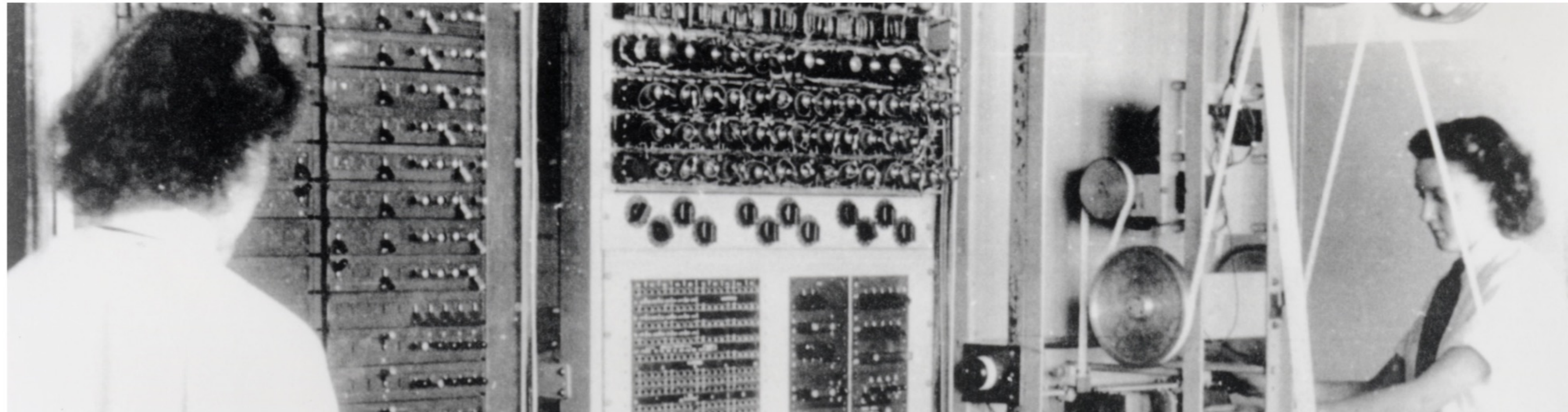




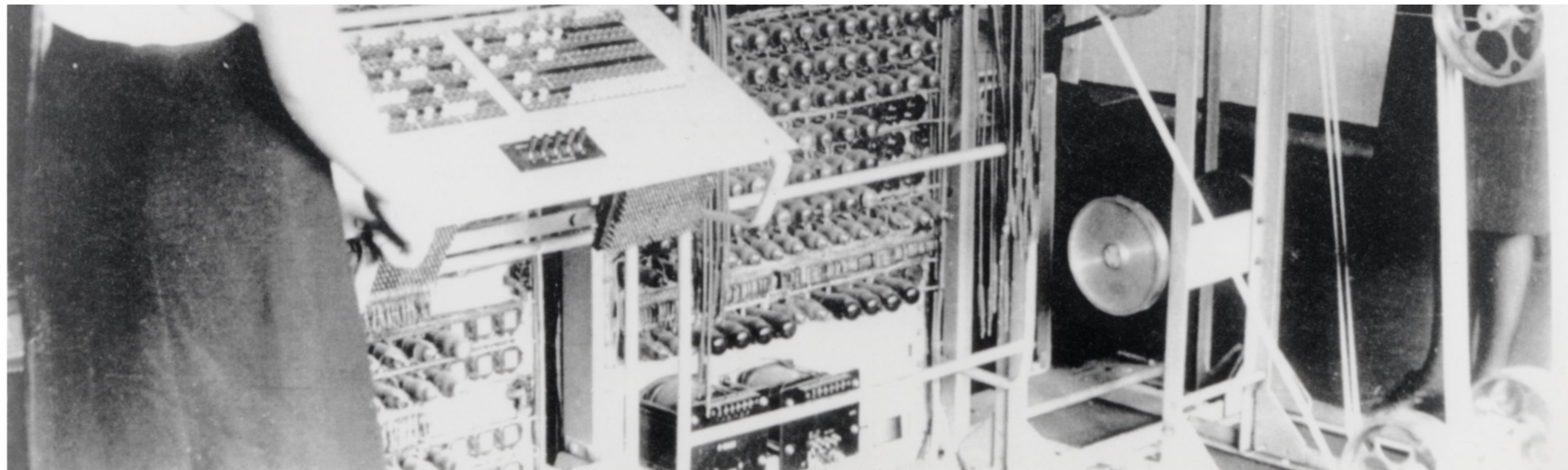
Harvard John A. Paulson
School of Engineering
and Applied Sciences

PL/HCI Seminar (252R/279R)

MW 12-1:15 PM in ~~LISE 303~~ **Pierce 209**



Making communicating with computers more accessible:
easier, faster, and safer



Welcome!

- Sign up for future announcements, paper responses and discussion, and group project organizing: <http://bit.ly/pl-hci-forum>
- Paper reading & presentation schedule
 - HCI folks will present and lead discussion in teams of 2
 - PL folks can present alone or in teams of 2 (and present twice)
 - Every 3rd class will not be co-located
 - Paper to be presented during next M/W classes announced by W of previous week
 - Required for non-presenters: post questions & design argument summary by F of previous week
- Key learning outcomes:
 - (279r) **to look at scientific publications, identify the core design arguments**, write new design arguments, and evaluate them
 - (252r) **understand**, design and implement language abstractions for solving a task

Outline

- 1. HCI research community**
2. Some useful HCI concepts and ideas

HCI Research Community

ACM

VBICOMP
FAT*

CHI

UIST
~400 researchers

~2K researchers

CSCW
~500?

AAAI
ICSM


SPLASH
PLATEAU
LIVE

TOCHI
journal

IEEE
VL/HCC



Google Scholar



Goldman max

×

human hypothesis formation

×

“interpretable decision sets”

×

Targeted Example Generation for Compilation Errors

UZ Ahmed, R Sindhgatta, N Srivastava, A Karkare - arXiv preprint arXiv:1909.00769, 2019

StackDoc-A Stack Overflow Plug-in for Novice Programmers that Integrates Q&A with API Examples

ASM Venigalla, CS Lakkundi, V Agrahari... - 2019 IEEE 19th ..., 2019

[See all recommendations](#)

Stand on the shoulders of giants





Articles

41 results (0.06 sec)



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All

Targeted Example Generation for Compilation Errors

UZ Ahmed, [R Sindhgatta](#), [N Srivastava](#)... - arXiv preprint arXiv ..., 2019 - arxiv.org

7 days ago - We present TEGCER, an automated feedback tool for novice programmers. TEGCER uses supervised classification to match compilation errors in new code submissions with relevant pre-existing errors, submitted by other students before. The dense ...

★ Cites OverCode: Visualizing variation in student solutions to programming ... All 2 versions

[PDF] arxiv.org

StackDoc-A Stack Overflow Plug-in for Novice Programmers that Integrates Q&A with API Examples

ASM Venigalla, CS Lakkundi, V Agrahari... - 2019 IEEE 19th ..., 2019 - ieeexplore.ieee.org

8 days ago - There is a tremendous increase in the use of online coding platforms, courses and walkthrough tutorials to learn programming today. Stack Overflow, a Q&A website of crowd-sourced knowledge on programming is one of the popular platforms that developers ...

★ Cites Visualizing API usage examples at scale

[PDF] Jupyter's Archive: Searchable Output Histories for Computational Notebooks

K Chaudhary, A Head, [B Hartmann](#) - 2019 - digitalassets.lib.berkeley.edu

7 days ago - When using a computational notebook, programmers tend to run, overwrite, and delete cells many times. These actions, which are core to exploratory programming, tend to create a long history of outputs that become fragmented and difficult to track. These ...

★

[PDF] berkeley.edu

A Survey of Automated Programming Hint Generation--The HINTS Framework

[J McBroom](#), [I Koprinska](#), [K Yacef](#) - arXiv preprint arXiv:1908.11566, 2019 - arxiv.org

9 days ago - Automated tutoring systems offer the flexibility and scalability necessary to

[PDF] arxiv.org

Q. What is the Check Harvard Library Bookmark?

Type your question

Search

Answered By: Kathleen Donovan

📅 Aug 21, 2019 👁 493

Use the **Check Harvard Library bookmark** to reload article web pages through Harvard's access. The bookmark works with all browsers. To install from your desktop or laptop:

1. Highlight this URL: **javascript:void(location.href="http://ezp-prod1.hul.harvard.edu/login?url="+location.href)**
2. Drag the highlighted URL into the Bookmarks Toolbar. When you see a + sign, release the URL onto the toolbar.
3. Browsers will display the bookmark differently:
 - In Chrome, the button will be called “log in” – right-click on button > edit > change “log in” to Check Harvard Library
 - In FireFox, the button will show the URL— right-click on button > properties > change URL to Check Harvard Library
 - In Safari, the button will be called "login?url..." -- CTRL click > rename > change "login..." to Check Harvard Library
4. When you're on a web page, click “Check Harvard Library” to get Harvard’s access.

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Check Harvard Library Bookmark

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Text: 617-858-6079

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Browse the Conferences:

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- [Conference Listing](#)

SIGPLAN
SIGCHI

Participating in the HCI Research Community

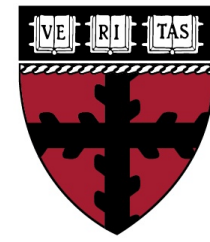
- Poster submission
- Late-breaking work submission
- Doctoral consortium submission
- Workshop submission
- Paper submission (≤ 10 pages or unlimited)
- Committee of professors review paper submissions and choose who gets published (and therefore a presentation)
- Undergrads & grad students typically present their papers when project lead, i.e., first author
- Shared hotel or airBnB, registration, flight all covered by supervising professor

Why?

- It's fun to tell people about your hard work, get great feedback.
- It's fun to hang out with your research group friends in a new city.
- You may get job offers if you're a good fit for an unannounced opening or earn a reputation as a good candidate for a PhD.

Outline

1. HCI research community
- 2. Some useful HCI concepts and ideas**



Harvard John A. Paulson
School of Engineering
and Applied Sciences

PL/HCI Seminar (252R/279R)

Some Useful HCI Stuff

concepts, research areas, and ideas

Error Prevention

Constraints

Pin Index Safety System

From Wikipedia, the free encyclopedia

"PISS" redirects here. For other uses, see [Piss \(disambiguation\)](#).

