

everything you wanted
to know about software
but were afraid to ask

Daniel Jackson · Leading Jewish Minds · May 12, 2022

part 1:
how did we
get here?

from word star (1978)...

```
WordStar C:\NOVEL\QUANTUM.WS [1]
<B><K>249 Insert P1 L4 V10.00" C13 H1.25"
MS Body Copy COURIER PC 12 B I U <*> L C R J
Q U A N T U M N I G H T
by Hugo and Nebula Award-winner ROBERT J. SAWYER
"A really good book. Just the sort of science fiction
I'd like to be writing myself if I had the time."
--John Gribbin, author of In Search of Schrödinger's Cat


---


I beheld the monster.
One of them, anyway. There were six according to the indictments; nine,
if you believed the Huffington Post, which argued that three other corrections
officers who should also have been charged had gotten off scot-free. But this
one, everyone agreed, had been the ringleader: Devin Becker was the man who
had incited the other guards -- and he was the only one who had actually
killed somebody.
"Thirty minutes," said a burly sergeant as Becker folded his lanky form
onto the metal seat. The irony wasn't lost on me: Becker himself was now in
the care of a prison guard. Quis custodiet ipsos custodes? Who indeed
watches the watchers?
Becker had high cheekbones, and the weight he'd lost since the notorious
video had been recorded made them even more prominent. That the skin pulled
taut across them was bone white only added to the ghastly appearance; put a
black hood over his head and he could have played chess for a man's soul.
```

... to apple pages (2005)

The image shows a screenshot of a Mac Pages document titled "facebook dark design". The document contains an article with the following text:

Facebook's Dark Design: It's Not Just the Algorithms

In the midst of our current debate about Facebook, have we ignored a core issue? Public scrutiny has focused almost entirely on the company and its practices. Congressional testimony of a whistle-blower earlier this fall—and the Wall Street Journal's continuing expose—have revealed the extent to which its employees knew, through their own research, about the damage that their product causes. And yet the product itself has been strangely absent from much of the discussion.

There has been talk of algorithms, notably how Facebook determines which posts users see, and how rankings favor sensational content, feeding extremism and aiding the spread of disinformation. And user interface experts have long noted the myriad small and subtle ways in which sites like Facebook entice the user into more frequent and impetuous interactions.

These things matter, and their pernicious effects are well known, if not always acknowledged. But the essence of a software product (such as the Facebook app) is not found in the buttons and colors that appear on the screen, nor in the algorithms that prioritize one data item over another. Instead, it lies in the *concepts* of an app—the behavioral building blocks we interact with—that shape how we use and understand it, and that determine the impacts of our actions.

The concepts of “newsfeed,” “likes,” “friends,” “tagging” and so on—these are the core of Facebook, and scrutinizing them reveals the ways in which Facebook's design often serves the interests not of users but of Facebook itself. These concepts, in other words, are the drivers behind Facebook's wider societal impacts, and the damage they cause is not accidental but is by design.

The purpose of the *newsfeed* is, according to [Facebook](#), “connecting people to the stories that matter most to them.” If that were true, you should be able to filter and sort posts as you would items in an online store. And yet Facebook's newsfeed not only lacks the most elementary controls but is not even stable: a refresh of your browser window will show you a new selection of posts, changing not only their order but even dropping top posts that you might have wanted to read.

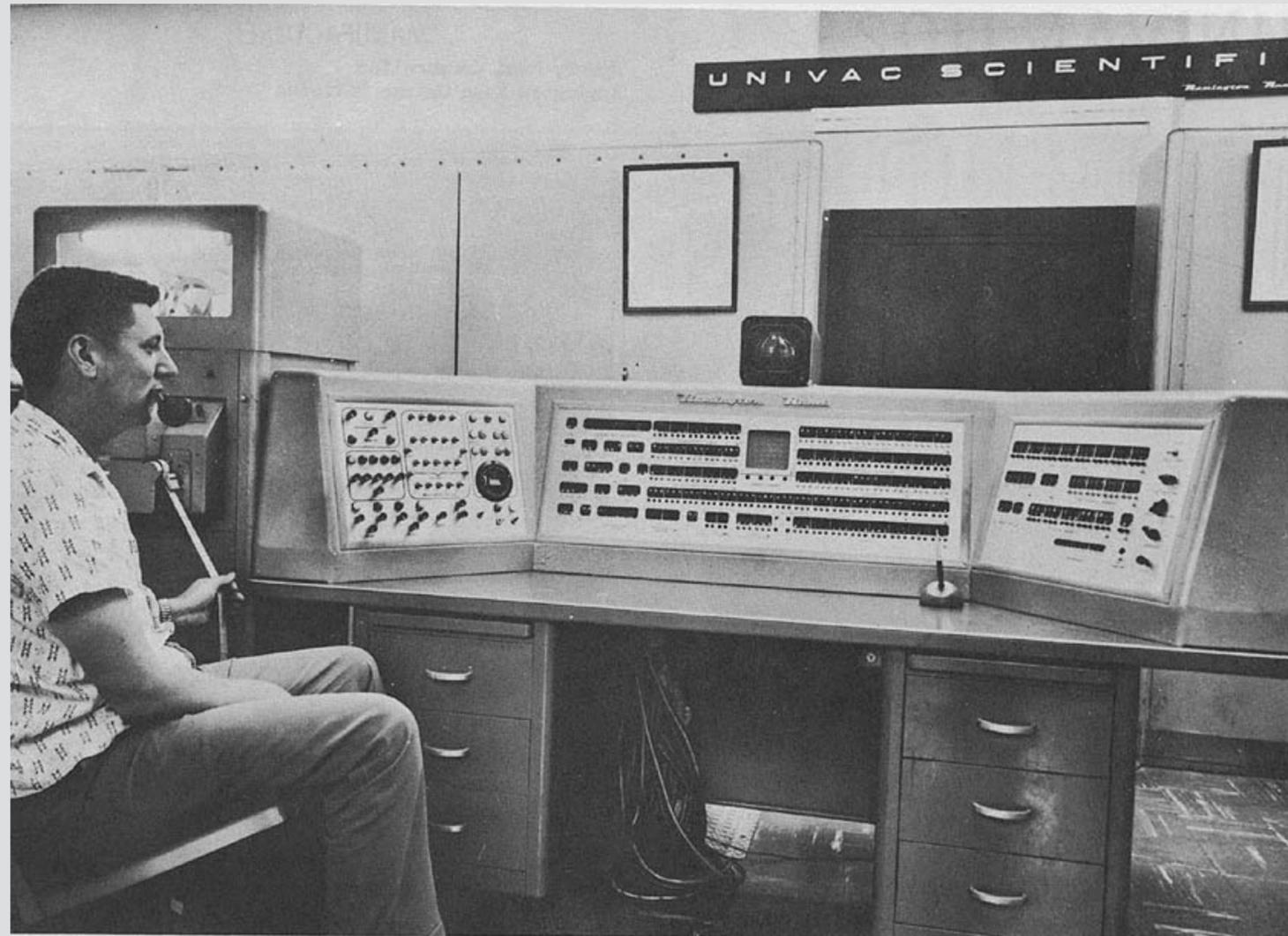
We're so familiar with this concept that we fail to notice how strange it is. The newsfeed concept has conditioned us to accept what appears to be a near-random selection of posts, opening the void into which Facebook can insert the algorithm **991 words** in choices.

The right-hand sidebar shows the "Text" formatting panel with the following settings:

- Default* (Update)
- Style | Layout | More
- Font: Warnock Pro
- Weight: Bold (12 pt)
- Character Styles: None
- Text Color: Black
- Spacing: Lines (1), Before Paragraph (0 pt), After Paragraph (0 pt)
- Bullets & Lists: None
- No Bullets
- Indent: 0 in (Bullet), 0 in (Text)
- Drop Cap: Off

tech-driven design:
from code-breakers to
memory extenders

the first digital computers: code-breaking, weather & missile trajectories



Univac 1101 console (1950)



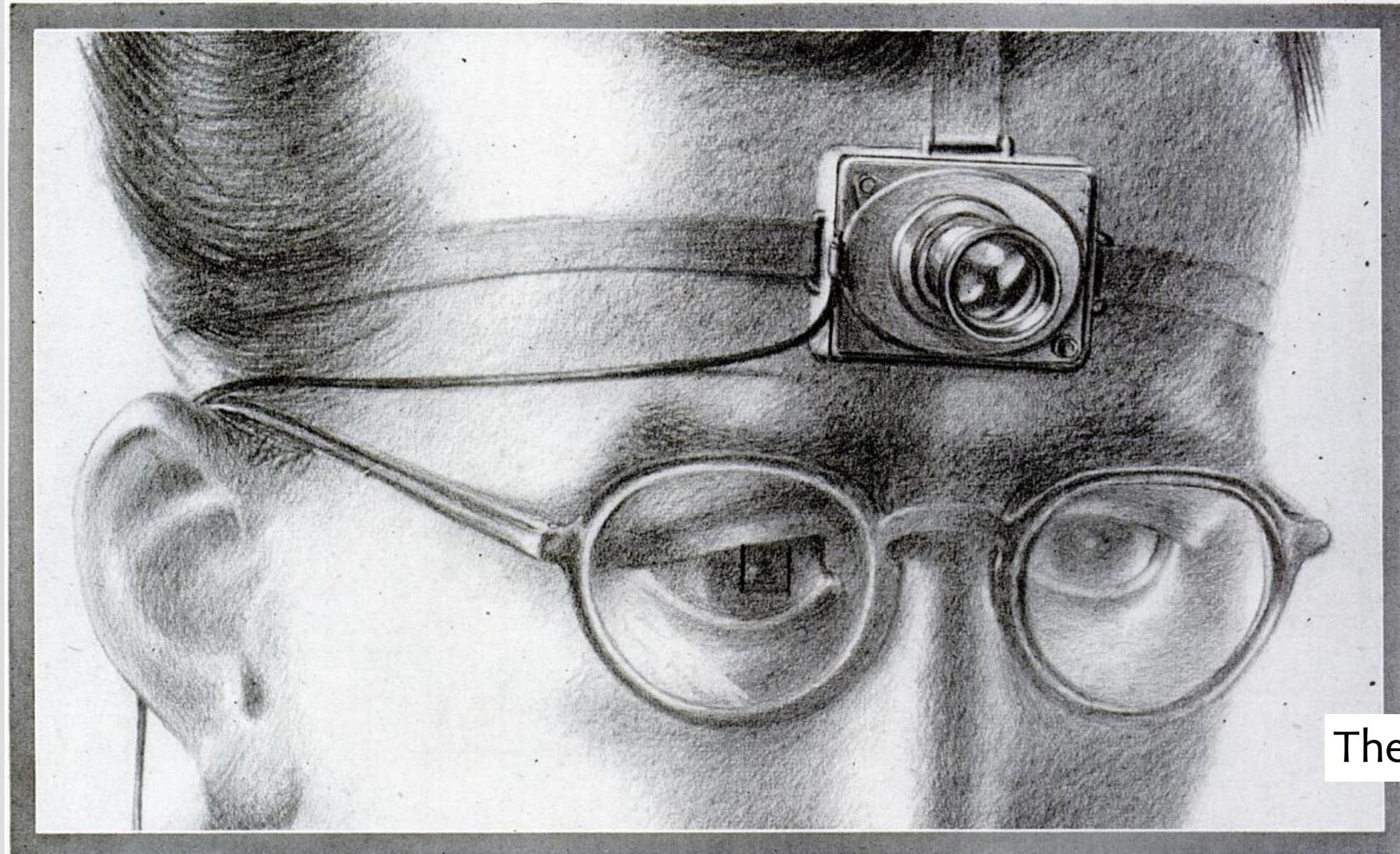
Univac 1103 (1950)

computers for payroll, inventory and tea!



LEO 1: Lyons Electronic Office (1951)

vannevar bush: a new role for computing



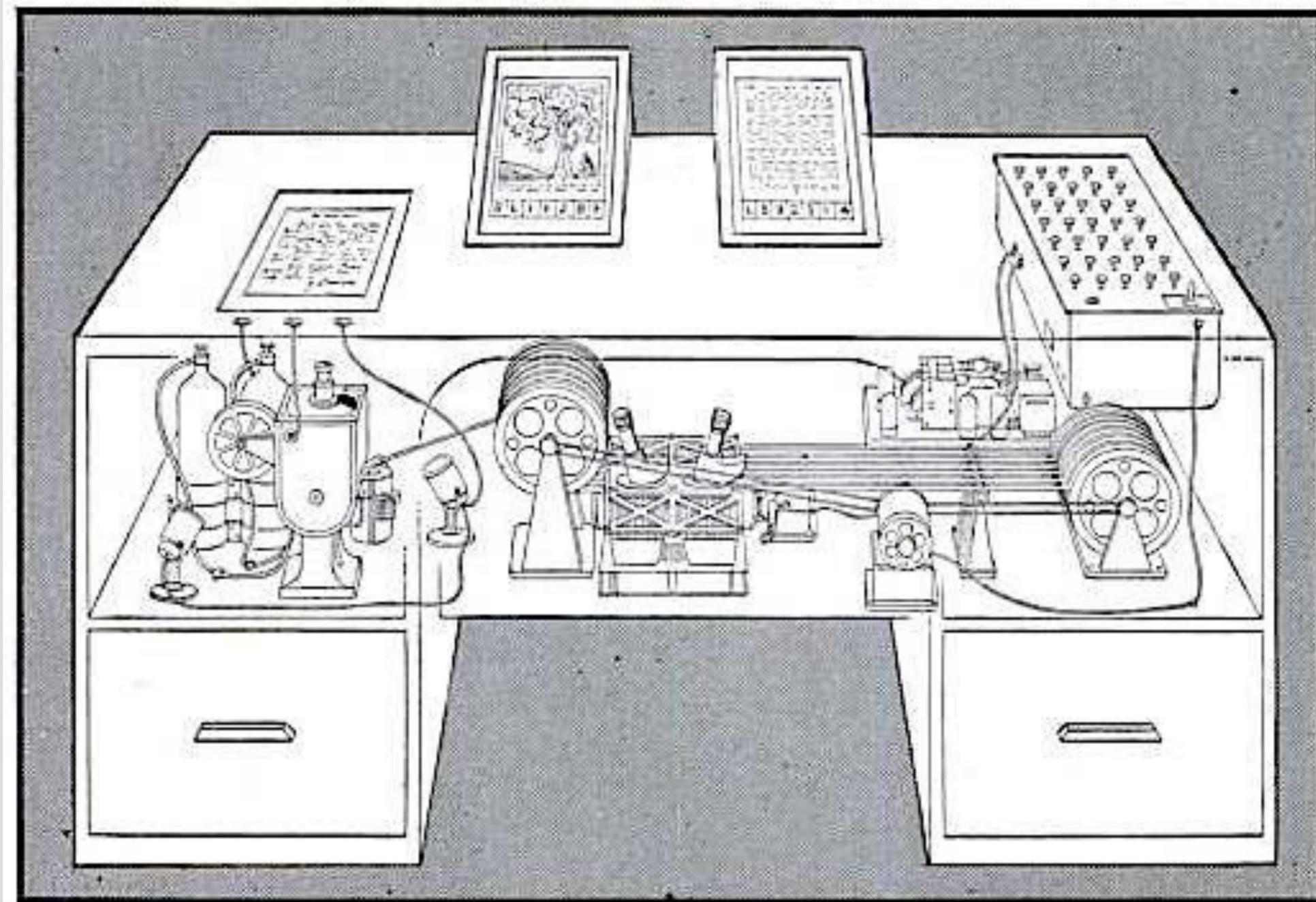
The Atlantic, July 1945

A SCIENTIST OF THE FUTURE RECORDS EXPERIMENTS WITH A TINY CAMERA FITTED WITH UNIVERSAL-FOCUS LENS. THE SMALL SQUARE IN THE EYEGLASS AT THE LEFT SIGHTS THE OBJECT

