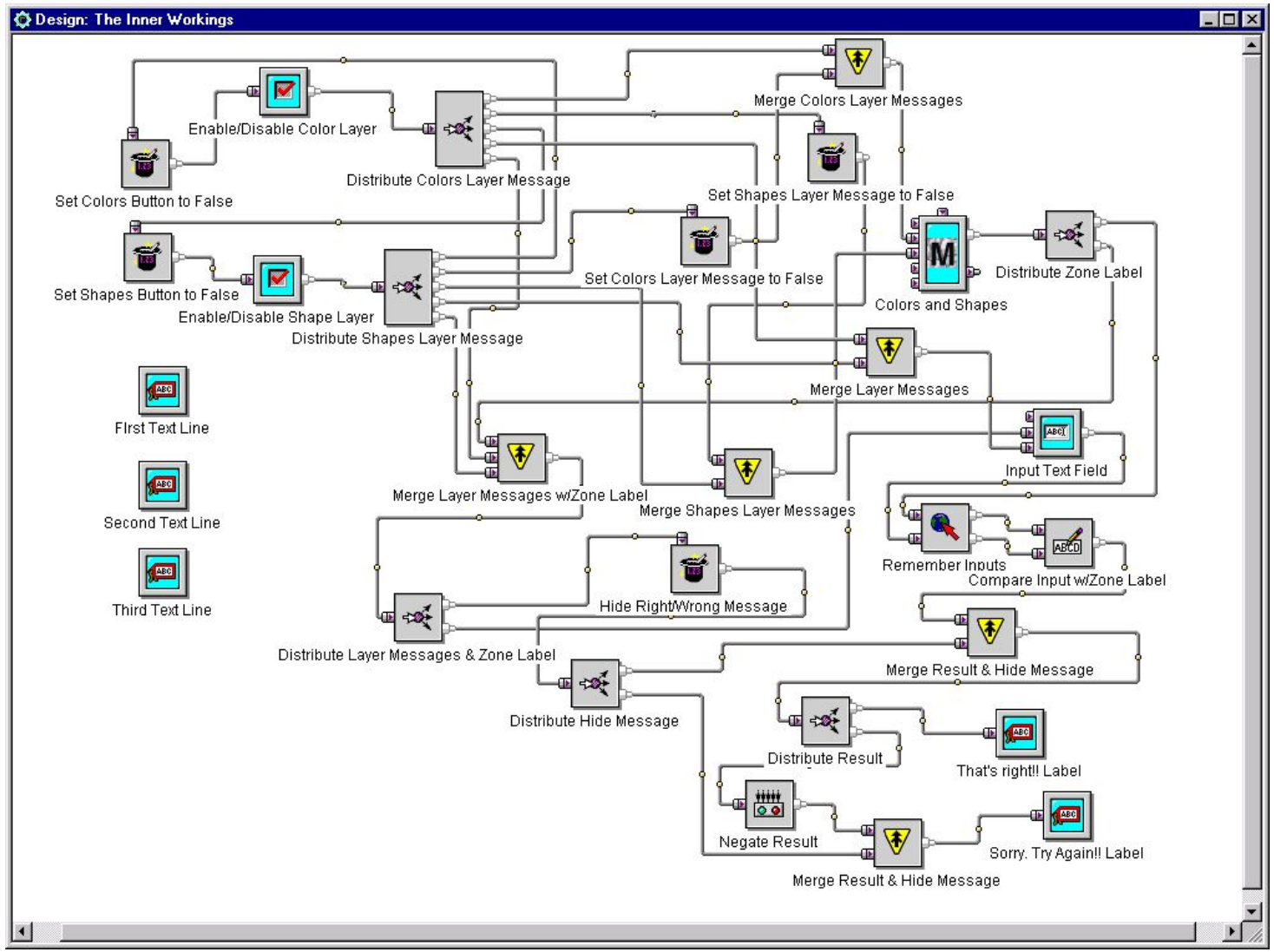
3a) NODE-AND-LINK DIAGRAMS



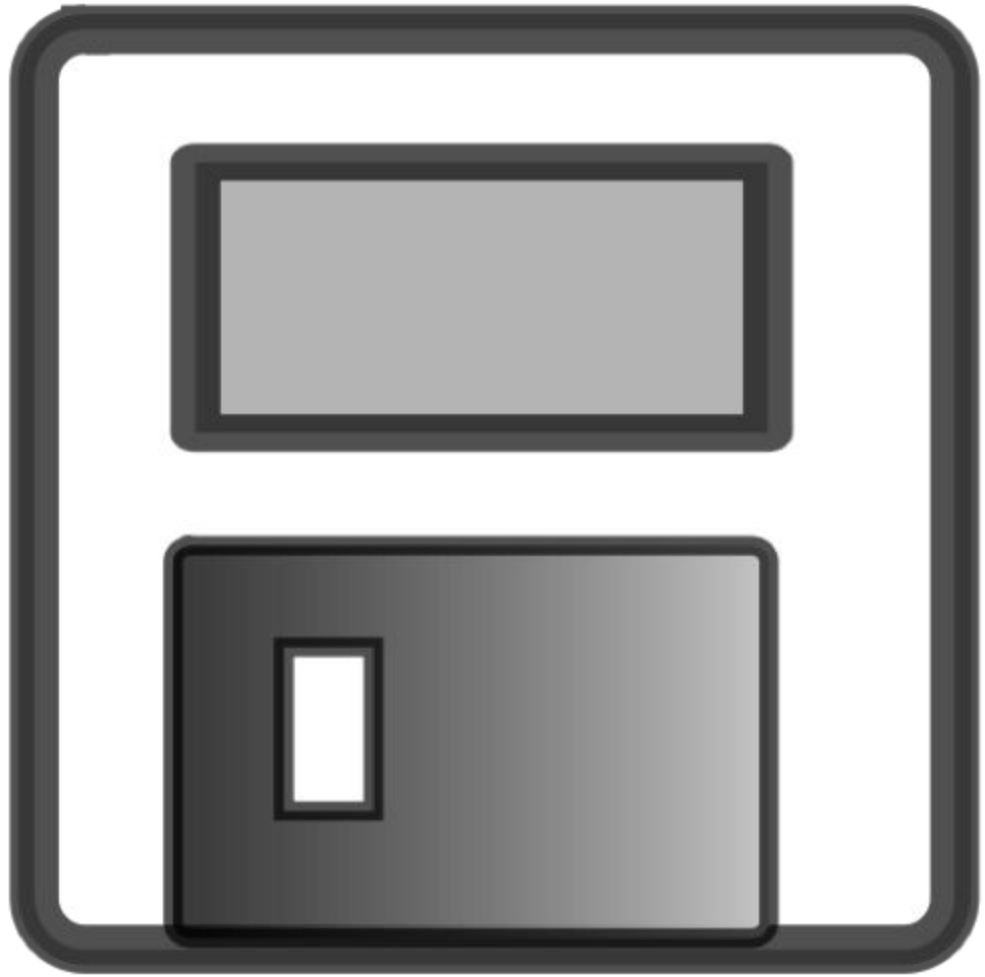
THE ARPA NETWORK


F2
5A
+VCC
R8
2k2
R14
560R
R16
0R1
R17
0R1
C7
220µF
GND
R3
2k2
C5
100µF
R9
2k2
Q6
BD139
Q8
MJE2955
Q10
MJE2955
D1
15V
GND
R4
2k2
R25
2k2
D4
Q4
BC549
R10
1k
R20
0R22
D2
Q12
BC549
R11 560R
C1
1µF
R1
2k2
IN
Q1 Q2
BC559
R7 22k
SPK+
C4
22µF
R12 560R
RV1
5k
D3
R21
0R22
R22
10R
SPK–
R6
1k
R13
1k
Q5
BC559
D5
R26
0R1
R2
22k
GND
GND
R23
100R
Q7
BD140
Q9
MJE3055
Q11
MJE3055
C8
100nF
GND
GND
R24
100R
C3
220pF
C2 220pF
Q3
BD139
R5
560R
R15
560R
R18
0R1
R19
0R1
C6
220µF
F1
5A
-VEE