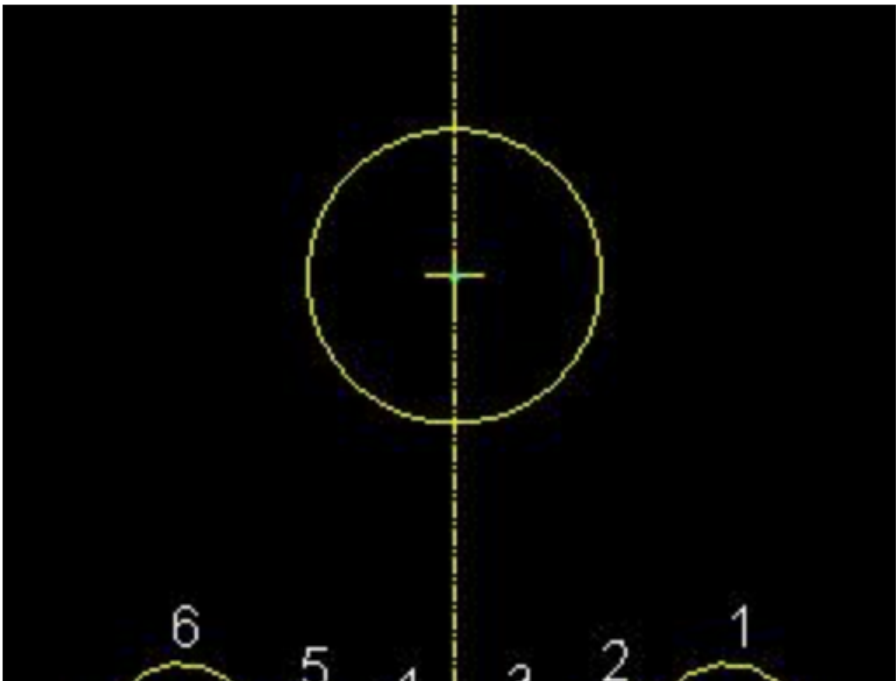
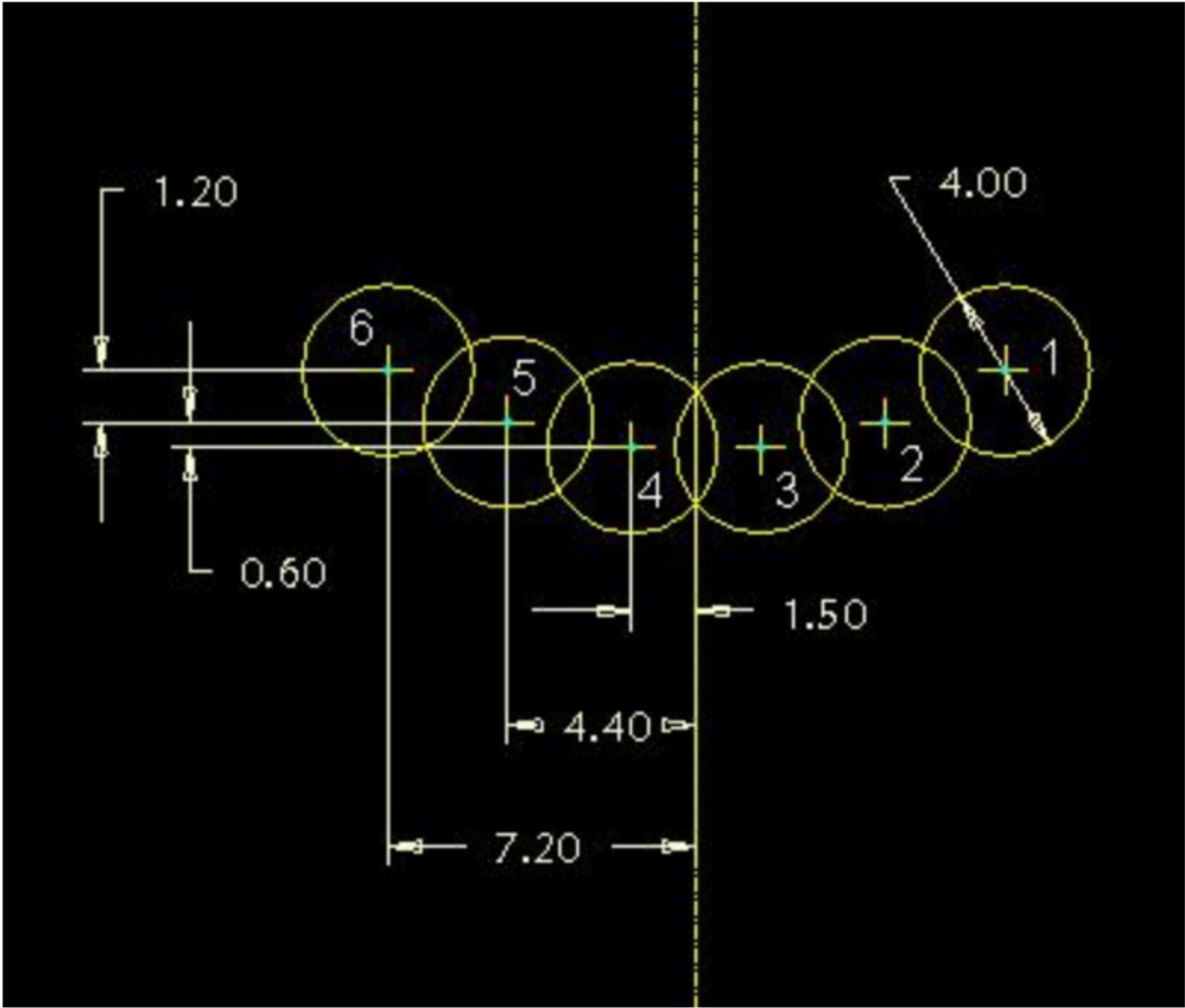
The **Pin Index Safety System**, or PISS, is a means of connecting [high pressure cylinders](#) containing [medical gases](#) to a [regulator](#) or other utilization equipment. It uses geometric features on the valve and yoke to prevent mistaken use of the wrong gas. This system is widely used worldwide for [anesthesia machines](#), portable oxygen administration sets, and inflation gases used in [surgery](#).

Contents [\[hide\]](#)

- 1 [Concept](#)
- 2 [Pin index configurations](#)
- 3 [International Standards](#)
- 4 [Limitations](#)
- 5 [Alternative systems](#)
- 6 [Blanking Plugs](#)
- 7 [See also](#)
- 8 [References](#)

Concept [\[edit\]](#)

The pin index safety system uses a face seal between the cylinder valve and the associated yoke clamp. There are two holes in specific positions on the cylinder valve body below the outlet port , in positions associated with the gas mixture, which prevent connection of the cylinder to a yoke or pressure regulator with a mis-matched set of pins. The holes accept pins 4 mm diameter by 6 mm long which are correctly aligned with the holes.^[1]



Ballots

PostEverything • Perspective

How a badly designed ballot might have swayed the election in Florida

In Broward County, thousands of ballots didn't include a

caus



HOUSTON★CHRONICLE

LOCAL // GRAY MATTERS

Why are our ballots so poorly designed?

Election integrity isn't only about hacking and security

Michael Byrne, Rice University | Nov. 14, 2017 | Updated: Nov. 14, 2017 1:57 p.m.



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Ballot design, not 'rigged' elections, may be to blame for inaccurate votes

AMY M
POSTER

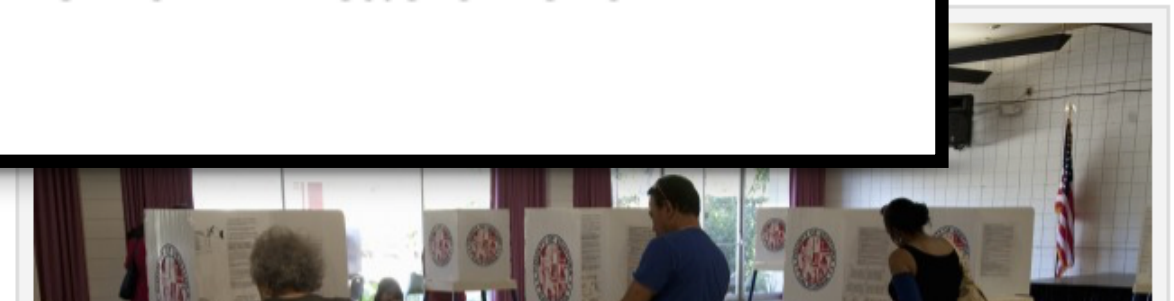


In the v
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sugges

"Voting
election
of a democracy," said Philp Kortum, an assistant
professor of psychology at Rice and the study's
lead author. "Elections must reflect the will of

headlines, some of the biggest threats to election integrity are not from unseen forces with nefarious intent, but rather from poorly designed voting systems that fail to account for the perceptual and cognitive limitations of voters themselves."

tions
ts



Ballots



Center for Civic Design

Field Guides

Projects

Sh

No. 01

Use lowercase letters.

Lowercase letters are more legible than ALL CAPITAL LETTERS because they make shapes that are easier to recognize.

Before

THIS LINE IS ALL CAPITAL LETTERS.



Use

This Line is Upper and Lowercase.



Ballots



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Field Guides

Projects

Sl

No. 02

Avoid centered type.

Left-aligned type is more legible than centered type, which forces the eye to hunt for the start of the next line.

Before

Insert the completed ballot
into the ballot sleeve. Hand in the
ballot to be counted.

(center-aligned)

After

Insert the completed ballot
into the ballot sleeve. Hand in the
ballot to be counted.

(left-aligned)

Ballots



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Field Guides

Projects

Show

No. 03

Use big enough type.

Small print is hard to read for many voters.

Use these minimum type sizes:

- 12-point for print
- 3.0 – 4.0mm for screen

Larger text may increase the number of pages but it is a worthwhile investment in election accuracy.

Before

Fill in the oval to the left of the name of your choice. You must blacken the oval completely, and do not make any marks outside of the oval. You do not have to vote in every race

(8-point)

After

Fill in the oval to the left of the name of your choice. You must blacken the oval completely, and do not make any marks outside of the oval. You do not have to vote in every race.