AS WE MAY THINK

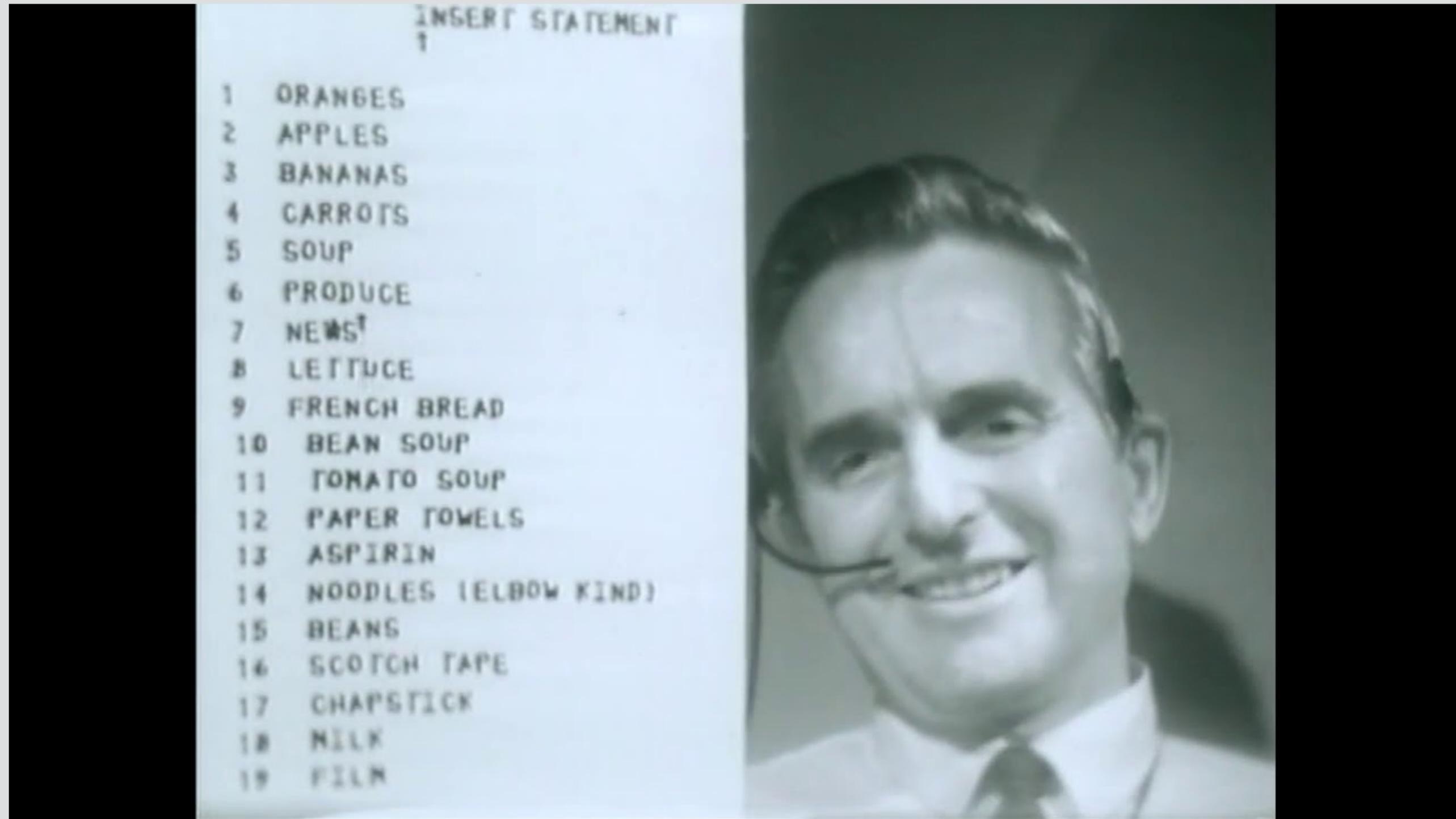
A TOP U. S. SCIENTIST FORESEES A POSSIBLE FUTURE WORLD
IN WHICH MAN-MADE MACHINES WILL START TO THINK

the "memex" memory extender



MEMEX in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference.

doug engelbart and the augmentation research center at SRI

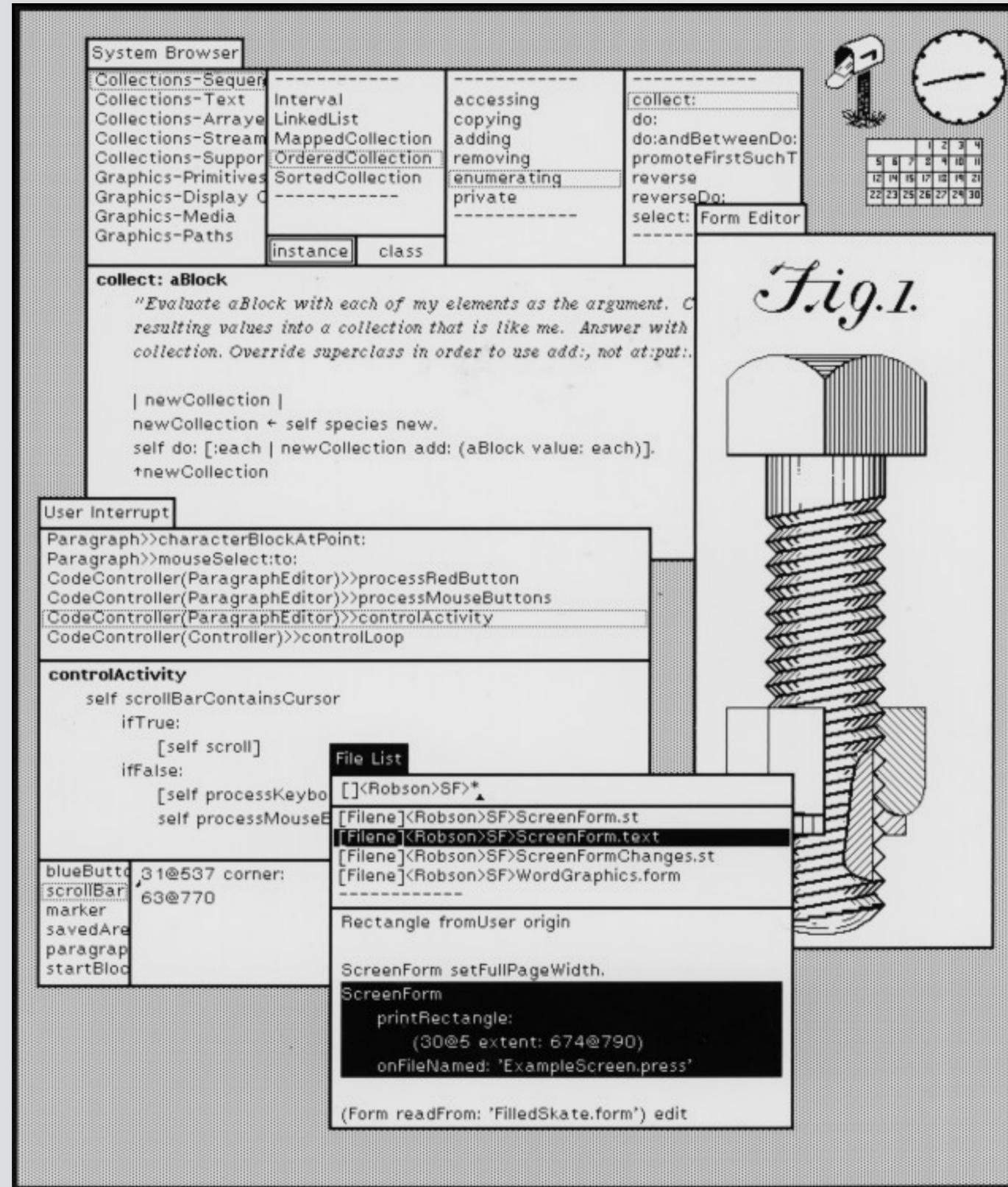


"the mother of all demos" (1968)

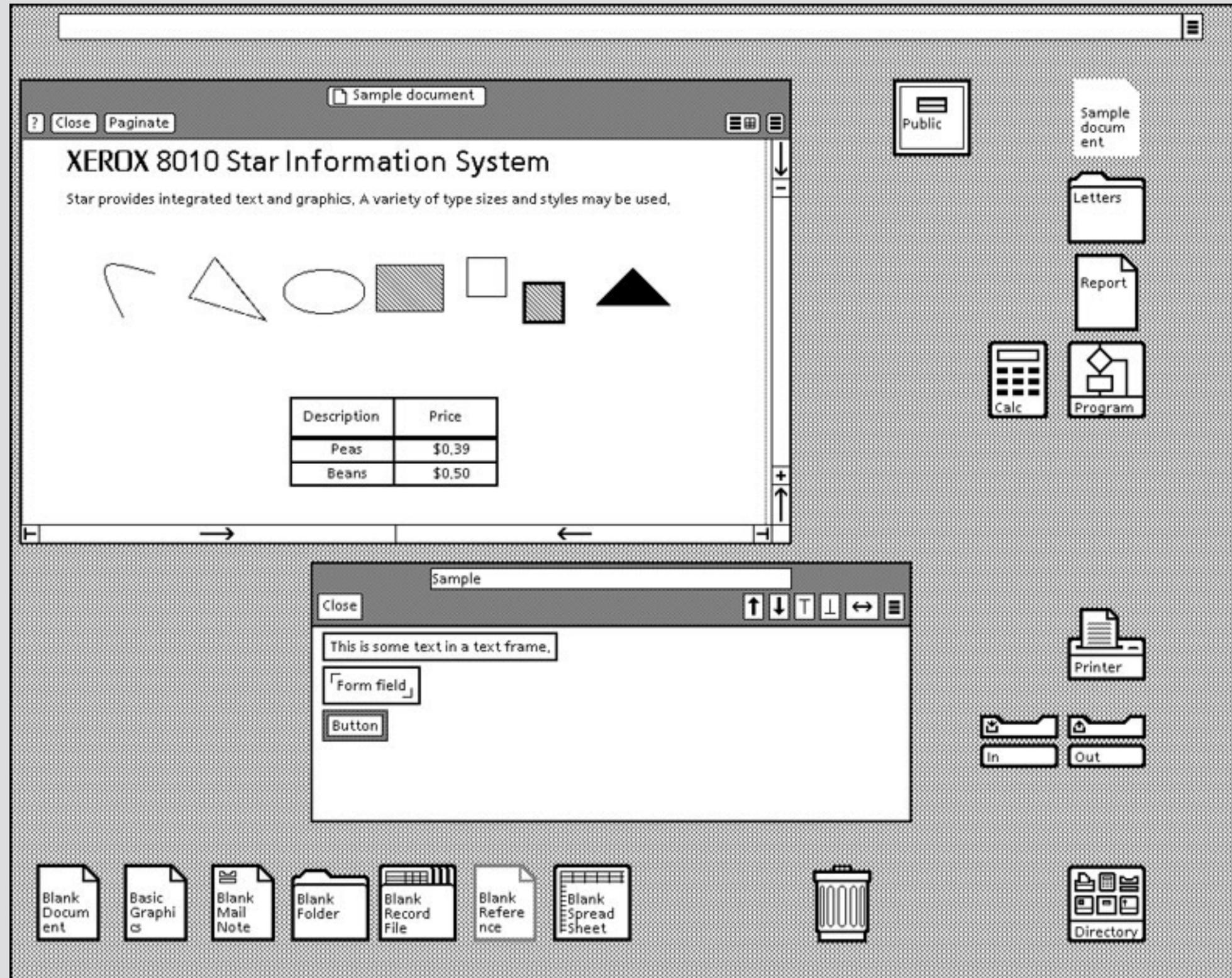
doug engelbart's mouse (1968)



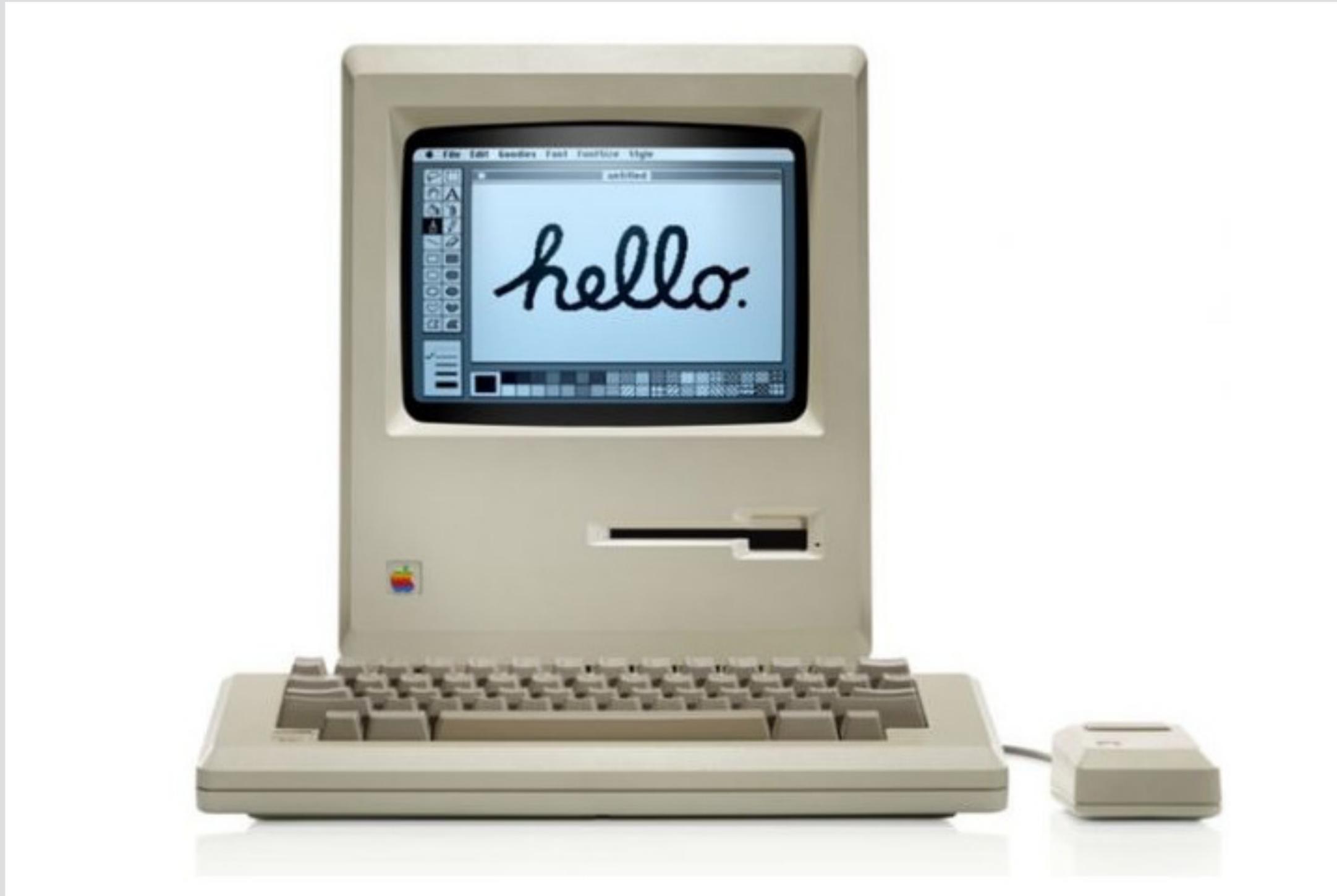
xerox alto (1973)



xerox star (1981)