The future of “no-code / low-code”? Java Studio (1995)

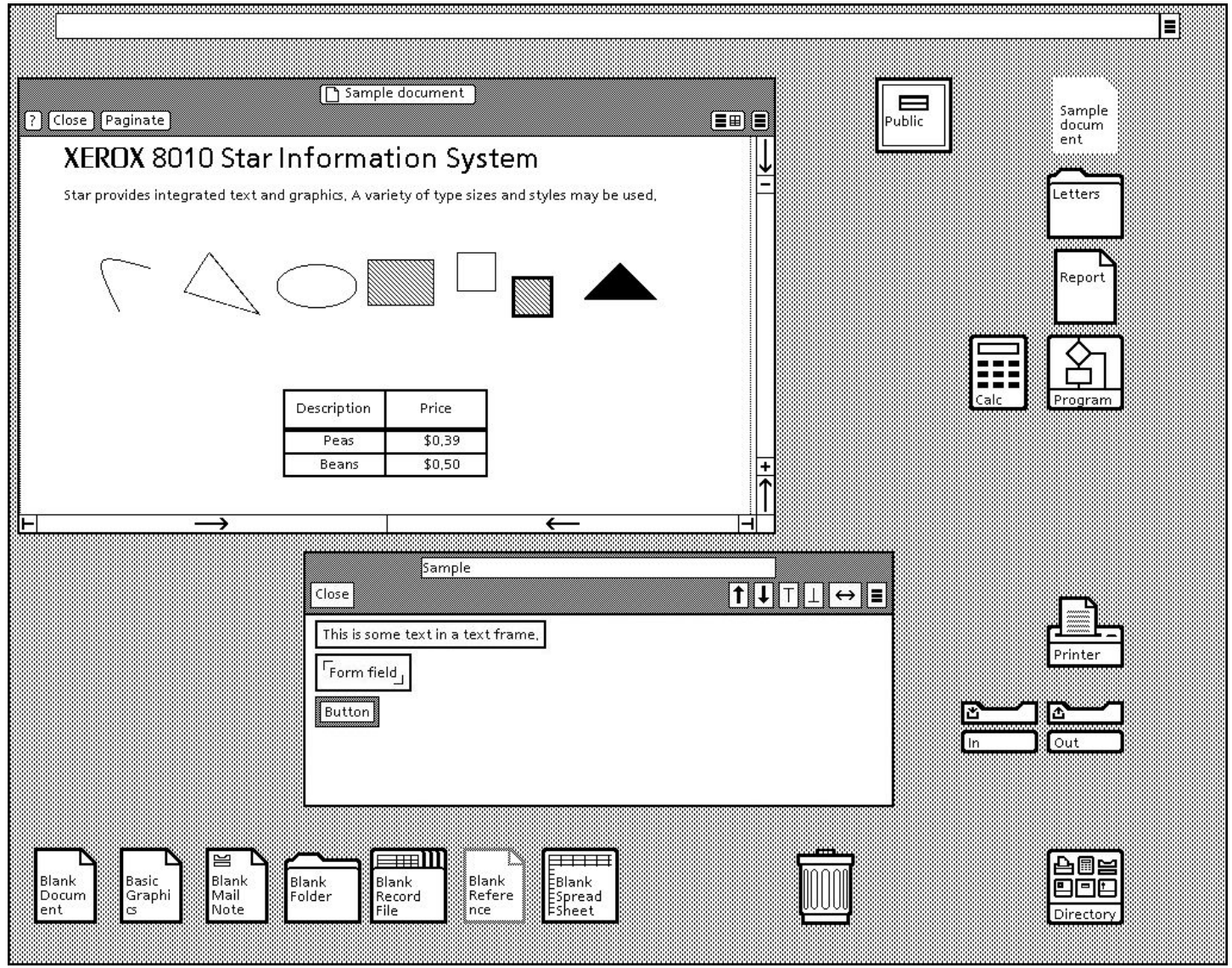


4. ICONS AND SYMBOLS




TIMER
STOP
—
+

5. VISUAL METAPHOR


Sample document
Close
Paginate
XEROX 8010 Star Information System
Star provides integrated text and graphics. A variety of type sizes and styles may be used.
Description
Price
Peas
$0.39
Beans
$0.50
Sample
Close
This is some text in a text frame.
Form field
Button
Public
Sample docum ent
Letters
Report
Calc
Program
Printer
In
Out
Blank Docum ent
Basic Graphi cs
Blank Mail Note
Blank Folder
Blank Record File
Blank Refere nce
Blank Spread Sheet
Directory


Public Family Room
Door to Public Safe
Door to Public Study
Door to Public Study
Bob Clock
Door to Public Mouse Hole
GeoSafari for Bob
Bob Financial Guide
Bob E-Mail
Bob Letter Writer
Book
Checkbook
EXIT


张诺涵
15828647377
张诺涵
15828647377
Mon
7
16
MIUI


Control
if
while
Events
when event is started
when event is received
Collision Events
when trigger is entered by object
when trigger is exited by object
when colliding with object
when colliding with player

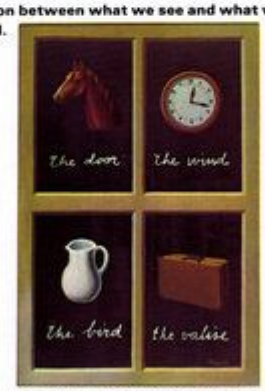
6. PICTURES

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

Correspondence theory for graphic design

	Graphic Resources	Correspondence	Design Uses
Marks	Shape Orientation Size Texture Saturation Colour Line	Literal (visual imitation of physical features) Mapping (quantity, relative scale) Conventional (arbitrary)	Mark position, identify category (shape, texture colour) Indicate direction (orientation, line) Express magnitude (saturation, size, length) Simple symbols and colour codes
Symbols	Geometric elements Letter forms Logos and icons Picture elements Connective elements	Topological (linking) Depictive (pictorial conventions) Figurative (metonym, visual puns) Connotative (professional and cultural association) Acquired (specialist literacies)	Texts and symbolic calculi Diagram elements Branding Visual rhetoric Definition of regions
Regions	Alignment grids Borders and frames Area fills White space Gestalt integration	Containment Separation Framing (composition, photography) Layering	Identifying shared membership Segregating or nesting multiple surface conventions in panels Accommodating labels, captions or legends
Surfaces	The plane Material object on which the marks are imposed (paper, stone) Mounting, orientation and display context Display medium	Literal (map) Euclidean (scale and angle) Metrical (quantitative axes) Juxtaposed or ordered (regions, catalogues) Image-schematic Embodied/situated	Typographic layouts Graphs and charts Relational diagrams Visual interfaces Secondary notations Signs and displays