(12-point)

Ballots



No. 04

Pick one sans-serif font.

Use sans-serif fonts with clean strokes.

For dual-language materials, use bold text for the primary language, regular text for the secondary language.

Using just one font makes the ballot more unified. Different fonts make voters stop reading and adjust.

Avoid

- Times New Roman
- Georgia
- Cambria

Use

- Arial
- Helvetica
- Univers
- Verdana
- Clearview ADA

Ballots



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SI

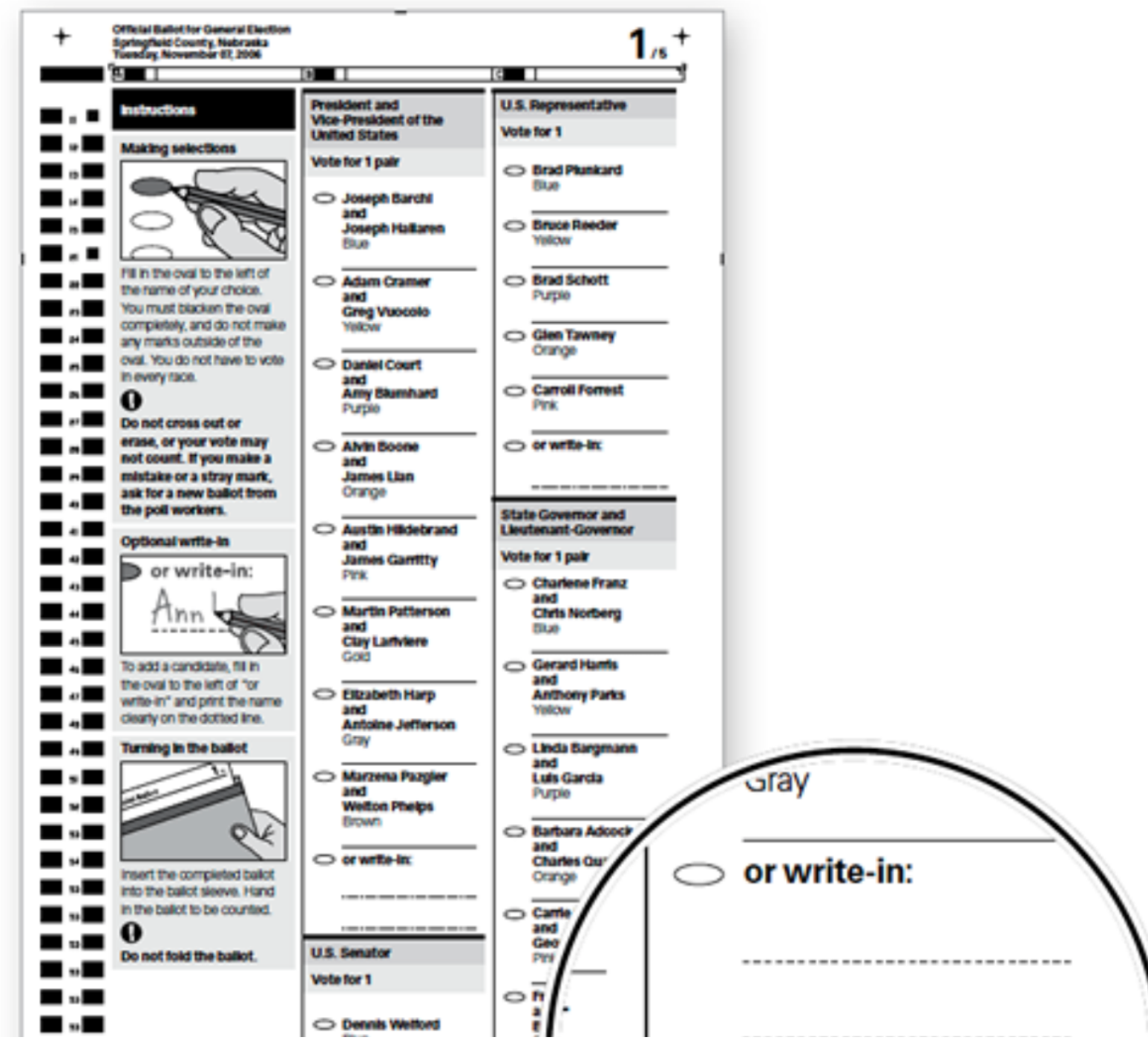
No. 05

Support process and navigation.

Put instructions where they are needed. Use page (or screen) numbering to show progress.

For electronic ballots, let voters change language or display options, with instructions available at any time.

Post easy-to-see instructions for both voting and moving around the polling place.



Ballots



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Sh

No. 06

Use clear, simple language.

Make instructions and options as simple as possible.

Do not include more than two languages.

If possible, summarize referenda in simple language alongside required formats.

Simple language is often shorter, taking up less space.

Before

If an overvoted ballot is encountered,
the voter is entitled to another blank
ballot after surrendering the spoiled
ballot.

After

If you make a mistake, ask a poll
worker for another ballot.

Ballots



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St

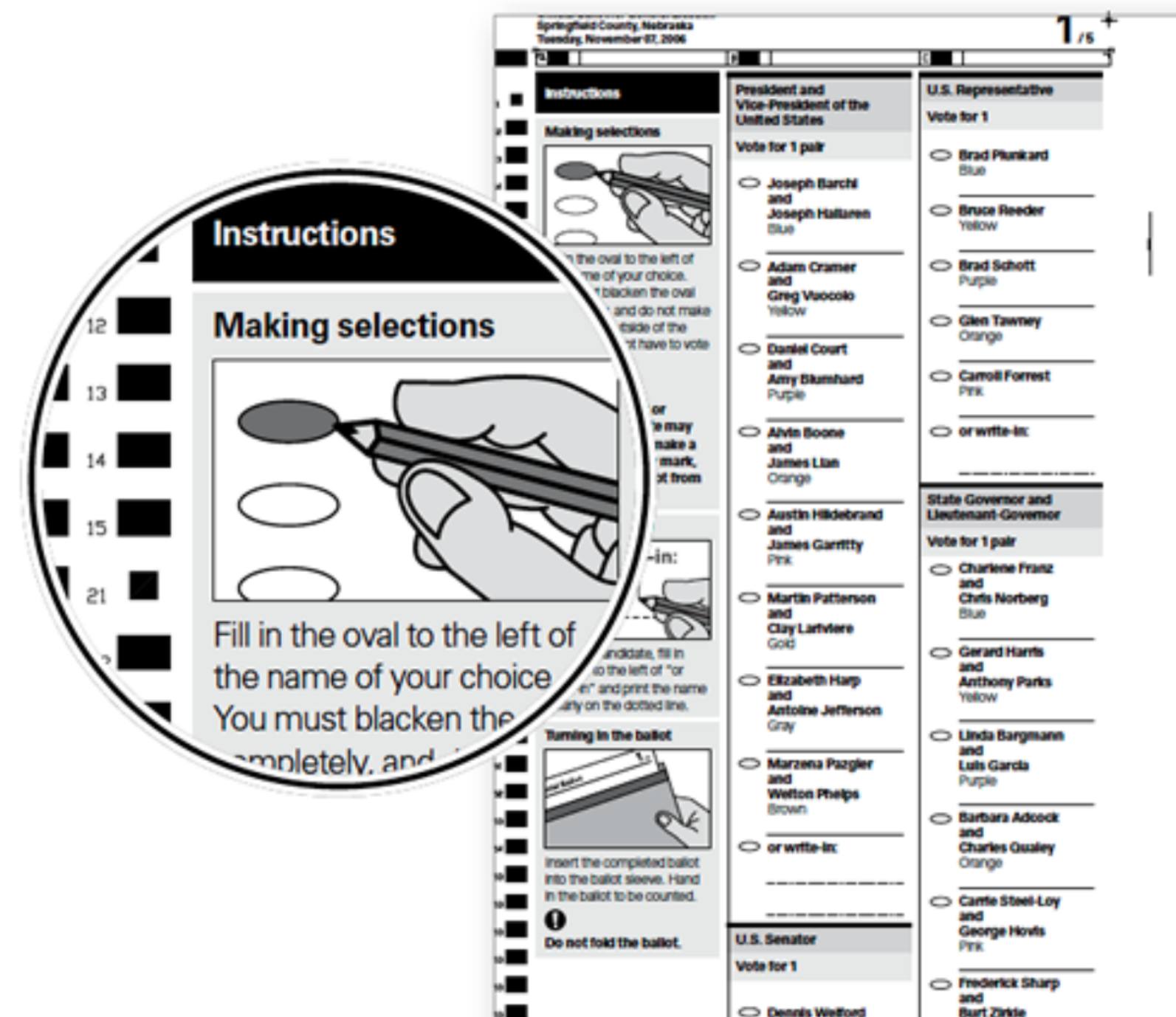
No. 07

Use accurate instructional illustrations.

Visual instructions help low-literacy and all voters.

Illustrations must be accurate in their details, highlighting the most important instructions.

Do not use photographs.



Ballots



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No. 08

Use informational icons (only).

Use icons that call attention to key information and support navigation with care.

Don't use political party emblems.