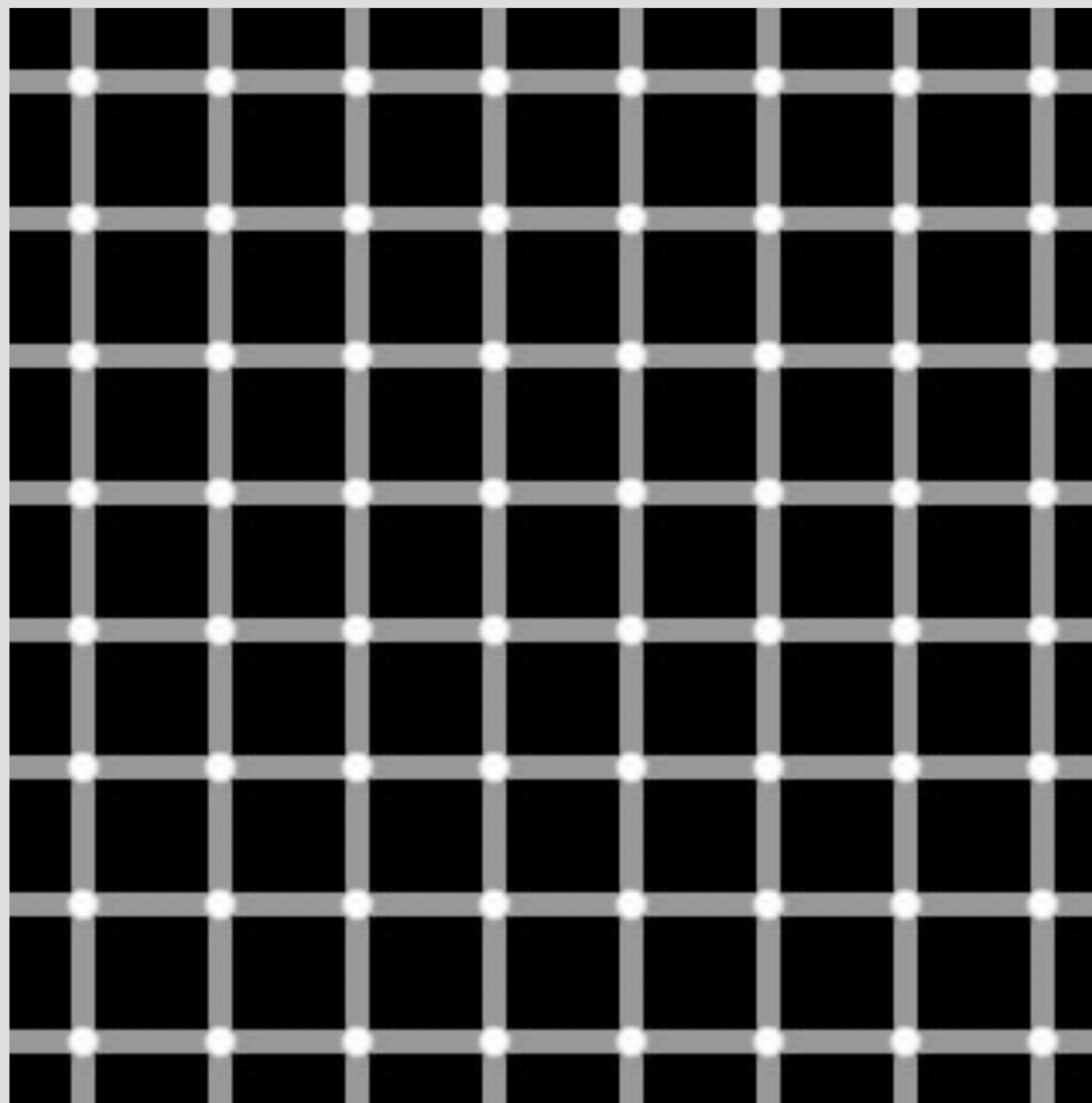


apple macintosh (1984)



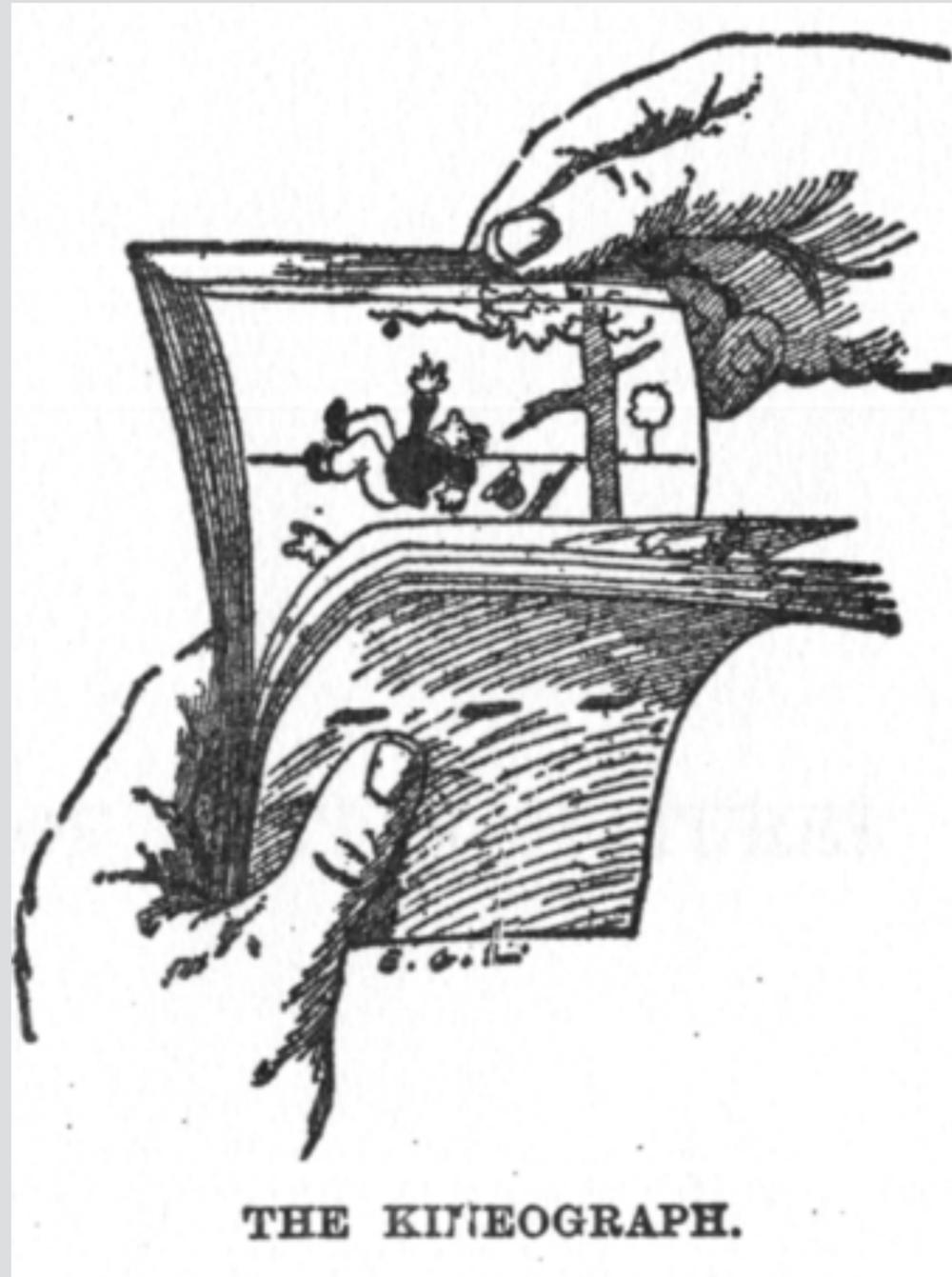
human-driven design:
from doors to
usability heuristics

the herman illusion: perception & brain function

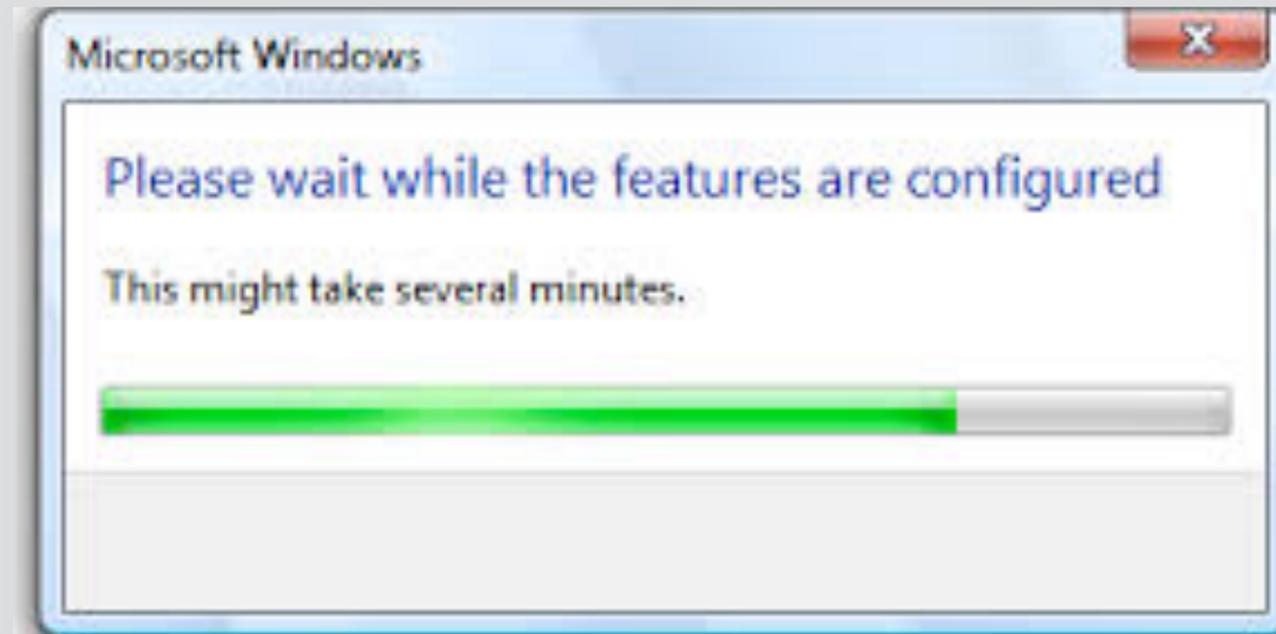


perceptual fusion

stimuli within 100ms are fused:
less than this feels instantaneous

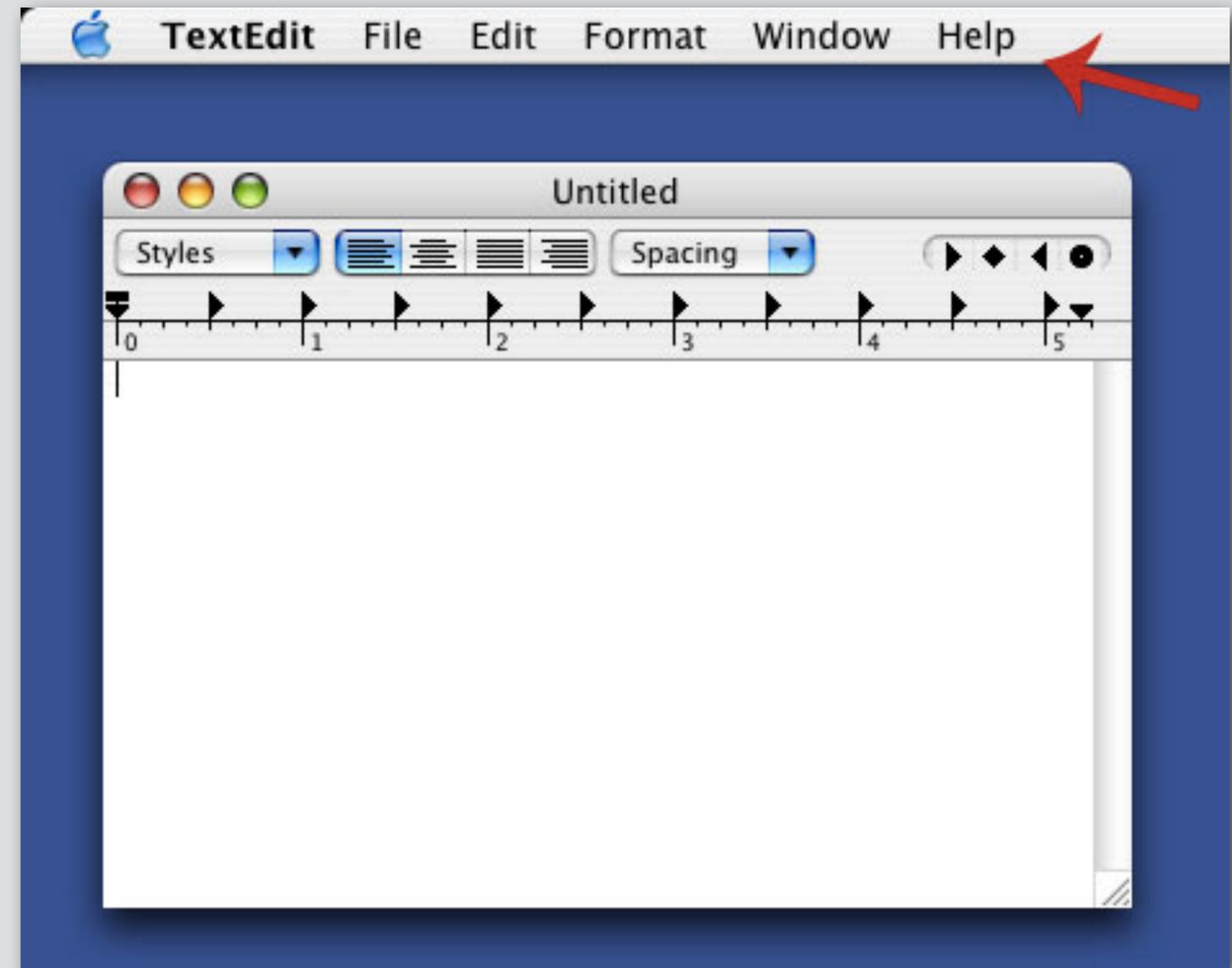
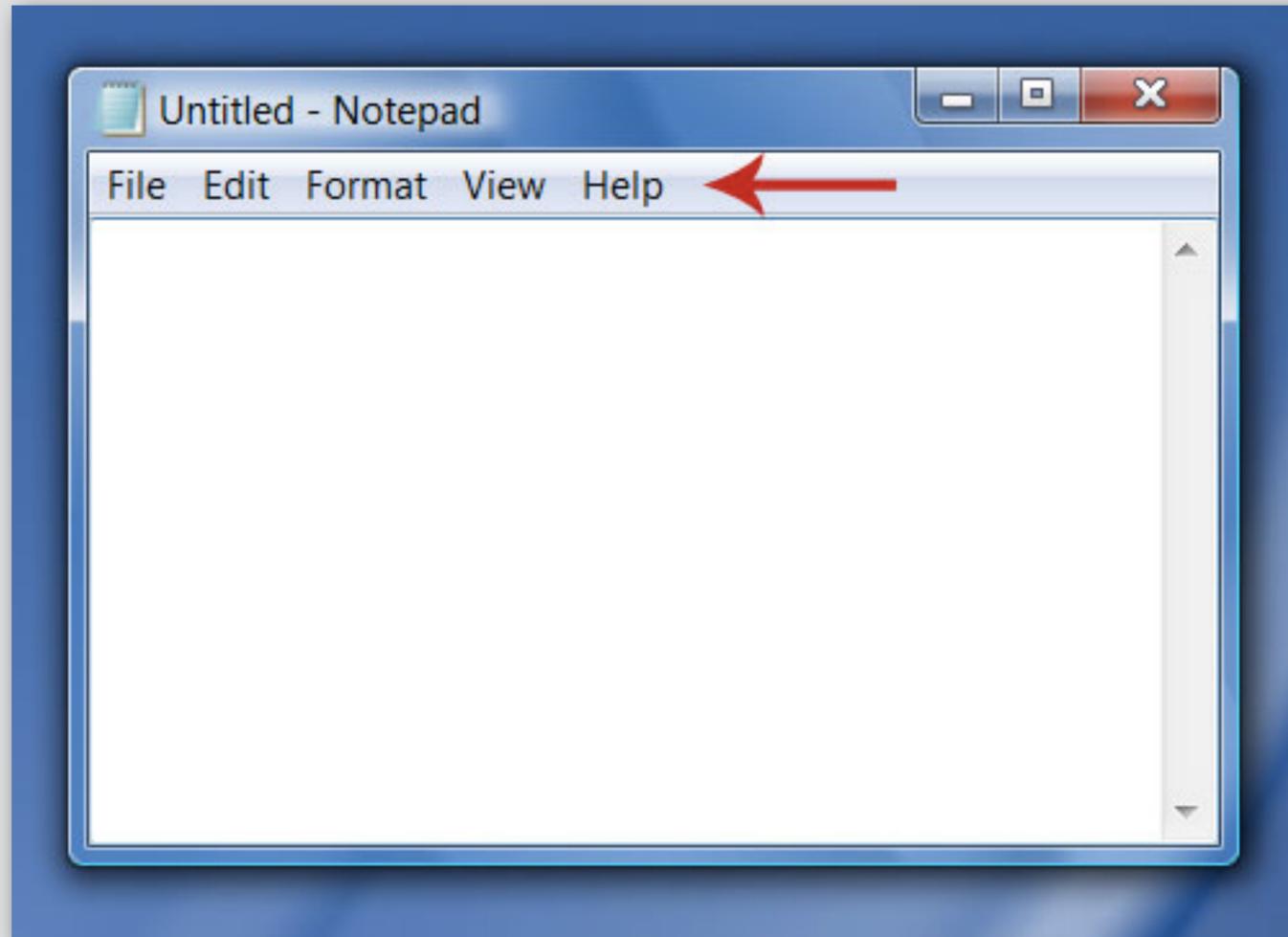