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

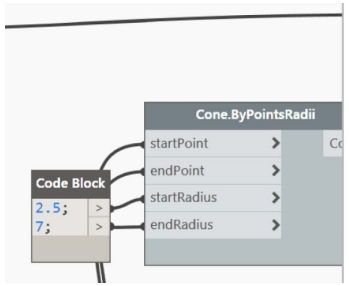
Use 1: Usability analysis

Mapping, Categorical: Off, cold, warm, hot

~~Mapping, Magnitude, Colder -> Warmer~~

Mapping, Direction(!!!), Colder -> Warmer

Use 2: Generating divergent designs



- Topological linking

=>

- Arbitrary conventional

2.5

7

Cone.ByPointsRadii

startRadius

endRadius

Cone.ByPointsRadii

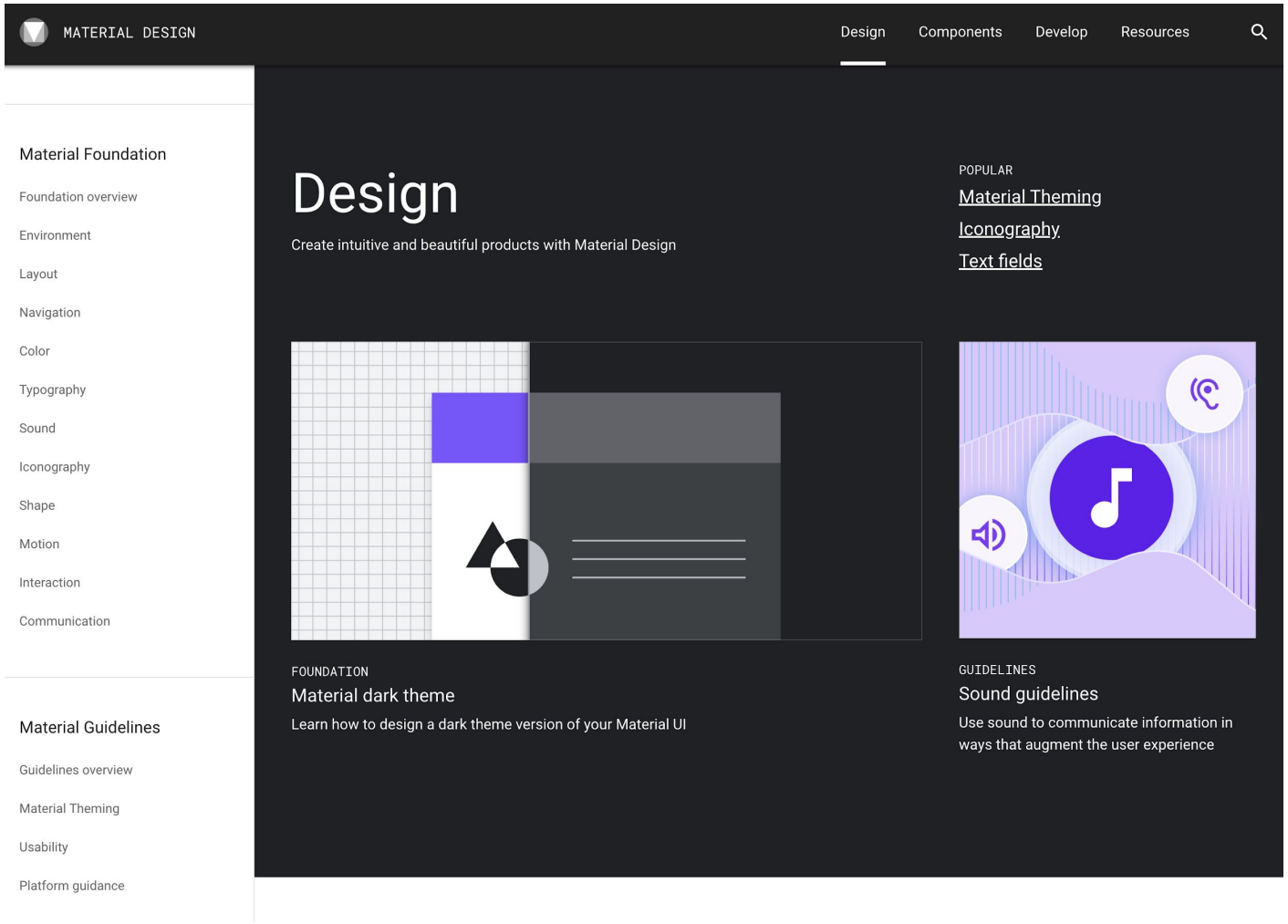
startRadius( )

endRadius ( )

=2.5

=2.5

Use 3: Design systems



Color usage

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

CONTENTS

Hierarchy

Brand

Meaning

State

(https://material.io)

The programming analogy challenge 2026: Example #1: Moodle

- Who is the user: You or me?
  - This question of perspective applies to most UIs ... and PLs!
  - I've never seen student view of Moodle, but from my own perspective …
- Inheritance in Moodle:
  - How is "Student" different from "Student observer"?
- Inheritance in Moodle:
  - Could there be a map operator for assignment feedback?