Avoid



Independent



Democrat



Republican

Use



Attention



Continue, proceed

Ballots



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Projects

SI

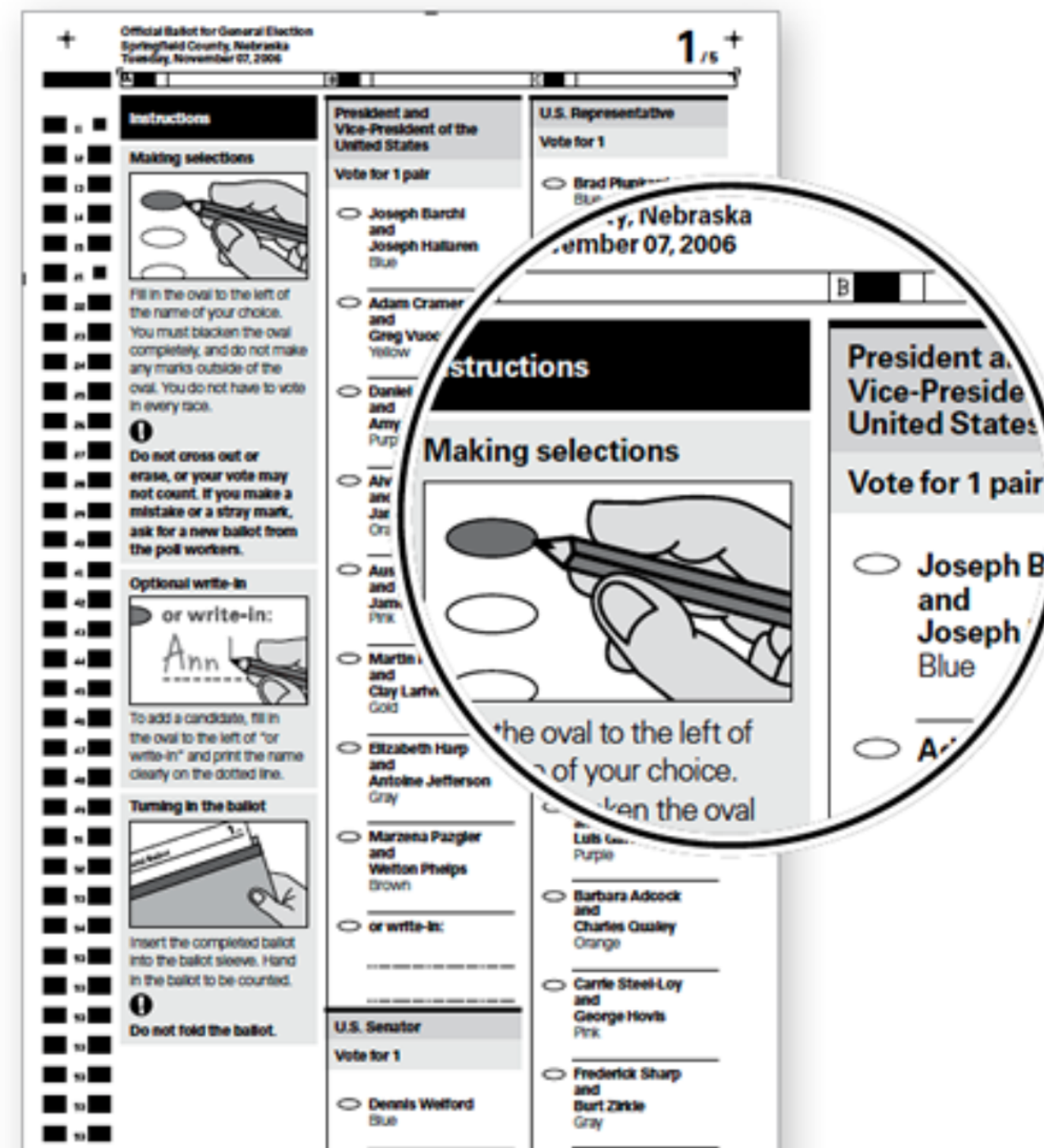
No. 09

Use contrast and color to support meaning.

Use color and shading consistently:

- On paper ballots, to separate instructions from contests and contests from each other.
- On electronic ballots, to support navigation, call special attention, and provide user feedback.

Do not rely on color as the only way to communicate important information.



Ballots



No. 10

Show what's most important.

Use layout and text size to help voters know what to pay attention to.

The ballot title should be the most prominent.

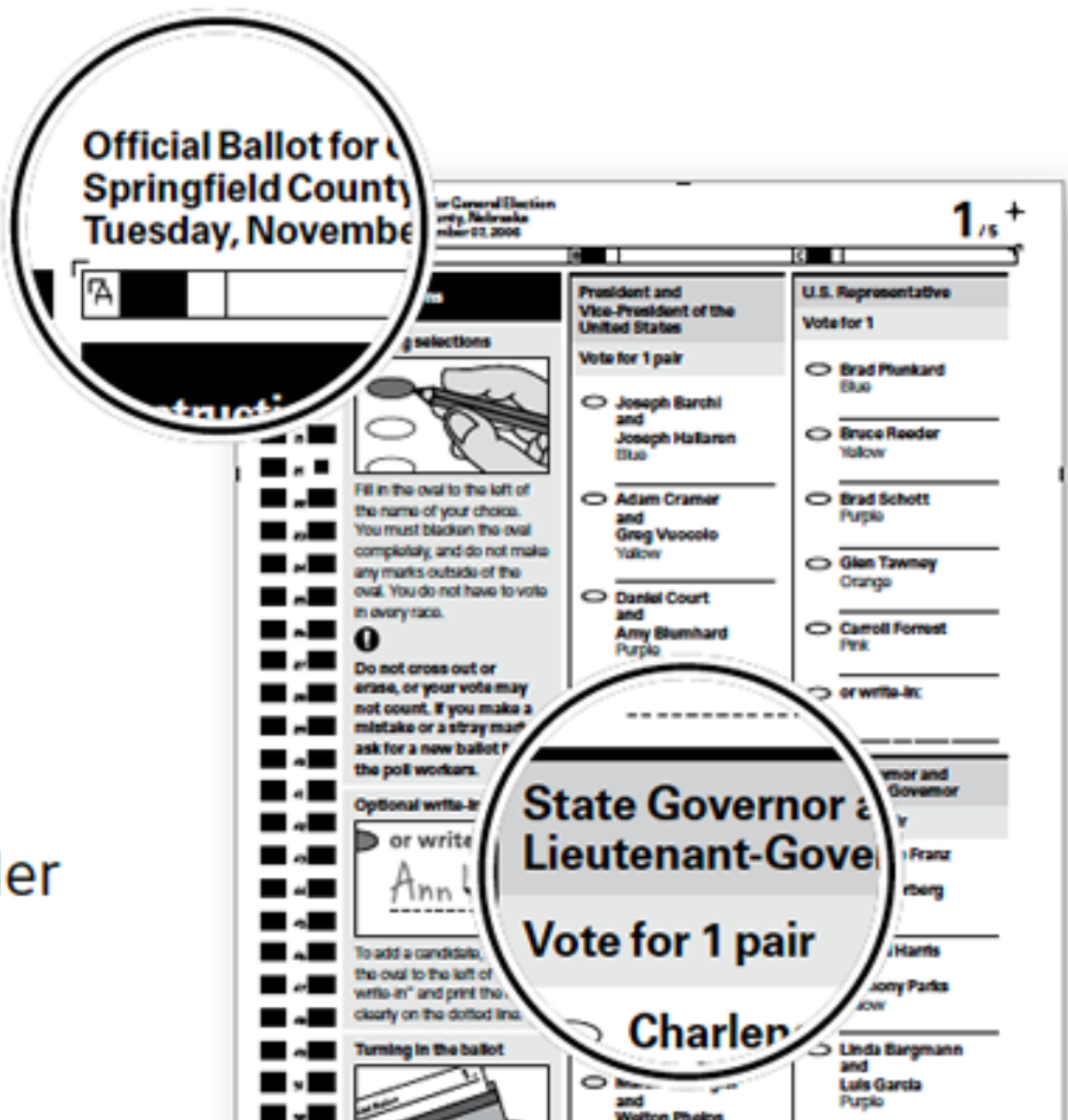
A contest header should be more prominent than the candidates' names.

A candidate's name should be bolder than his/her party affiliation.

Candidates' names and options should be presented with equal importance.

Ballot Title

Contest Header



Previews

Click & hold to compare



Undo edits

Done



Original



Auto



West



Palma



Metro



Eiffel



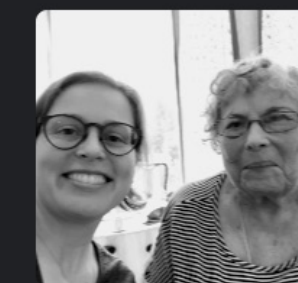
Blush



Modena



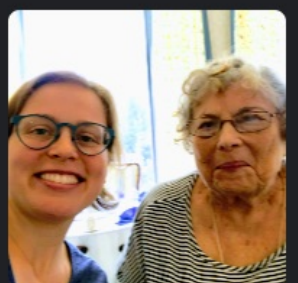
Reel



Vogue



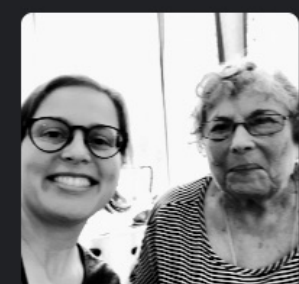
Ollie



Bazaar



Alpaca



Vista

Be thoughtful about who you include in the design and evaluation process.

An apple a day
Health & wellbeing

This article is more than 4 years old

The medical research gender gap: how excluding women from clinical trials is hurting our health

Large gender gaps in research limit how much we know about the difference between women's health and men's

- This article is part of a series on women's health and chemicals
- Women still do most of the cleaning: is it putting their health at risk?
- How excluding women from clinical trials is hurting our health

Amy Westervelt

A California-based freelancer covering the environment, business and health for the Guardian and The Wall Street Journal

@amywestervelt

Thu 30 Apr 2015 15.32 EDT



590 21



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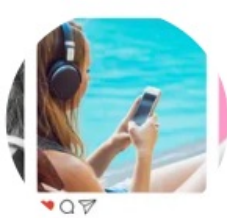
most viewed in US



'This tape rewrites everything we knew about the Beatles'



Underpopulated Italian region offers visitors €25,000 to move in



What does 'living fully' mean? Welcome to the age of pseudo-profound nonsense



'Rick Scott had us on lockdown': how Florida said no to \$70m for HIV crisis

Airbags

[VIDEO](#)[LIVE](#)[SHOWS](#)

Air Bags Dangerous for Tall, Small People: Study

By **BY STEVEN REINBERG** and **HEALTHDAY REPORTER** Mar. 23



WEDNESDAY, May 16 (HealthDay News) -- Short people and tall people can receive serious injuries from air bags, a new study found.

"This is the first time that there is proof to substantiate the concern about small-stature occupants, and it is the first time that there has been any implication that tall people are also at risk," said lead researcher Dr. Craig Newgard, an assistant professor of emergency medicine and public health and preventive medicine Oregon Health & Science University.

Results of the study are expected to be presented Friday at the Society for Academic Emergency Medicine annual meeting, in Chicago.

While there have been reports that short people are at risk from air bags, that risk has never been conclusively demonstrated, Newgard said. "We found that small stature and large stature people, male and female, were at risk for injury from an air bag as opposed to having a protective benefit," he said.