an early flip book



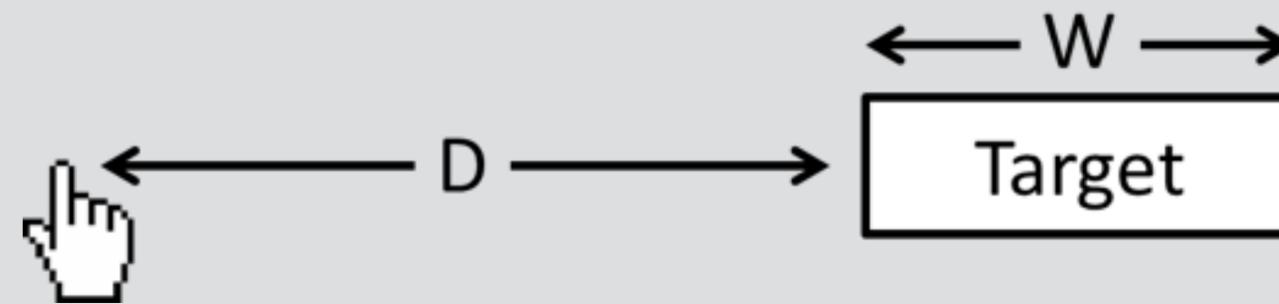
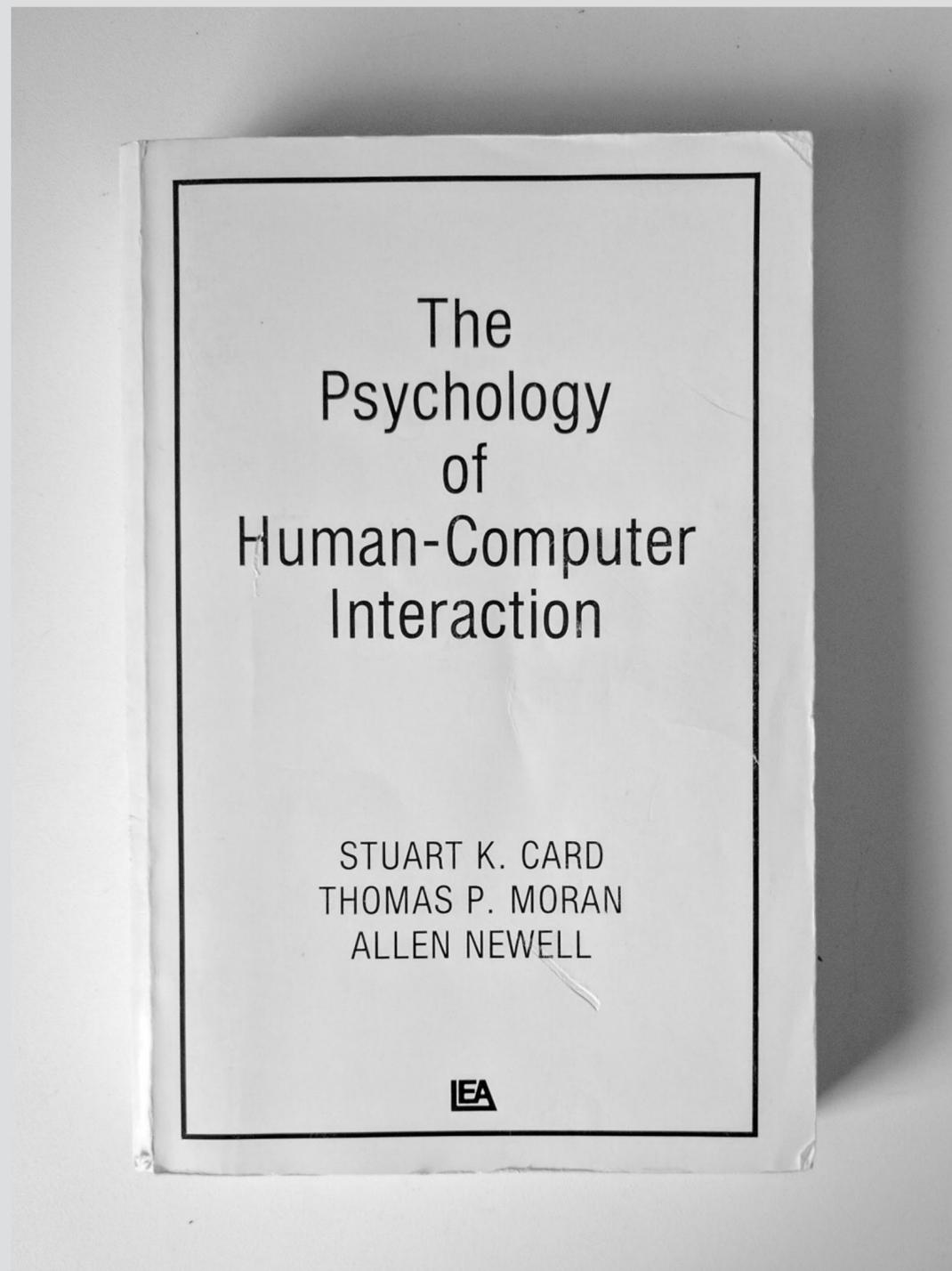
progress bar

windows vs. mac: which is better?



"On Windows the menu bar is right there, no need to move your eye to another part of the screen."

psychology of HCI and fitts's law (1986)

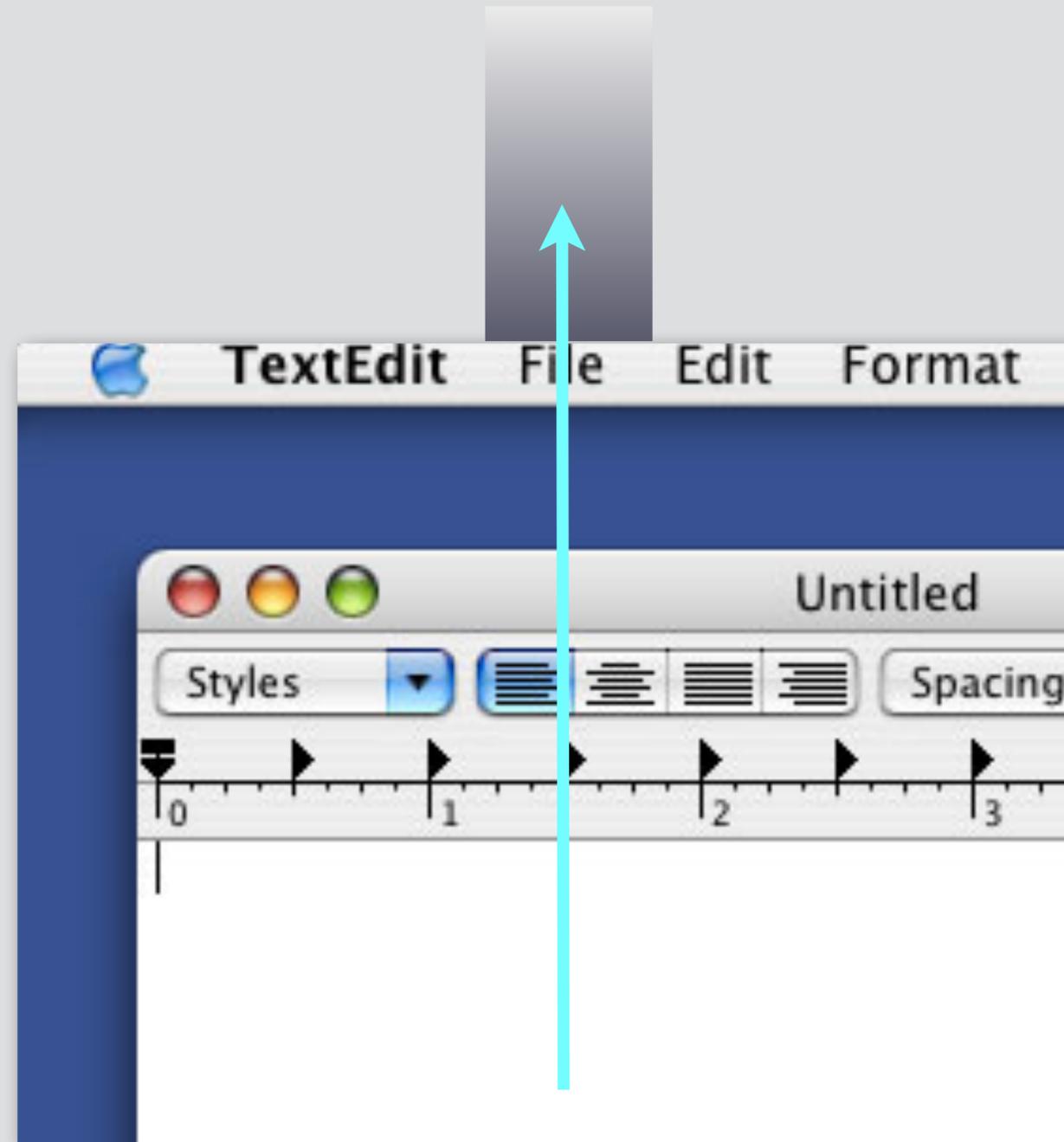


time to move to target is
 $a + b \cdot \log(D/W + 1)$

reaction time

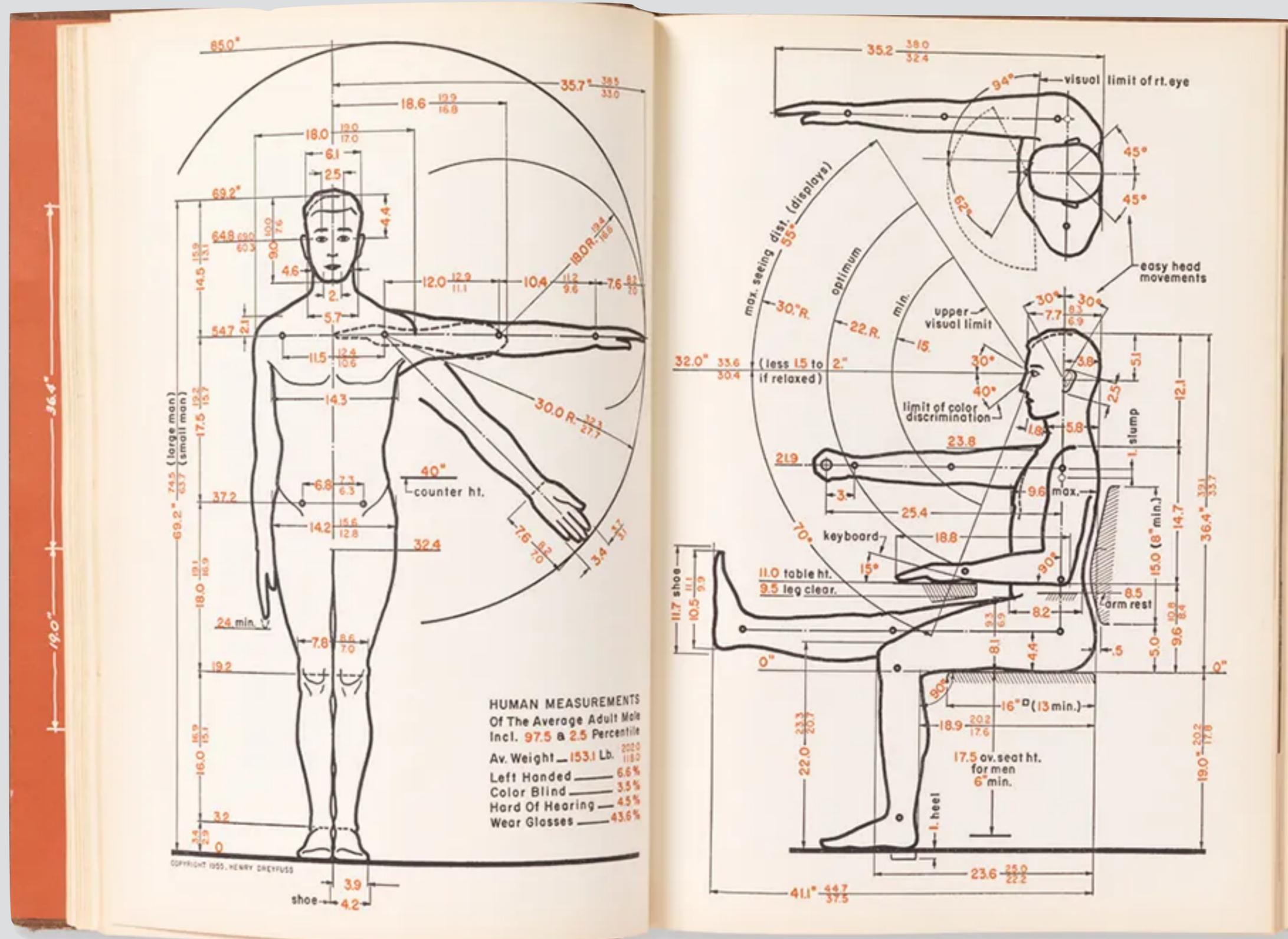
"index of difficulty"

applying fitts's law

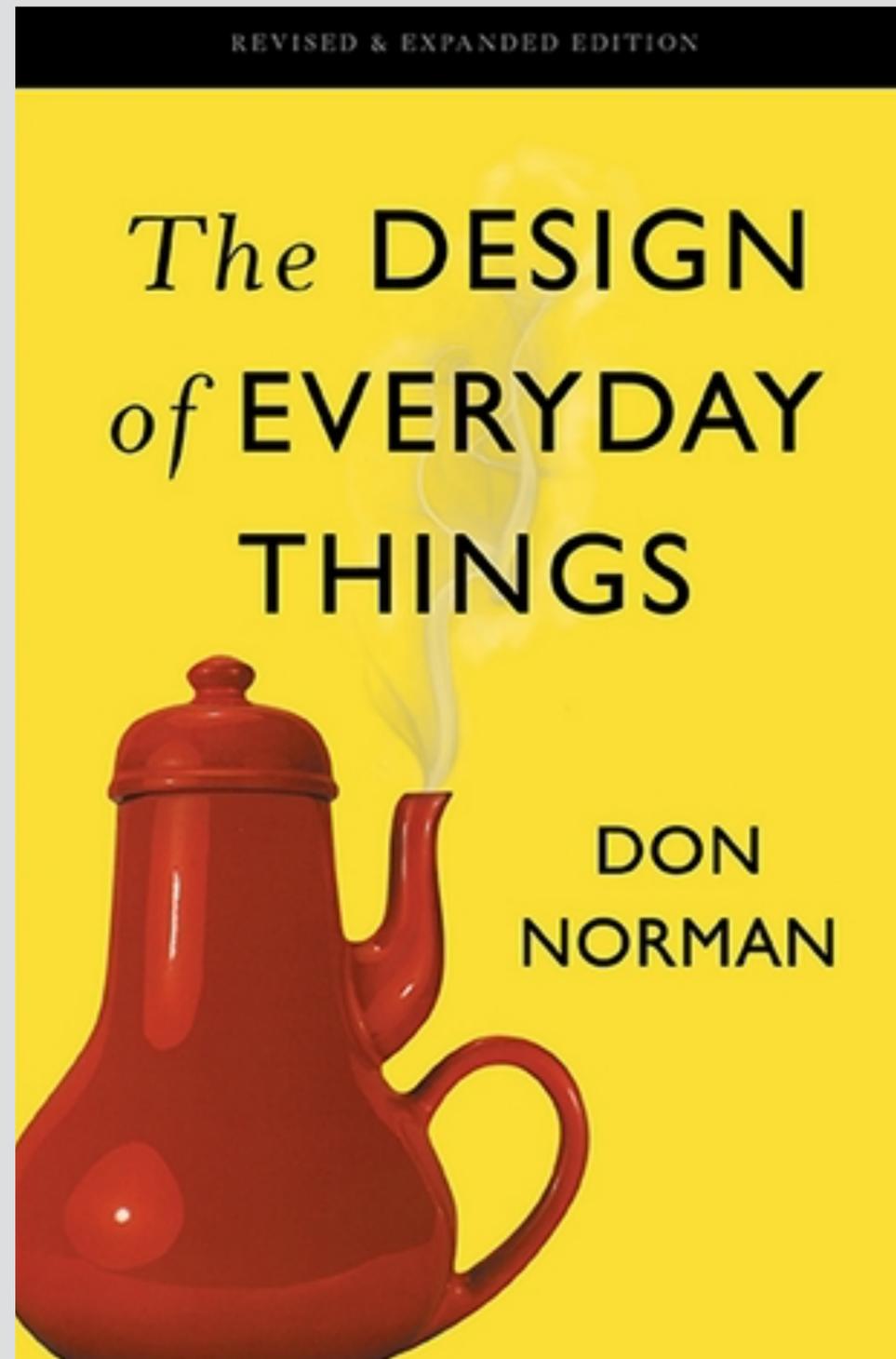


the Mac menu is a bit further away,
but it effectively has **infinite** size,
so it's much quicker to locate

henry dreyfuss, designing for people (1955)



user-centered design



1988

james gibson's affordances, repurposed by don norman (1988)



“norman doors”



push or pull?

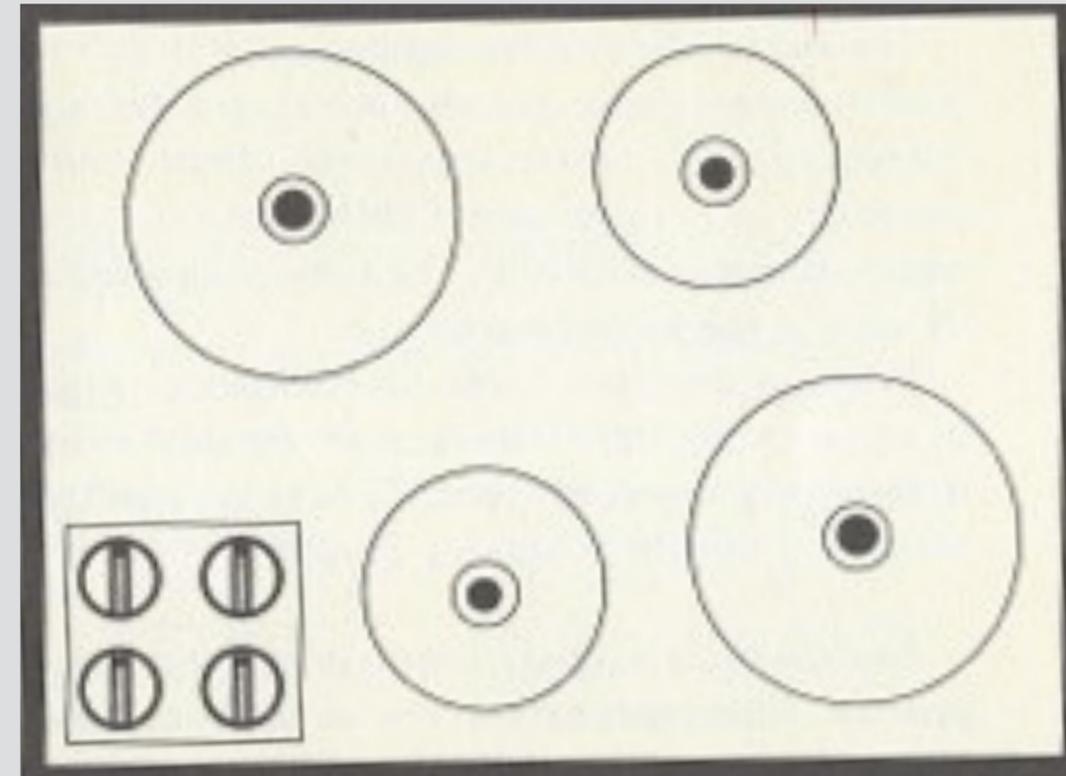
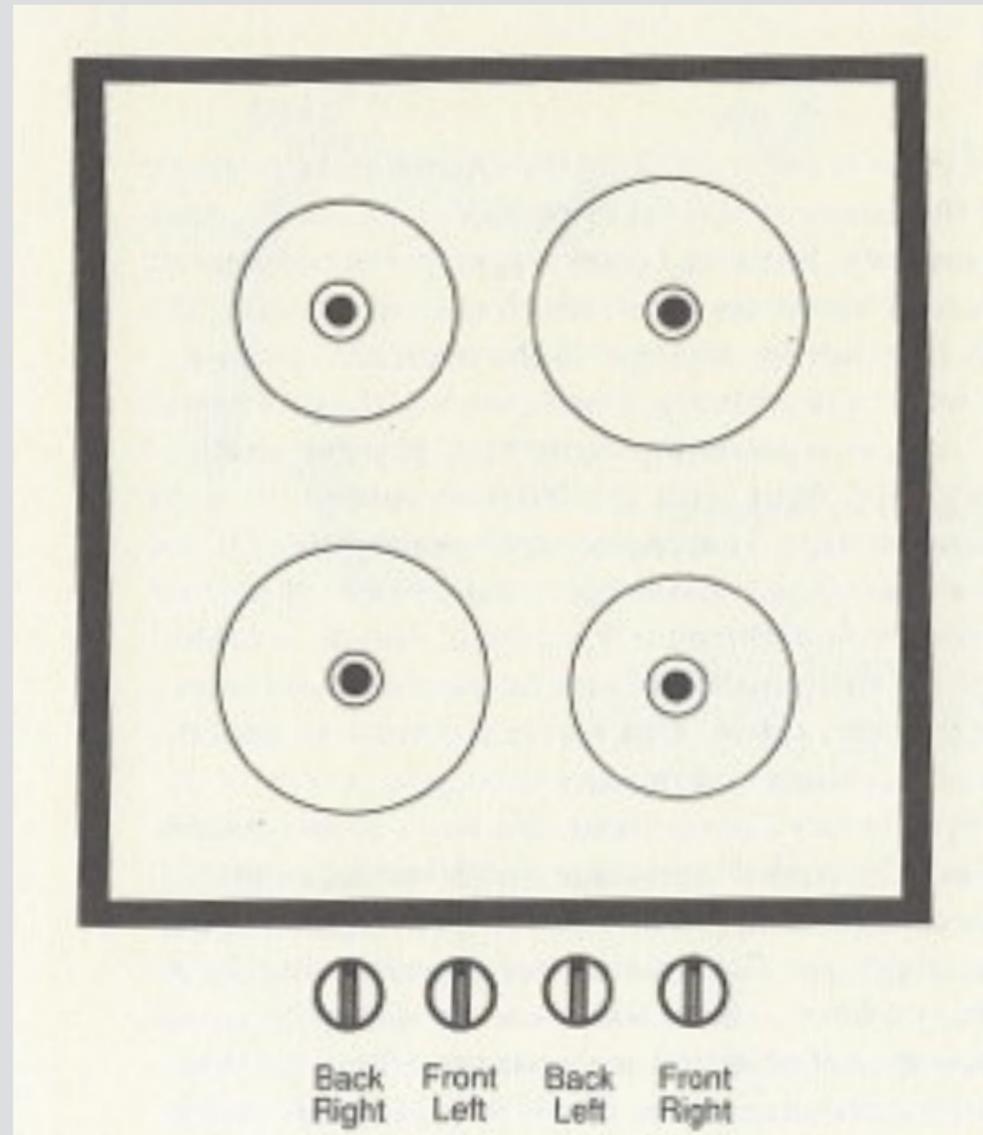


door with user manual



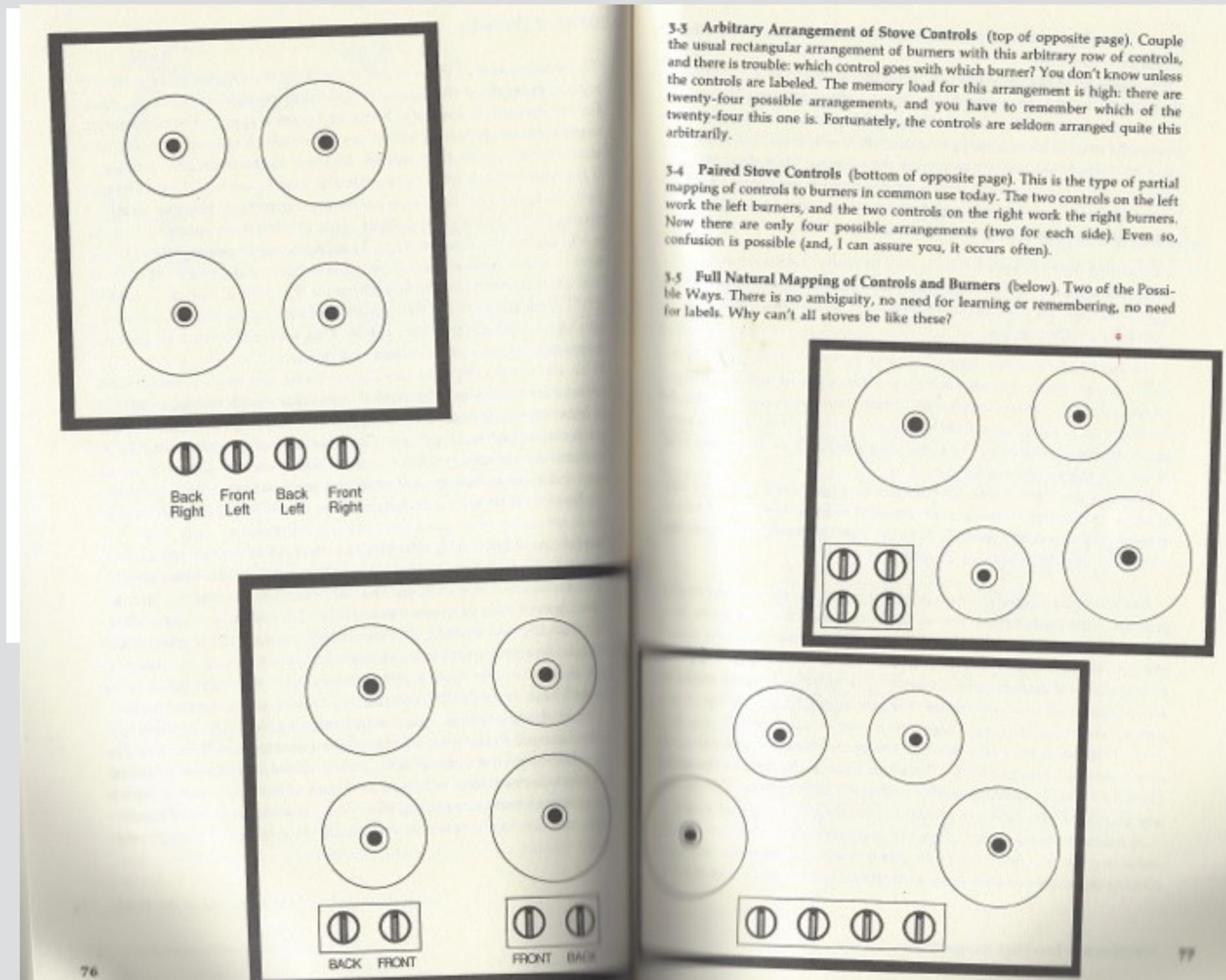
multiple user manuals

mapping

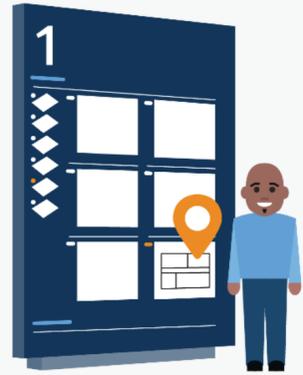


from: The Design of Everyday Things, Donald Norman

did the book designer read the book?



jakob nielsen's heuristics of user interface design (1994)



NN/g
NNGROUP.COM

visibility of
system status



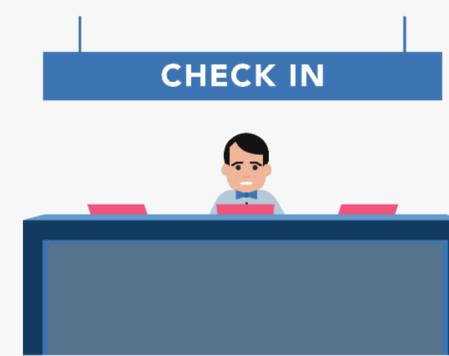
NN/g
NNGROUP.COM

match between
system & world



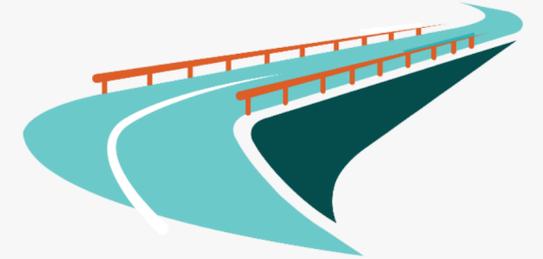
NN/g
NNGROUP.COM

user control
& freedom



NN/g
NNGROUP.COM

consistency
& standards



NN/g
NNGROUP.COM

error
prevention



NN/g
NNGROUP.COM

recognition
not recall



NN/g
NNGROUP.COM

flexibility
& efficiency



NN/g
NNGROUP.COM

aesthetic &
minimalist



NN/g
NNGROUP.COM

helpful error
messages



NN/g
NNGROUP.COM

help &
documentation

"design systems"

The screenshot shows the Apple Developer website's Human Interface Guidelines page for Feedback. The page has a top navigation bar with links like 'Developer', 'News', 'Discover', 'Design', 'Develop', 'Distribute', 'Support', and 'Account'. Below this is a sub-navigation bar with 'Overview', 'Resources', 'Videos', and 'What's New'. A left sidebar lists various guidelines categories, with 'Feedback' highlighted. The main content area features the title 'Feedback' and a sub-header 'Feedback helps people know what an app is doing, discover what they can do next, and understand the results of actions.' Below this is an image of a smartphone displaying a message thread with a 'Updated Just Now' status bar at the bottom. To the right of the image, there is a key principle: 'Unobtrusively integrate status and other types of feedback into your interface. Ideally, users can get important information without taking action or being interrupted. Mail, for example, subtly displays status information in the toolbar while navigating through mailboxes of messages. This information doesn't compete with the primary content onscreen, but can be checked at any time with a quick glance.'