Newgard said that the study researchers examined more than 11 years of data. That data included results for both older air bags and the newer "smart" air bags, which are designed to compensate for a person's weight. But, it was impossible to determine how

Affordances









Web Design

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Submit

Submit

Workflow

Keynote for iPad: Add a Magic Move transition




A Magic Move transition creates the effect of objects moving from their positions on one slide to new positions on the next slide when you play your presentation.

The easiest way to create a Magic Move transition is to create a slide and add objects to it, then duplicate the slide and rearrange, resize, or reorient the objects on the duplicated slide. Any objects appearing on both slides become part of the transition. Any objects appearing on the first slide, but not the following slide, fade out. Any objects appearing on the following slide, but not the original slide, fade in.

1. In the [slide navigator](#), tap to select the slide you want to add a Magic Move transition to, tap the slide again, then tap Transition.
2. Tap Add Transition, tap Magic Move, then tap Done.
3. Tap Duplicate to duplicate the slide, or tap Cancel if you already duplicated it.
4. Change the position or appearance of the objects on one or both slides; you can drag objects to new locations, rotate or resize objects, add or delete objects on either slide, and more.

The Magic Move transition is most effective when both slides include at least one common object whose position or appearance has been altered.

5. To preview the transition, tap the first of the two slides in the slide navigator, then tap .

6. To customize the transition duration and timing, tap the first of the two slides in the slide navigator, tap

Consistency

Hamburger button

From Wikipedia, the free encyclopedia

The **hamburger button**, so named for its unintentional resemblance to a [hamburger](#), is a [button](#) typically placed in a top corner of a [graphical user interface](#).^[1] Its function is to toggle a menu (sometimes referred to as **hamburger menu**) or [navigation bar](#) between being collapsed behind the button or displayed on the screen. The icon which is associated with this [widget](#), consisting of three horizontal bars, is also known as the *collapsed menu icon*.

Contents [hide]

- 1 [History](#)
 - 1.1 [Original Design](#)
 - 1.2 [In Mainstream Computing](#)
- 2 [Appearance and functionality](#)
- 3 [Criticisms](#)
 - 3.1 [Appearance](#)
 - 3.2 [Usability](#)
- 4 [See also](#)
- 5 [References](#)

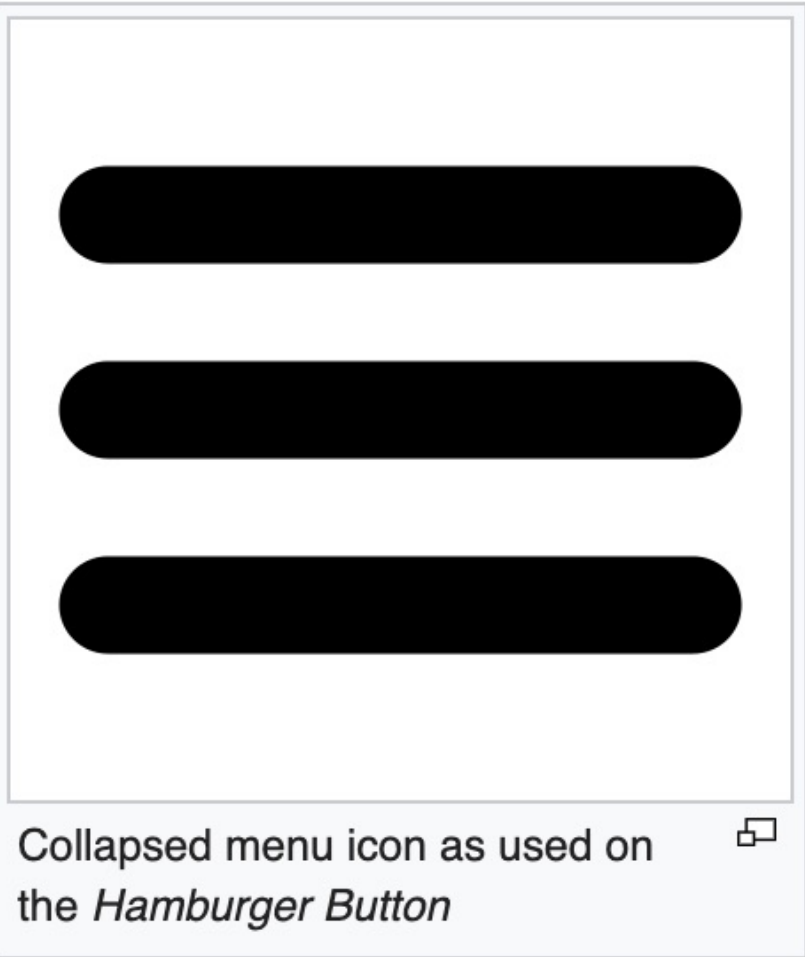
History [[edit](#)]

Original Design [[edit](#)]

The icon was originally designed by [Norm Cox](#) as part of the user interface for the [Xerox Star](#), introduced in 1981;^[2] it saw a resurgence starting in 2009 stemming from the limited screen area available to [mobile apps](#).^{[3][4][5]} Cox described the icon's creation, saying “Its graphic design was meant to be very “road sign” simple, functionally memorable, and mimic the look of the resulting displayed menu list. With so few pixels to work with, it had to be very distinct, yet simple. I think we only had 16×16 pixels to render the image. (or possibly 13×13... can’t remember exactly).”^[6]

In Mainstream Computing [[edit](#)]

In possibly its first use after the Xerox Star, the release of [Windows 1.0](#) in 1985 contained a hamburger icon in each window's control menu.^[7] It was short-lived, however, as the hamburger icon disappeared in [Windows 2.0](#) in favor of a single horizontal line denoting the control menu. [Windows 95](#) replaced the single line with the program's icon,^[8] and the hamburger would not return to Windows until a placement on the [Start menu](#) of the [one-year update](#) of [Windows 10](#).^[9]



Collapsed menu icon as used on the *Hamburger Button*



Hamburger - icon [nickname](#) origin

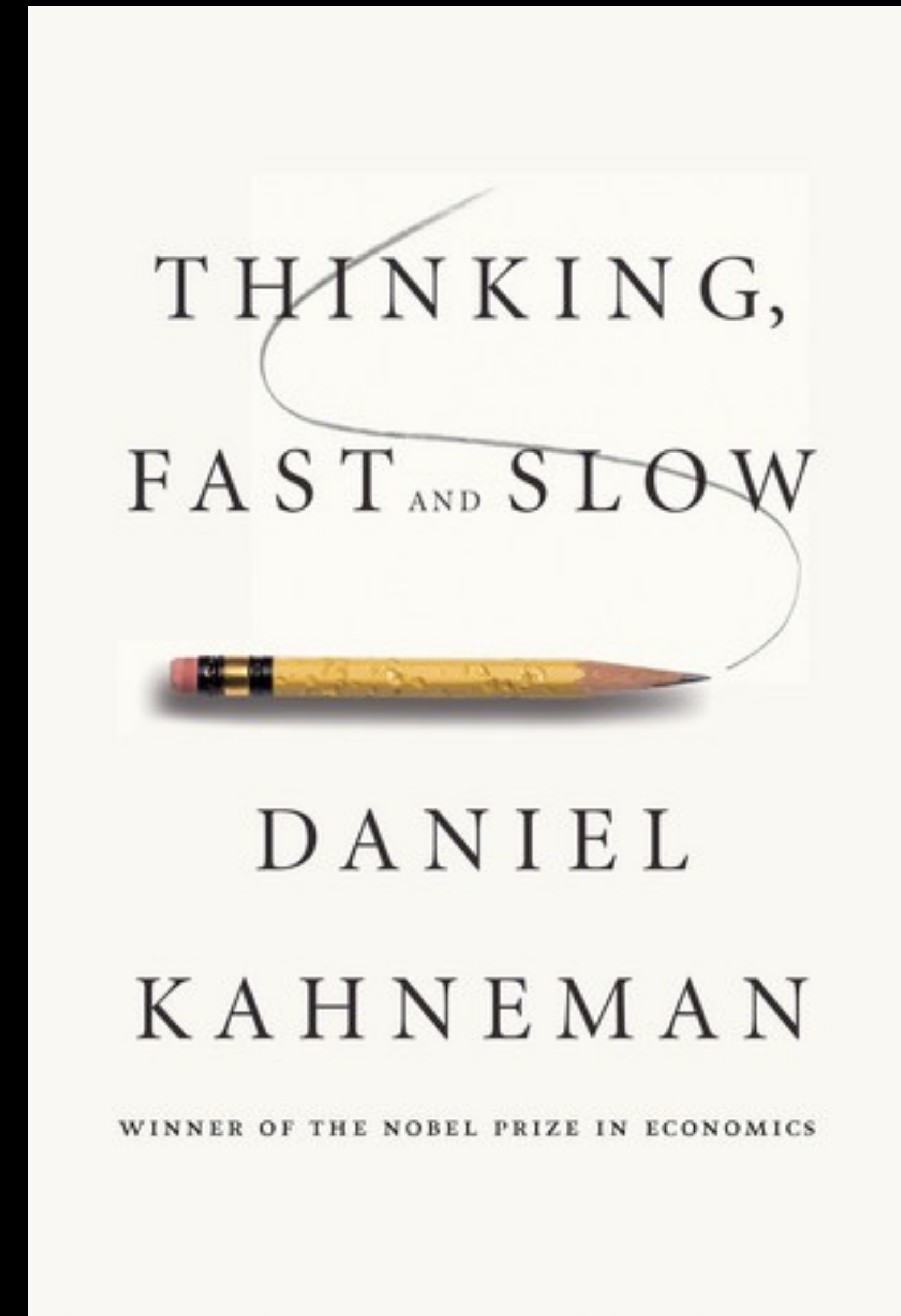
Prototyping

CODING CAN BE LAST.

Human Cognition

System 1 uses association and metaphor to produce a quick and dirty draft of reality, which System 2 draws on to arrive at explicit beliefs and reasoned choices. System 1 proposes, System 2 disposes. So System 2 would seem to be the boss, right? In principle, yes. But **System 2, in addition to being more deliberate and rational, is also lazy. And it tires easily.** Too often, instead of slowing things down and analyzing them, System 2 is content to accept the easy but unreliable story about the world that System 1 feeds to it. "Although System 2 believes itself to be where the action is," Kahneman writes, "the automatic System 1 is the hero of this book." System 2 is especially quiescent, it seems, when your mood is a happy one.