Apple's human interface guidelines

The screenshot shows the Material Design website's 'Understanding navigation' page. The browser address bar shows 'material.io'. The page has a dark navigation bar with 'MATERIAL DESIGN' and links for 'Design', 'Components', 'Develop', 'Resources', and 'Blog'. A light blue banner at the top reads 'The latest version of Material Design is now available for Android' with a 'Start exploring Material 3' button. The main content area is titled 'Understanding navigation' and includes the text 'Navigation enables users to move through an app.' Below this is a diagram showing three stages of navigation: a grid layout, a horizontal bar, and a list view. A left sidebar lists various design principles like 'Layout', 'Pixel density', 'Responsive layout grid', 'Spacing methods', 'Component behavior', 'Applying density', 'Navigation', 'Search', 'Color', 'Typography', and 'Language support'. A right sidebar contains a 'CONTENTS' section with links for 'Types of navigation', 'Lateral navigation', 'Forward navigation', and 'Reverse navigation'.

Google's Material Design

part 2:

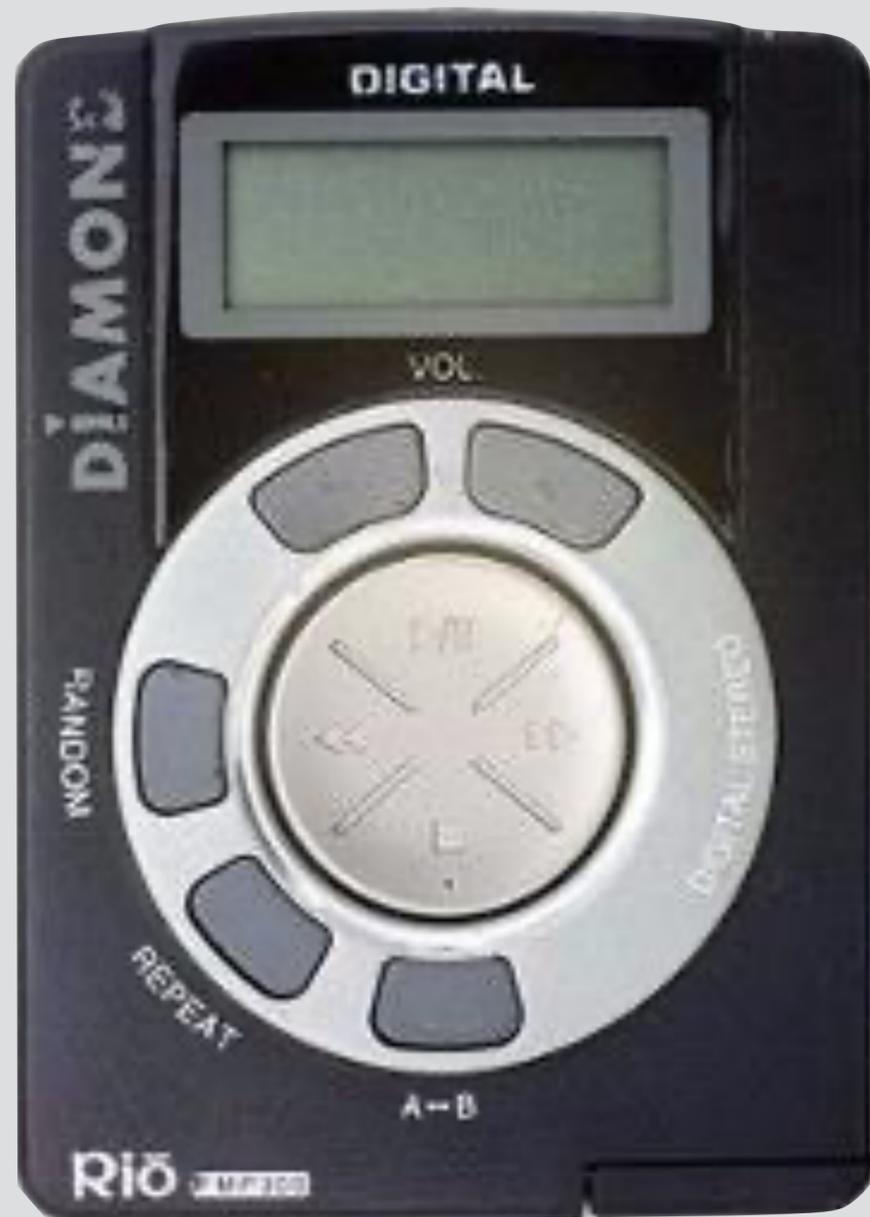
the essence of software

5 sample concepts

apple iPod (2001-2022): what made it great?



was it the first MP3 music player?



Rio PMP300 (1998)



Sony MS Walkman (1999)



Apple iPod (2001)

was it the physical design?



Jony Ive, 2001
Apple iPod



Dieter Rams, 1958
pocket transistor radio T3

was it the technology?



Toshiba's 5GB disk (2000)
1.8 inch wide x 5mm thick

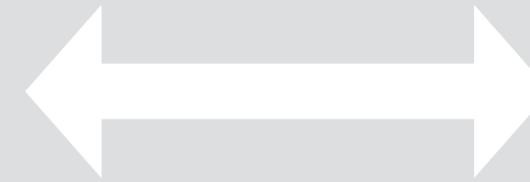
1 Connect iPod.

Start up your Macintosh and connect iPod using the included FireWire cable. iPod's battery begins to charge. If you don't already have the latest version of iTunes, install it using the iPod CD.



apple, IBM and sony's firewire (1995)
1,000 songs in < 10 minutes

the song library concept



some other
product-defining
concepts

the url concept

DANIEL JACKSON PHOTOGRAPHY

American Spaces · 2008–2021



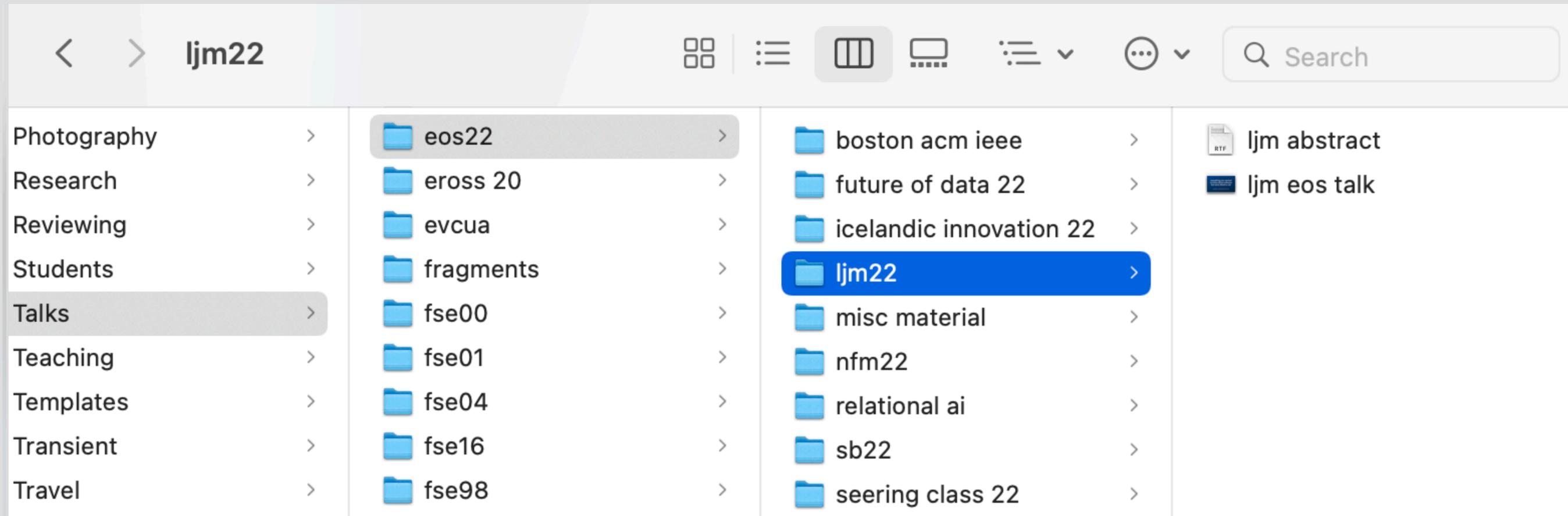
Lakeville, Connecticut



 <https://dnj.photo/projects/spaces/#image/5>



the folder concept



invented as part of Multics operating system (1964)

the spreadsheet formula concept

B5 (U) +B3-B4
Command: BCDEFGIMPRSTUW-

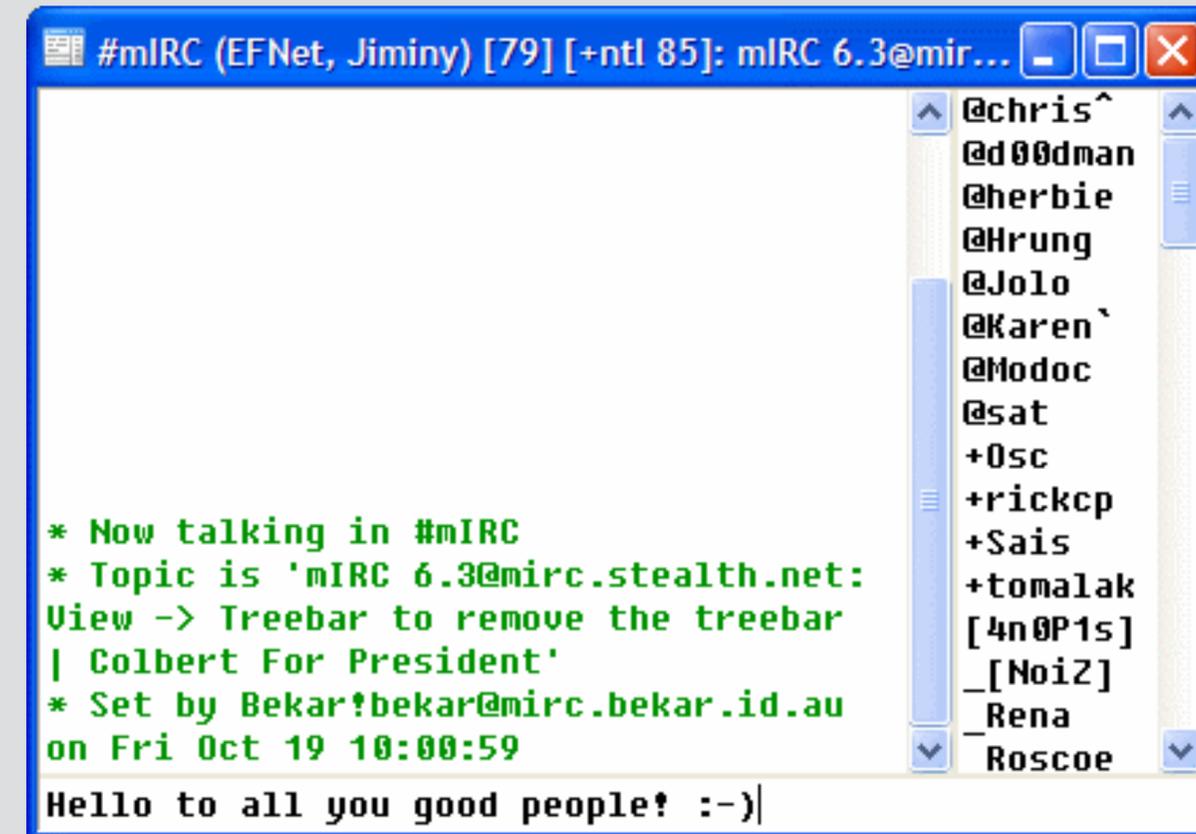
	A	B	C	D	E
1	Year	1979	1980	1981	1982
2					
3	Sales	54321	59753	65728	72301
4	Cost	43457	47802	52583	57841
5	Profit	10864	11951	13146	14460
6					
7					
8					
9					
10					
11					
12					

Dan Bricklin's VisiCalc (1979)

the chatroom concept



WhatsApp (2022)



internet relay chat (1988)

part 3:
confusing concepts

twitter confuses
a first lady



Andy Ostroy

@AndyOstroy



Seems the only #Wall @realDonaldTrump's built is the one between him and @FLOTUS #Melania #trump



8,221 likes 8:15 PM - May 2, 2017

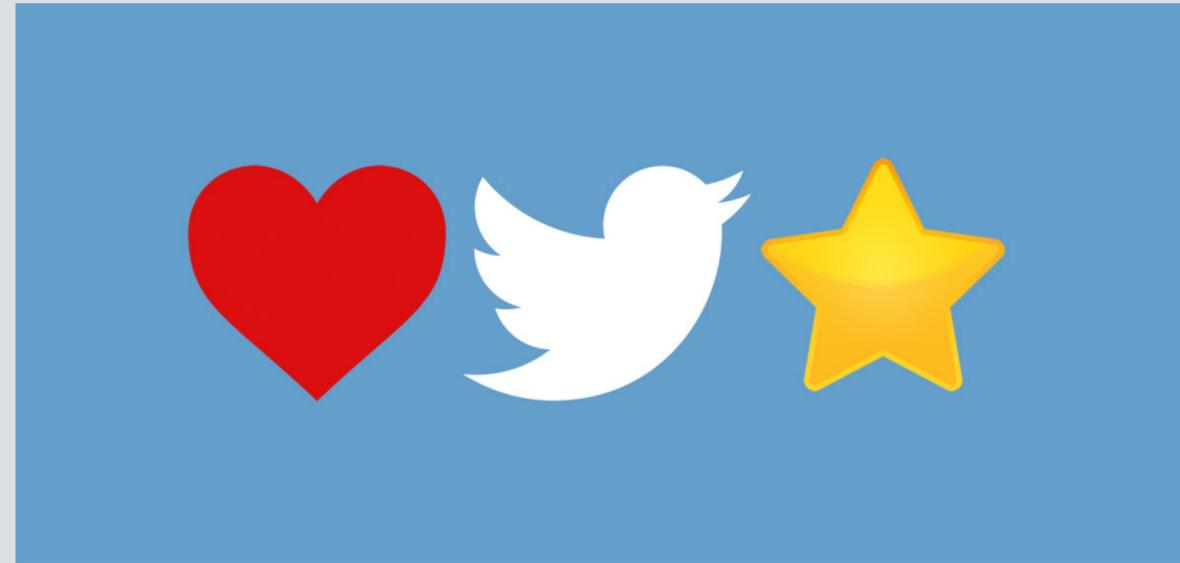


4,022 people are talking about this



MELANIA TRUMP liked your Tweet

Seems the only #Wall @realDonaldTrump's built is the one between him and @FLOTUS #Melania #trump pic.twitter.com/XiNd2jiLUF