– JIM HOLT



A review of possible effects of cognitive biases on interpretation of rule-based ML models

Confirmation bias

Anchoring/Primacy effect

Automation bias ? Algorithmic aversion

Reiteration effect ? Mere exposure effect

Availability heuristic

Human Perception (Inputs for Humans)

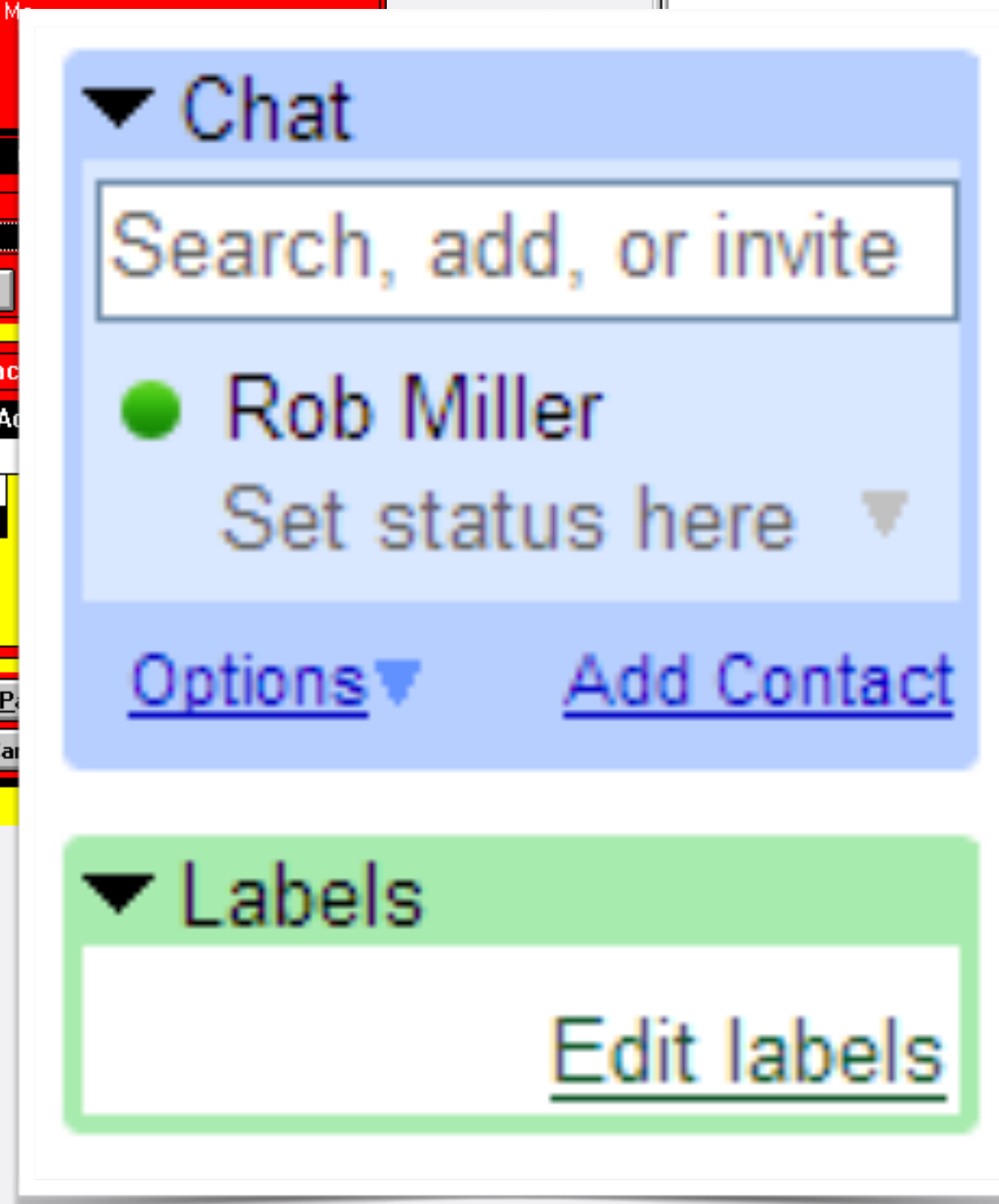
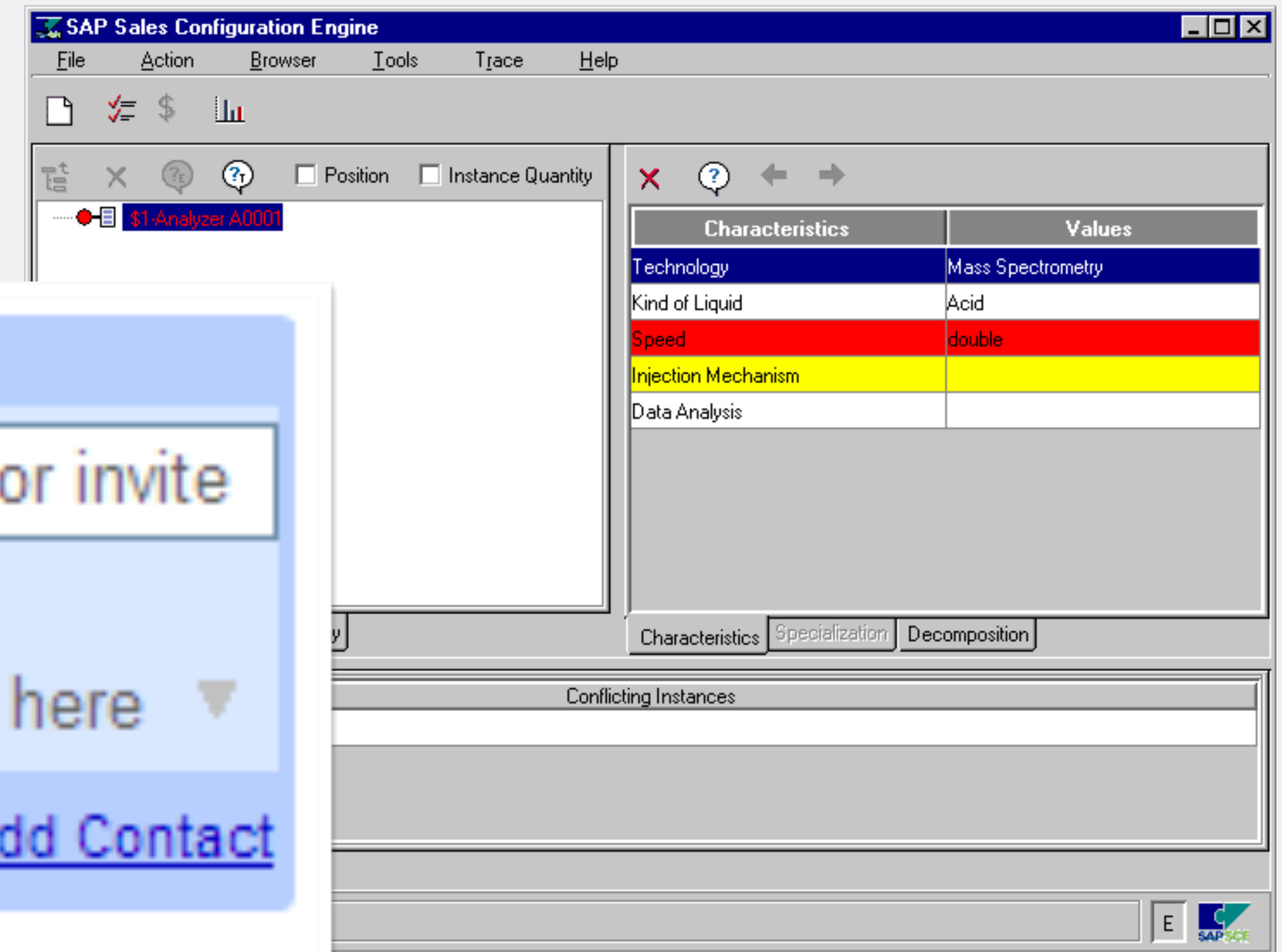
What inputs do humans have?

Which inputs do we take advantage of
in today's interfaces?

Which inputs would you like interfaces to interact with
in the future?

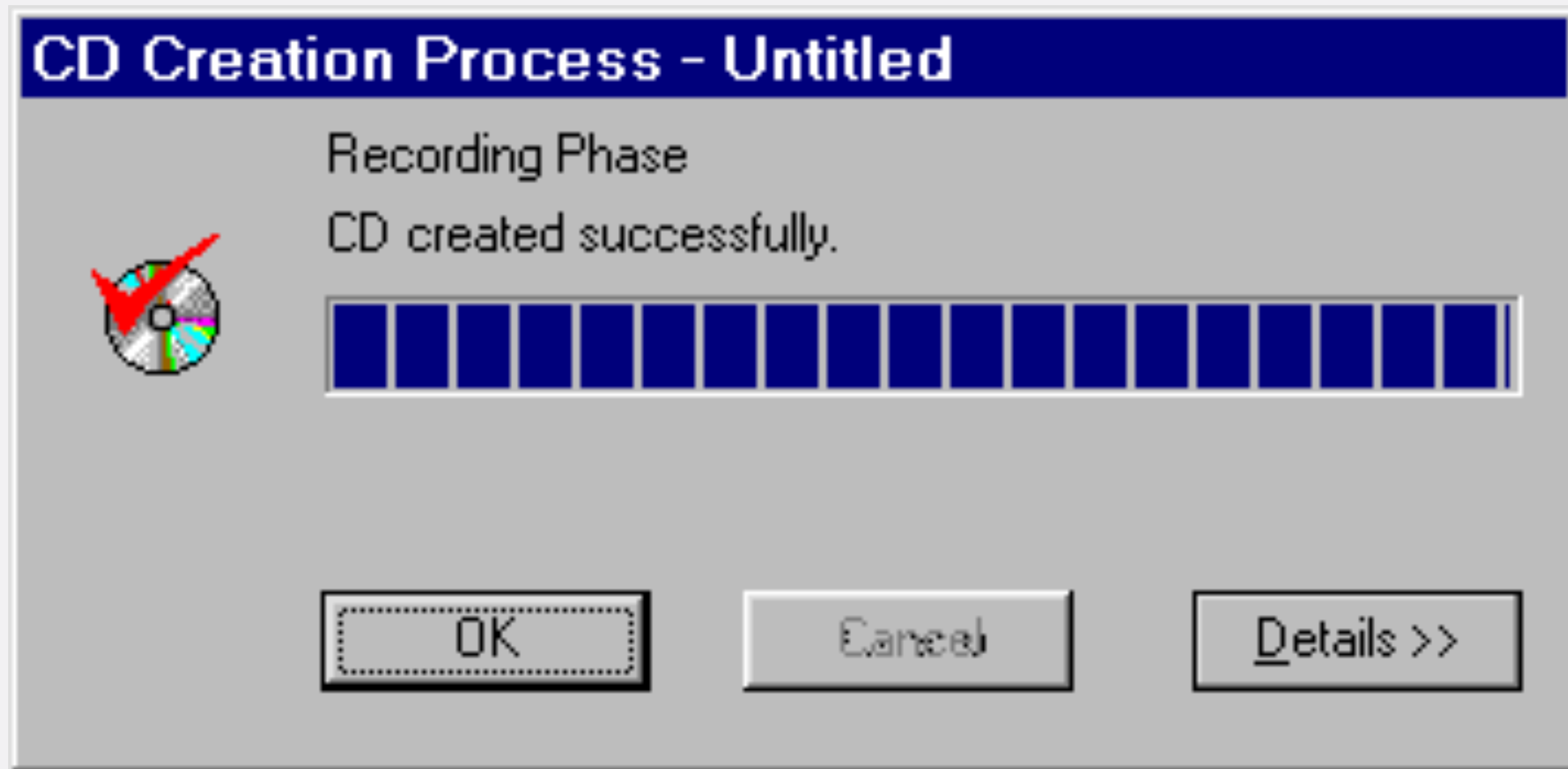


Avoid Saturated Colors

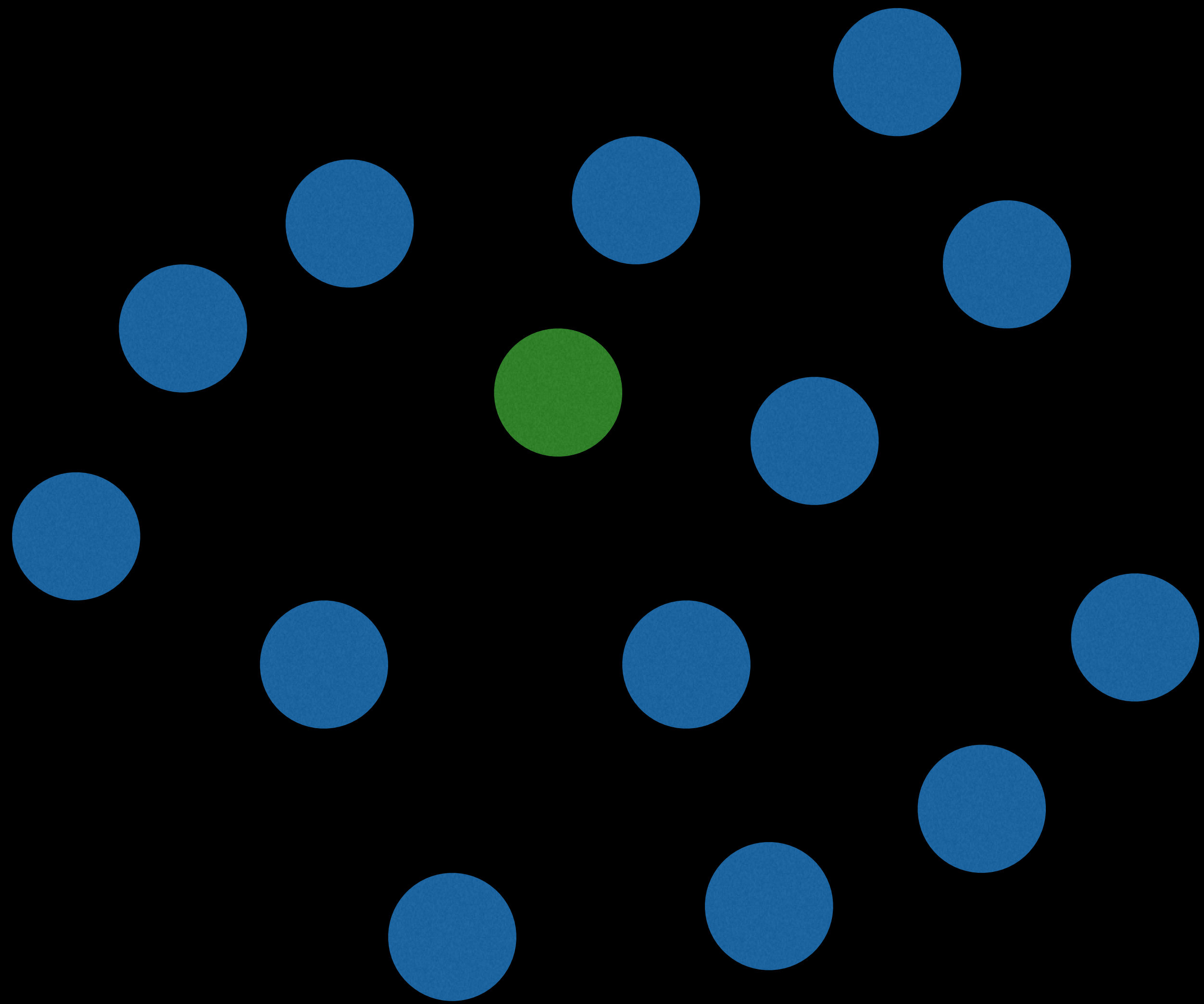




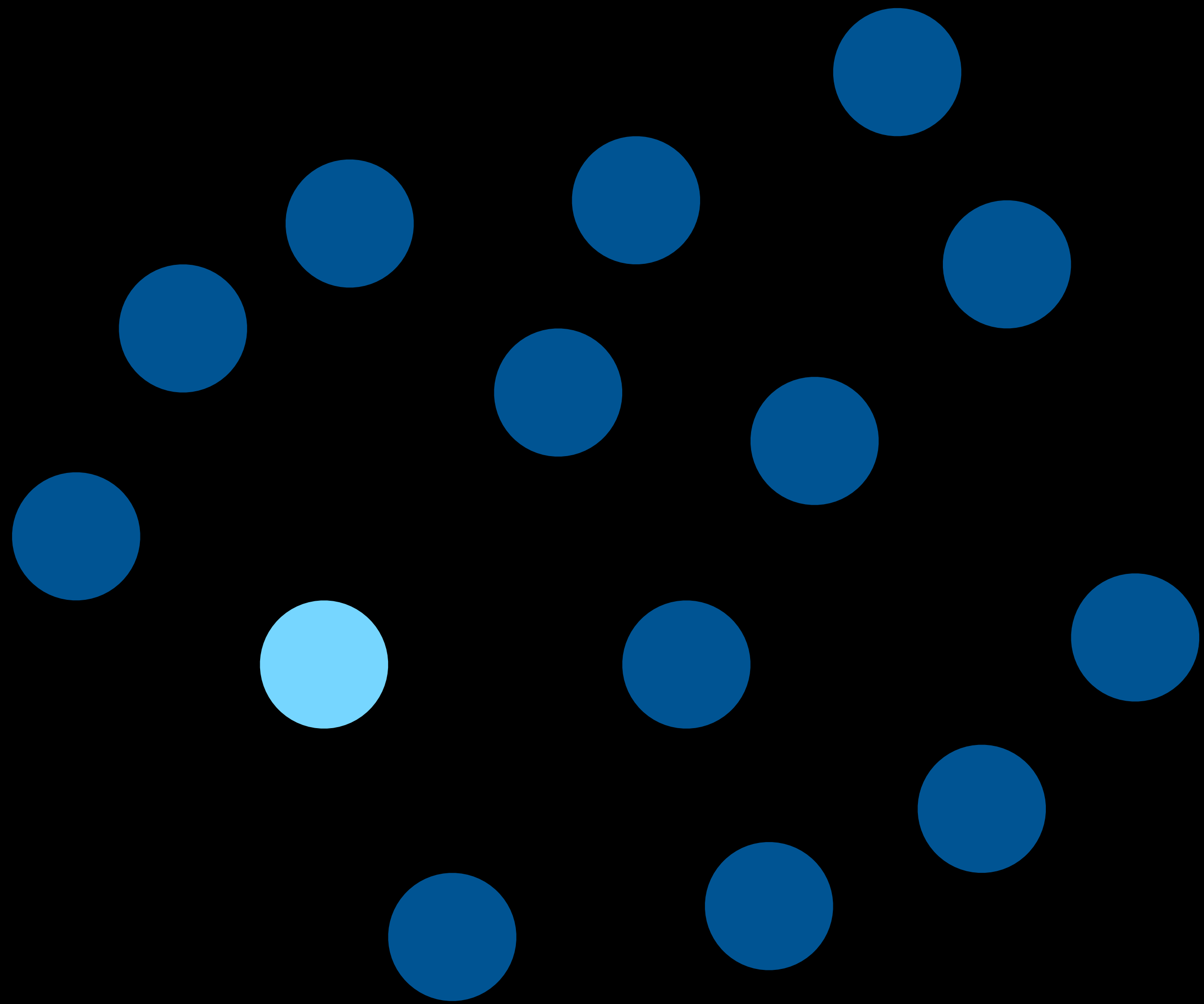
Cultural Consistency



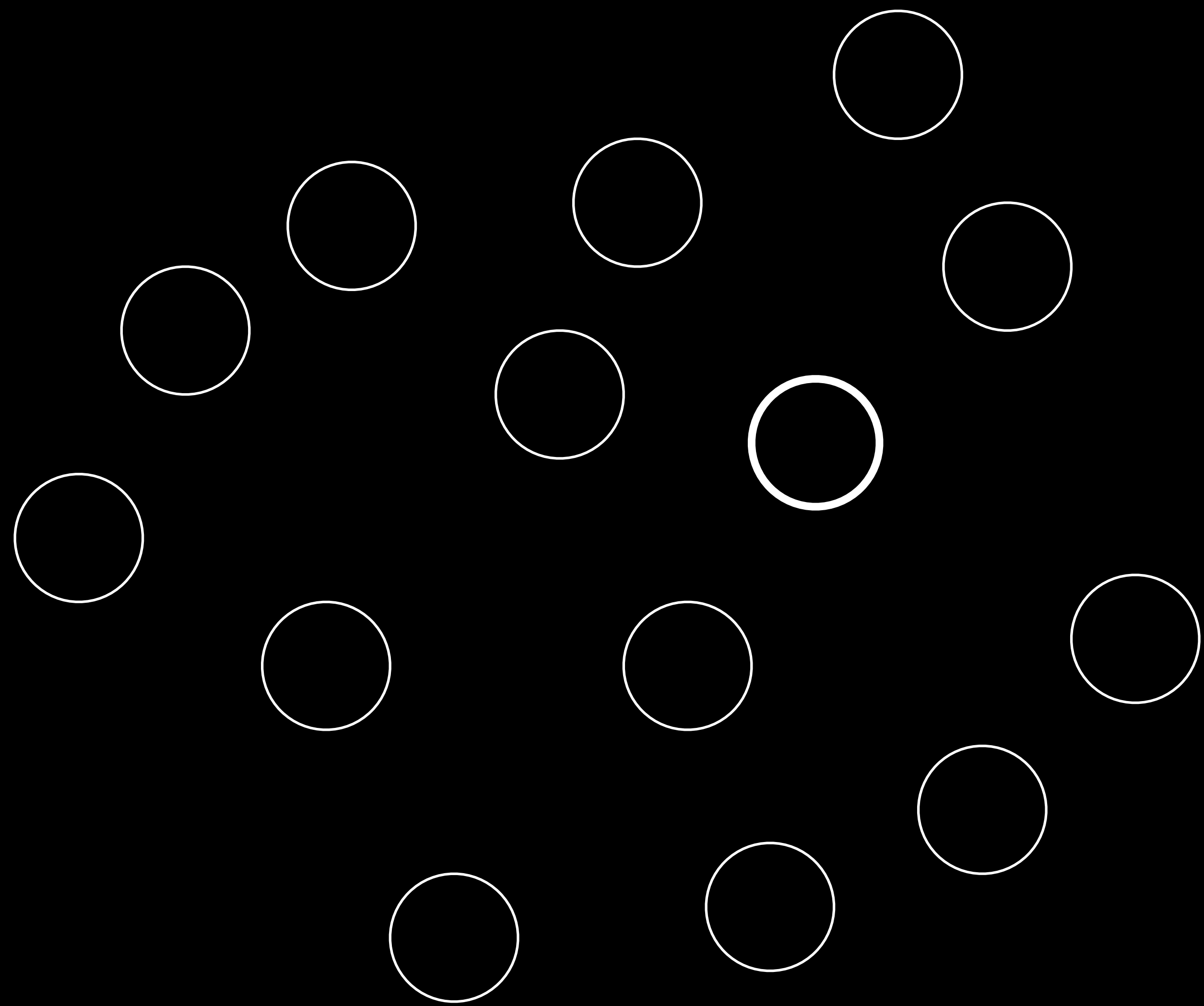
Find ●



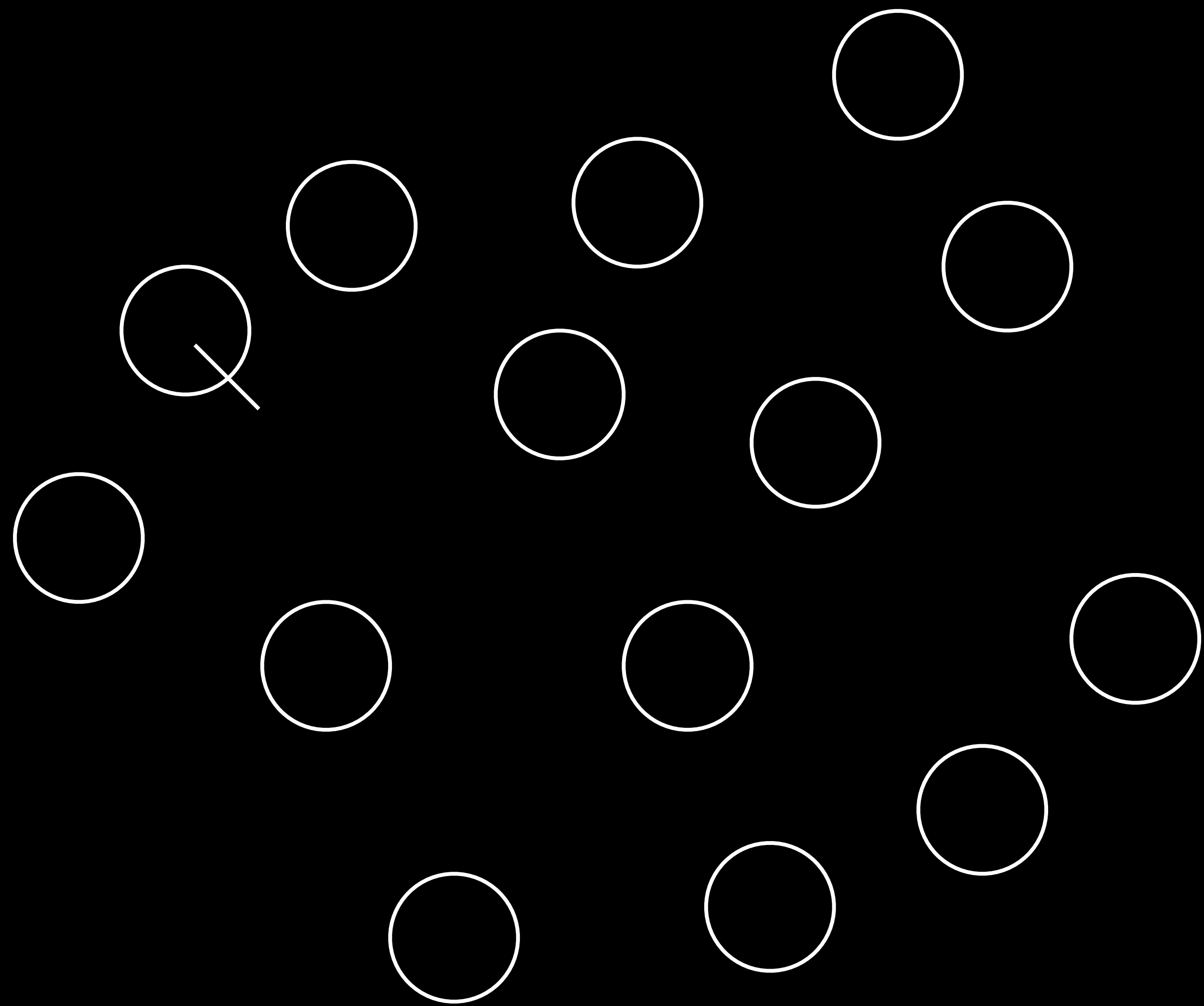
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Visual Pop-out















A BRIEF CHRONICLE OF SENSORY ENHANCEMENT


CIRCA 6000 B.C.:
What may be the first known written language appears in ancient China, an early example of substituting visual for auditory perception.




1888:
The first contact lenses, which were made of glass, are manufactured by a Swiss physician.




1960:
The Smell-O-Vision, a system designed to add odors to the movie-theater experience, is deployed for the film *Scent of Mystery*.



1972:
Patients, mostly children and veterans, begin receiving the first cochlear implants.



1992:
Peter Meijer, a Dutch engineer, develops the vOICe, a device that can convert images into sound.



2013:
Researchers in Singapore develop a digital lollipop that can simulate different tastes.

2015:
The FDA approves the BrainPort V100, a device that allows blind people to “see” with their tongue.

2017

2100:
People will gain the “sixth sense” of ESP through neural implants.

PREDICTIONS

6000 B.C.

1850


1965

2014

2100

CIRCA 6000 B.C.:
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PREDICTIONS



2014

2100

Heuristic Evaluation

10 Usability Heuristics for User Interface Design

In 1994, [Jakob Nielsen](#) published [a set of 10 general usability principles](#). These principles are still valid, but the original language, which refers to technologies and design practices from a quarter century ago, is not always easy to interpret. This document is an attempt to translate that content gently into language that makes sense today.

Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Match between system and the user's mental model

Both the vocabulary and the task structure reflected in the interface should match how the user thinks about the task.

User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Consistency and standards