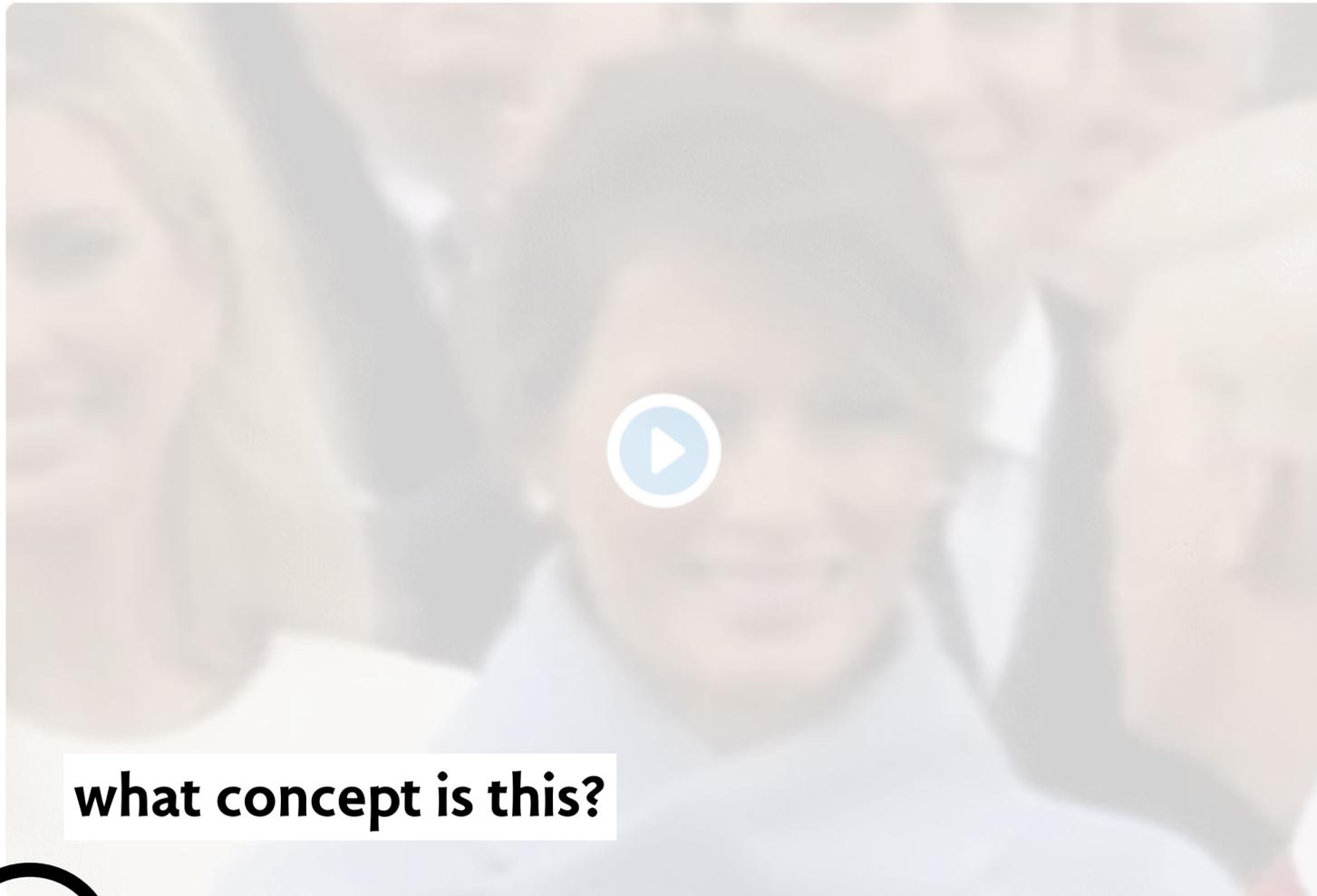
Nov 2, 2015: Twitter changes Favorite (Star) to Like (Heart)

We are changing our star icon for favorites to a heart and we'll be calling them likes... **We know that at times the star could be confusing, especially to newcomers.** You might like a lot of things, but not everything can be your favorite. *Twitter press release*

 **Andy Ostroy** ✓
@AndyOstroy



Seems the only #Wall @realDonaldTrump's built is the one between him and @FLOTUS #Melania #trump



8,221 8:15 PM - May 2, 2017



4,022 people are talking about this



concept Upvote
purpose rank items by popularity



concept Bookmark
purpose save items to revisit

missing
concept!

twitter adds a new concept (2018)

 **The Boston Globe**  @BostonGlobe · 21h

Andrew Yang would fine gunmakers for deaths caused by their products.



Yang would fine gunmakers for deaths caused by their products - Th...
You probably know Andrew Yang wants to give every American \$1,000 a month. Something you might not know: He wants to fine gun ...
[bostonglobe.com](https://www.bostonglobe.com)

 29  9  9 



concept Upvote

purpose rank items by popularity

 **The Boston Globe**  @BostonGlobe · 21h

Andrew Yang would fine gunmakers for deaths caused by their products.



Yang would fine gunmakers for deaths ca...
You probably know Andrew Yang wants to...
a month. Something you might not know...
[bostonglobe.com](https://www.bostonglobe.com)

 29  9  94 

-  Send via Direct Message
-  Add Tweet to Bookmarks
-  Copy link to Tweet
-  Share Tweet via ...



concept Bookmark

purpose save items to revisit

**concepts
that confuse
(unintentionally)**

Quora

🔍 Search



Dropbox: [Edit](#)

Someone accidentally deleted thousands of files in my company Dropbox: how can I quickly undelete them? [Edit](#)

[Add Question Details](#)

[Comment](#) · [Share](#) · [Report](#) · [Options](#)



Ava is a party planner

Dropbox
Overview [Show](#) ⋮

<input type="checkbox"/>	Name ↑	Members ▾	⋮
<input type="checkbox"/>	Bella Plan ☆	2 members	⋮

does the name change for Ava too?



Bella is having a party

Dropbox
Overview [Show](#) ⋮

<input type="checkbox"/>	Name ↑	Members ▾	⋮
<input type="checkbox"/>	My Party Plan ☆	2 members	⋮

answer: it depends

if Ava just shares Bella Plan with Bella
and Bella renamed the folder, Ava sees no change

if Ava shared a folder containing Bella Plan
then Ava does see the change

- Star
- Rewind
- Rename**
- Move
- Copy
- Delete
- Events
- Pin to Dropbox

Bella deletes
Bella Plan from
shared folder
Bella Party

Delete folder?



Are you sure you want to delete **Bella Plan** from the shared folder 'Bella Party'?

Cancel

Delete

Bella deletes
shared folder
Bella Party

Remove shared folder?

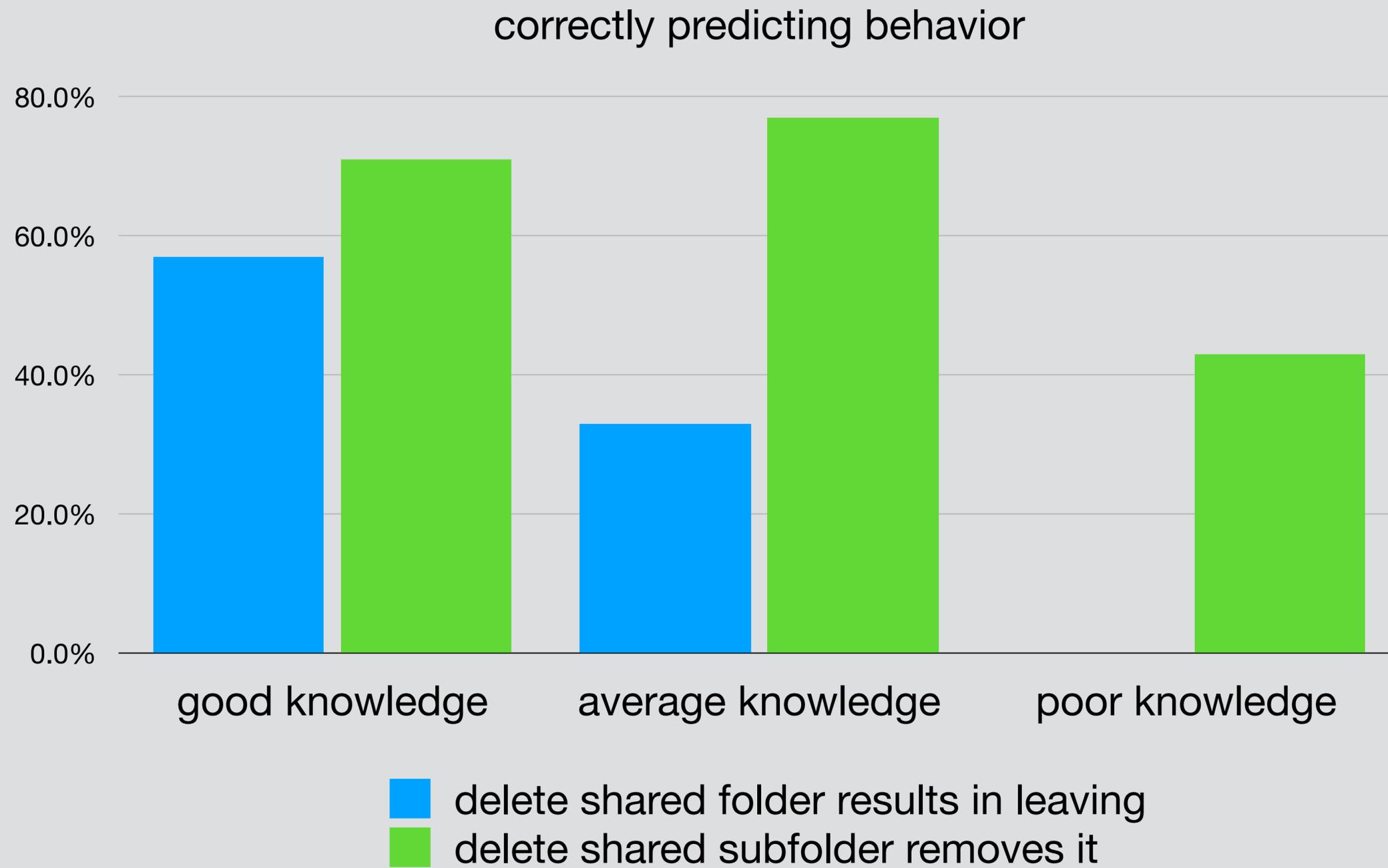


Are you sure you want to remove the shared folder **Bella Party** from your Dropbox? This folder will stay shared with any existing members. You can re-add it later.

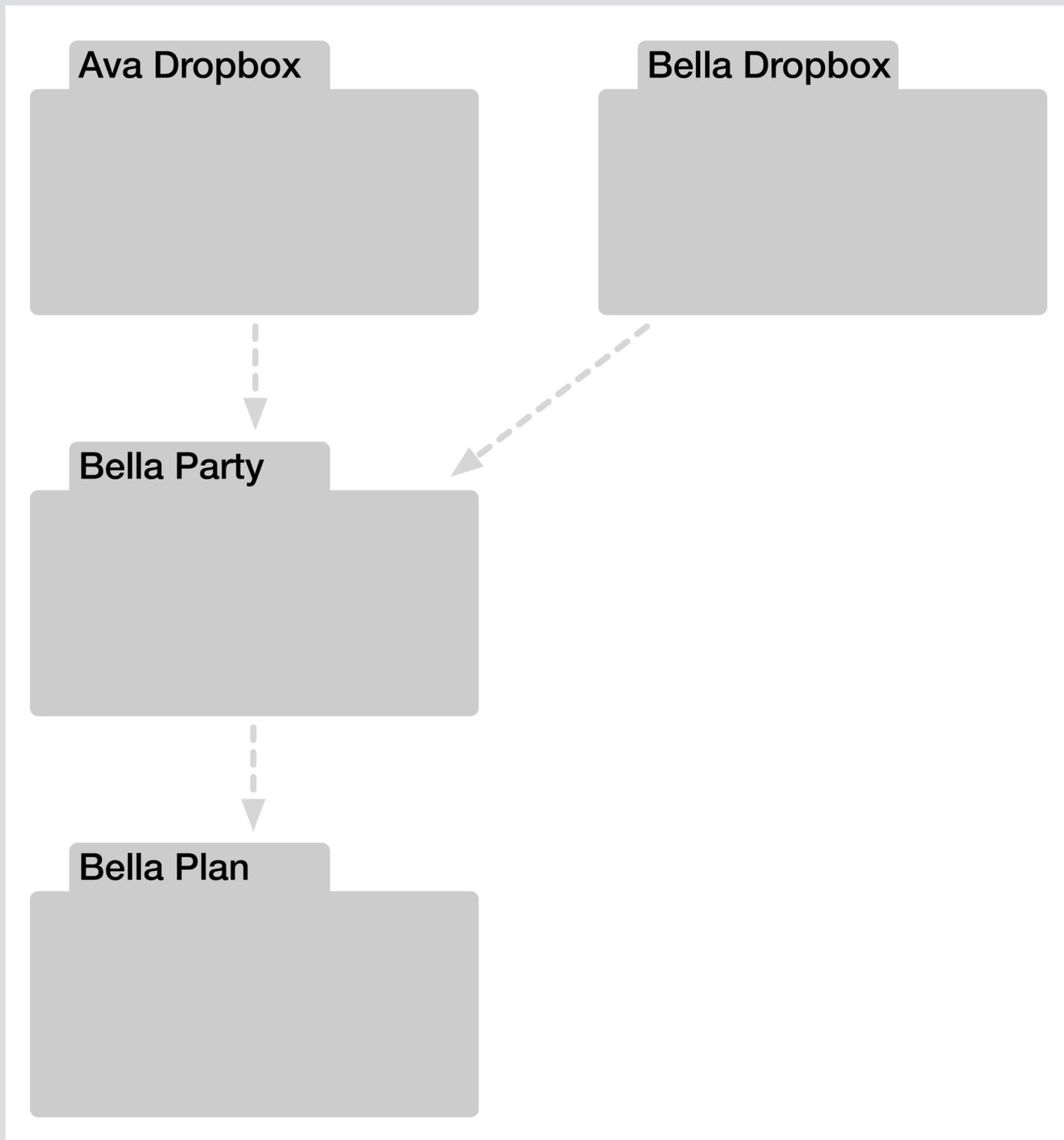
Cancel

Remove

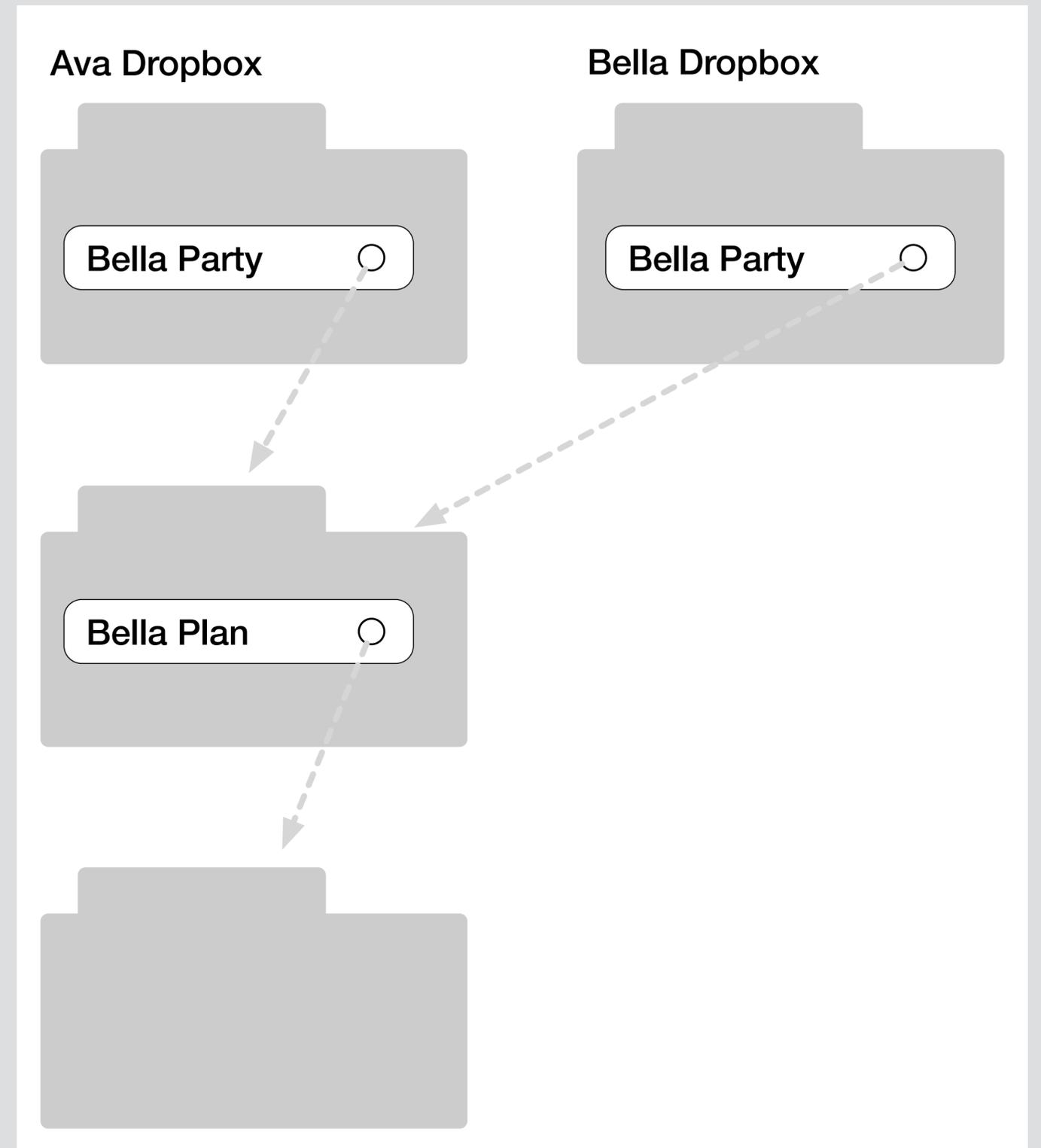
survey of dropbox users (MIT CS undergrads)



Kelly Zhang



how many users believe the folder concept works



how folders actually work (in Dropbox, Unix, Multics)

**concepts
that obfuscate
(intentionally)**

a dark UI pattern: sneak into basket

ZSL London Zoo Guide
Book

ADD TO BASKET



SUPPORT WILDLIFE WITH A 10% DONATION

Did you know ZSL is a wildlife conservation charity?