Use established design language and follow platform conventions. Use consistent vocabulary and design choices throughout your product.

Error prevention

Need we say more? There should be no such thing as "user error" in the design of consumer products.

Recognition rather than recall

10 Usability Heuristics

- Visibility of system status
- Match between system and the user's mental model
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetics matter
- Help users recognize, diagnose, and recover from errors
- Help and documentation

The severity of a usability problem is a combination of three factors:

- The **frequency** with which the problem occurs: Is it common or rare?
- The **impact** of the problem if it occurs: Will it be easy or difficult for the users to overcome?
- The **persistence** of the problem: Is it a one-time problem that users can overcome once they know about it or will users repeatedly be bothered by the problem?

Severity Ratings

The following 0 to 4 rating scale can be used to rate the severity of usability problems:

- 0** = I don't agree that this is a usability problem at all
- 1** = Cosmetic problem only: need not be fixed unless extra time is available on project
- 2** = Minor usability problem: fixing this should be given low priority
- 3** = Major usability problem: important to fix, so should be given high priority
- 4** = Usability catastrophe: imperative to fix this before product can be released

Group Projects

- Systems HCI requiring heavy-duty PL
 - Humans modifying DSLs for PBD (programming by demonstration)
 - Example with interactively defined templates
- Generic human-centered PL
 - Pick language feature, design it in a human-friendly way
 - Pick a language, describe how-and to what extent-its features are being used in the wild
- Usable + X (PL technique)
 - Usable Generative Programming
 - Usable Probabilistic Programming
 - Usable Type System / Verification
 - Usable Synthesis
 - inductive bias alignment between human and machine
 - ranking function improvements
 - DSL improvements
 - expressing constraints on intermediate states, i.e., equivalence values or types

Thank you!