As a nonprofit organisation, we kindly ask you include a **10% donation** in the price of your ticket to help us continue our vital conservation work around the world.

Including this small amount and selecting the Gift Aid option at the checkout means we can treat your whole ticket purchase as a donation and claim an extra 25p for every £1 spent - at **no extra cost** to you or us.

ADD TO BASKET
without donation

ADD TO BASKET
with donation

If you are not a UK tax payer your donation will still help ZSL work for wildlife.

Your Basket



Recipient
Yourself

Chosen Date

Saturday 11th March 2017

Tickets

2 × Adult (£24.30) Edit

Discount code

ACTIVATE

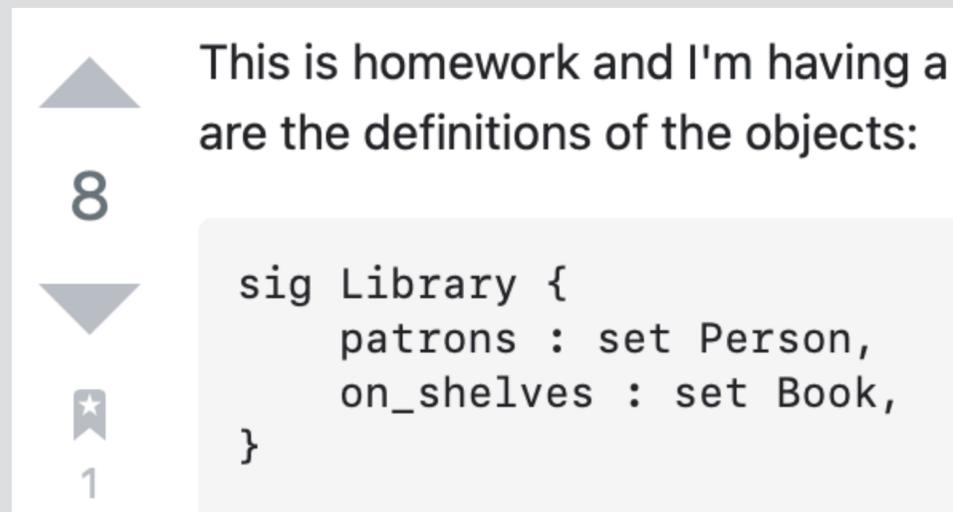
To pay today:

£48.60

thumbs up, but 3 distinct concepts

concept Upvote

purpose rank items by popularity



This is homework and I'm having a
are the definitions of the objects:

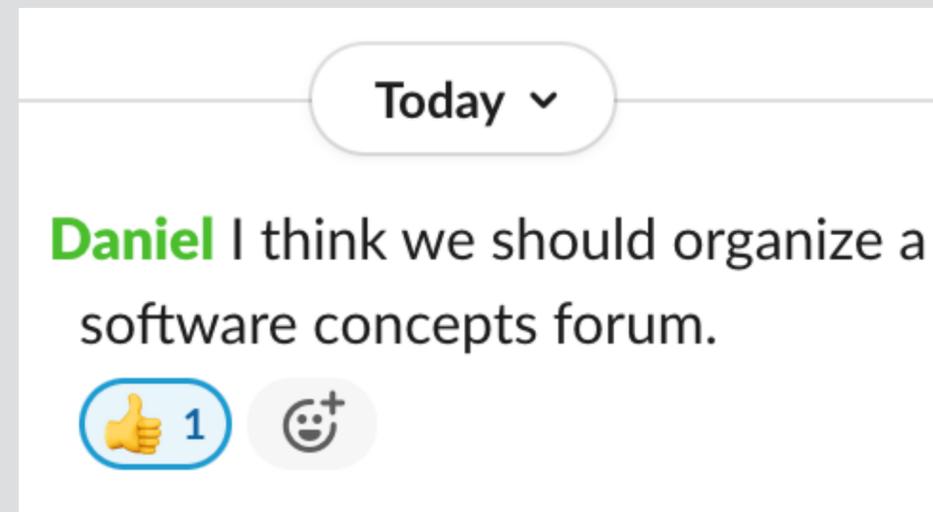
```
sig Library {  
  patrons : set Person,  
  on_shelves : set Book,  
}
```

8

1

concept Reaction

purpose send reactions to author



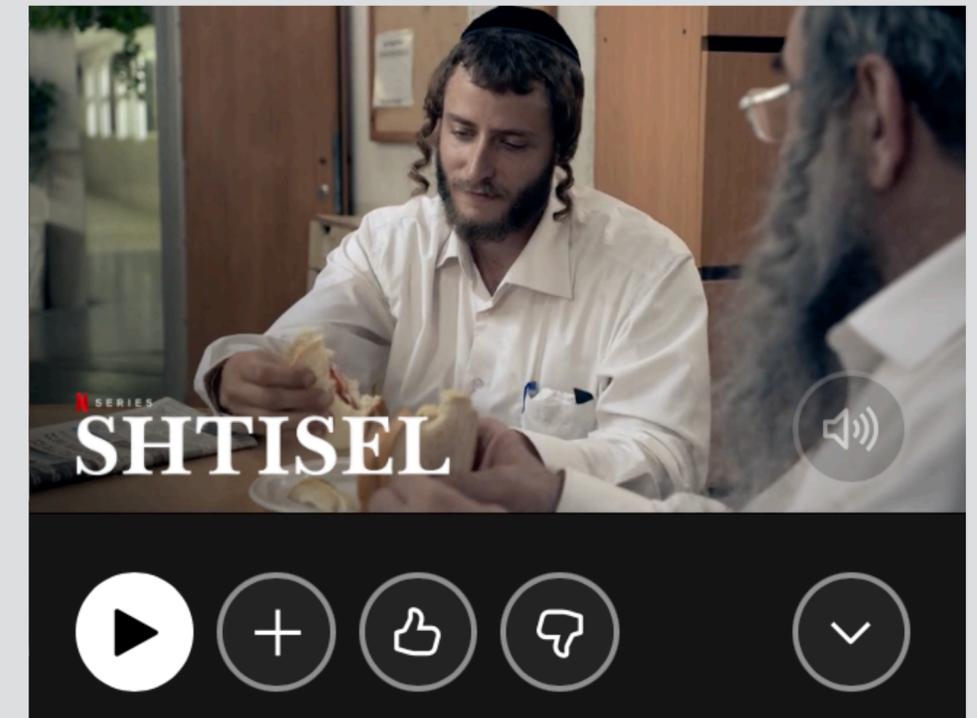
Today ▾

Daniel I think we should organize a
software concepts forum.

👍 1

concept Recommendation

purpose use prior likes to recommend



SHTISEL

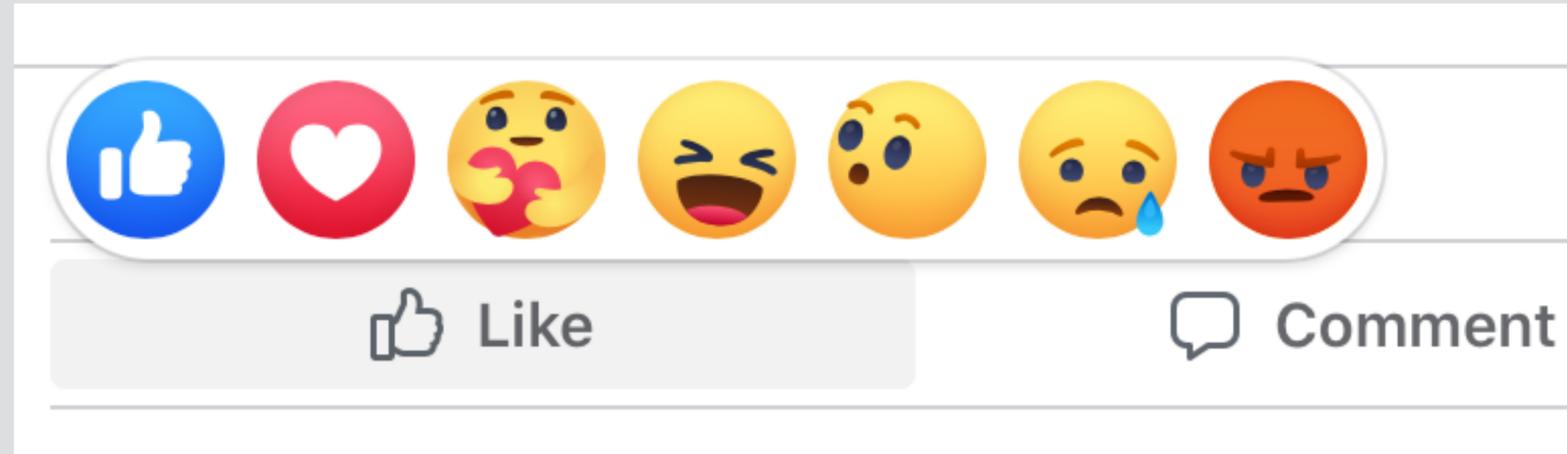
🔍

👍

🗨️

⌵

what is a facebook like?



3 concepts in one!

Reaction (send emoticon to poster)

Upvote (show this post more)

Recommendation (show me more like this)

five dark concepts of surveillance capitalism



upvote

promotes
popular
content

damages
self esteem
of teens



profile

infers
personal
tastes

big pharma
advertises to
sick people



notification

tells you
when new
content

endless
engagement
& interruption



Facebook tag

names
people
in posts

expands
visibility
unexpectedly



web beacon

tracks
visits to
websites

Facebook
tracks non
members too

closing thoughts

summary: three kinds of invention shape our software



technology



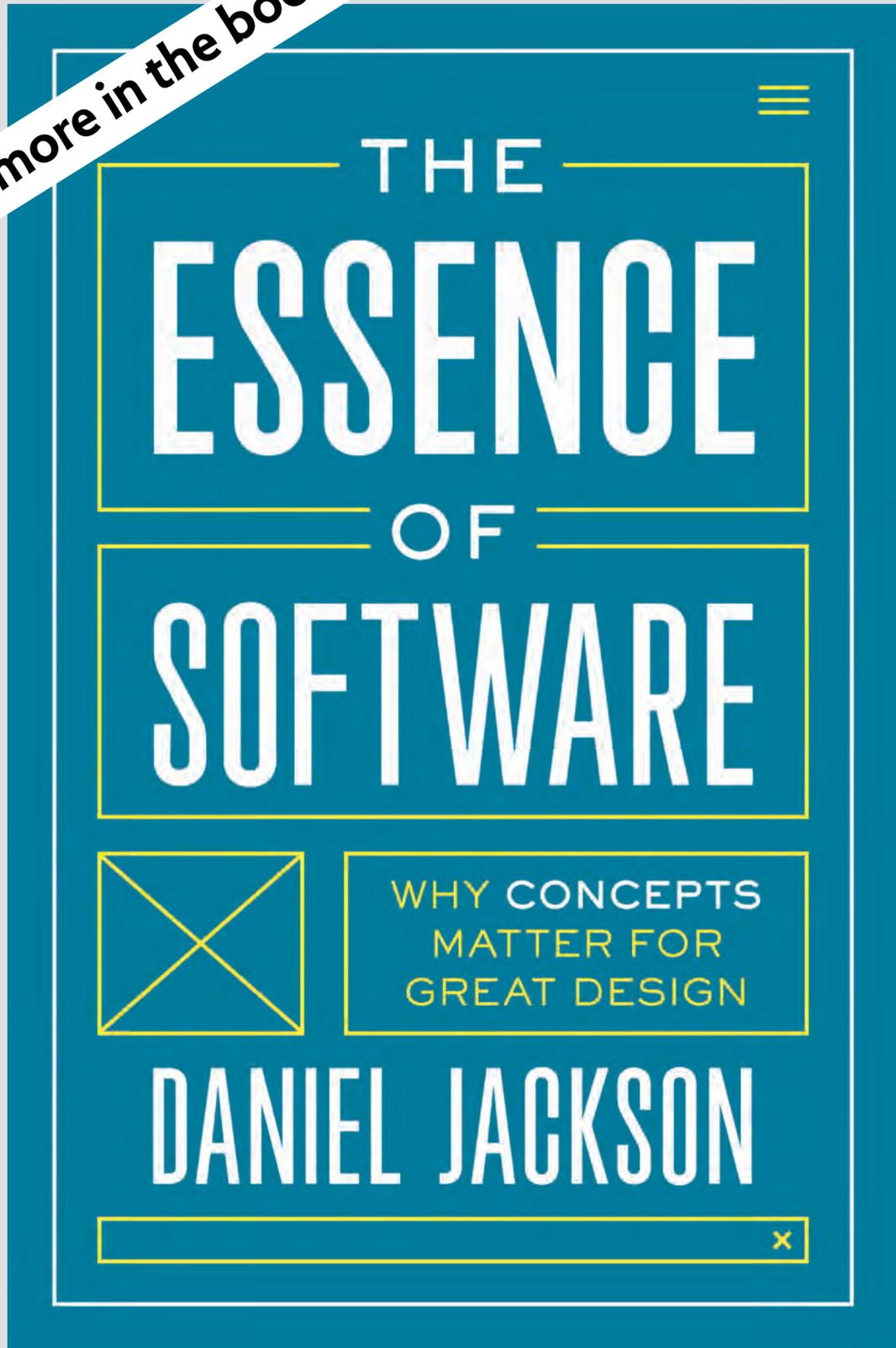
user interfaces



concepts

how we understand
our software and
whether it's fit for

much more in the book



sign up for newsletter
essenceofsoftware.com

join the discussion
forum.softwareconcepts.io

essenceofsoftware.com