Building User Interfaces

# Usability Evaluation: Rapid Methods

Professor Bilge Mutlu

# Announcements

- Supplemental material

# What we will learn today?

- What is usability evaluation?
- What are rapid/expert methods?
  - Heuristic evaluation
  - Cognitive walkthrough
- Assignment preview

# TopHat Attendance

TOP HAT

# TopHat Questions

# What is usability evaluation?

# Usability Evaluation

**Definition:** The assessment of the effectiveness of and user satisfaction with design solutions.

# Types of Usability Evaluation

1. **Testing-based** methods
2. **Expert-review-based** methods

# Testing-based methods

**Definition:** Empirical, i.e., based on data, testing with users who represent the target population of design solutions.

We will cover testing-based methods later in the semester.

# Expert-review-based methods

**Definition:** Also called "usability inspection," review-based evaluation by experts who follow well-established protocols to inspect the usability of design solutions.

Our focus today will be on expert-review-based methods.

# Which methods?

**Heuristic evaluation**, heuristic estimation, **cognitive walkthrough**, pluralistic walkthrough, feature inspection, consistency inspection, standards inspection, formal usability inspection.

We will cover the most commonly use two methods.

# Heuristic Evaluation

# Heuristic Evaluation

**Definition:** Developed by Jacob Nielsen, heuristic evaluation involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles (the "heuristics").[1] [2]

[1] NN/g: How to conduct a heuristic evaluation

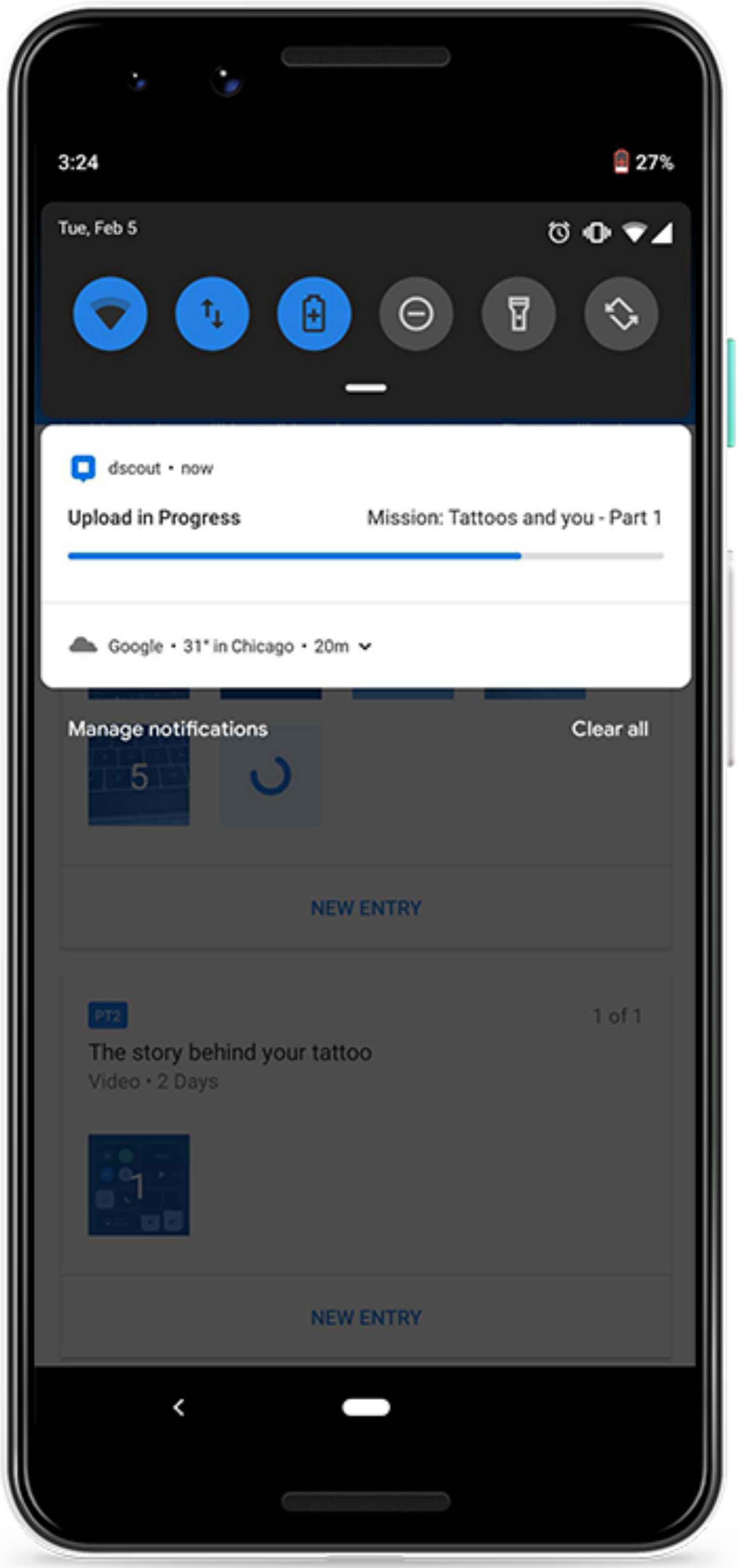
[2] NN/g: Video explanations of the 10 heuristics

NN/g
Heuristic Evaluation

# 1: Visibility of system status[3] [4]

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

E.g., email clients making a swoosh sound when sending email.

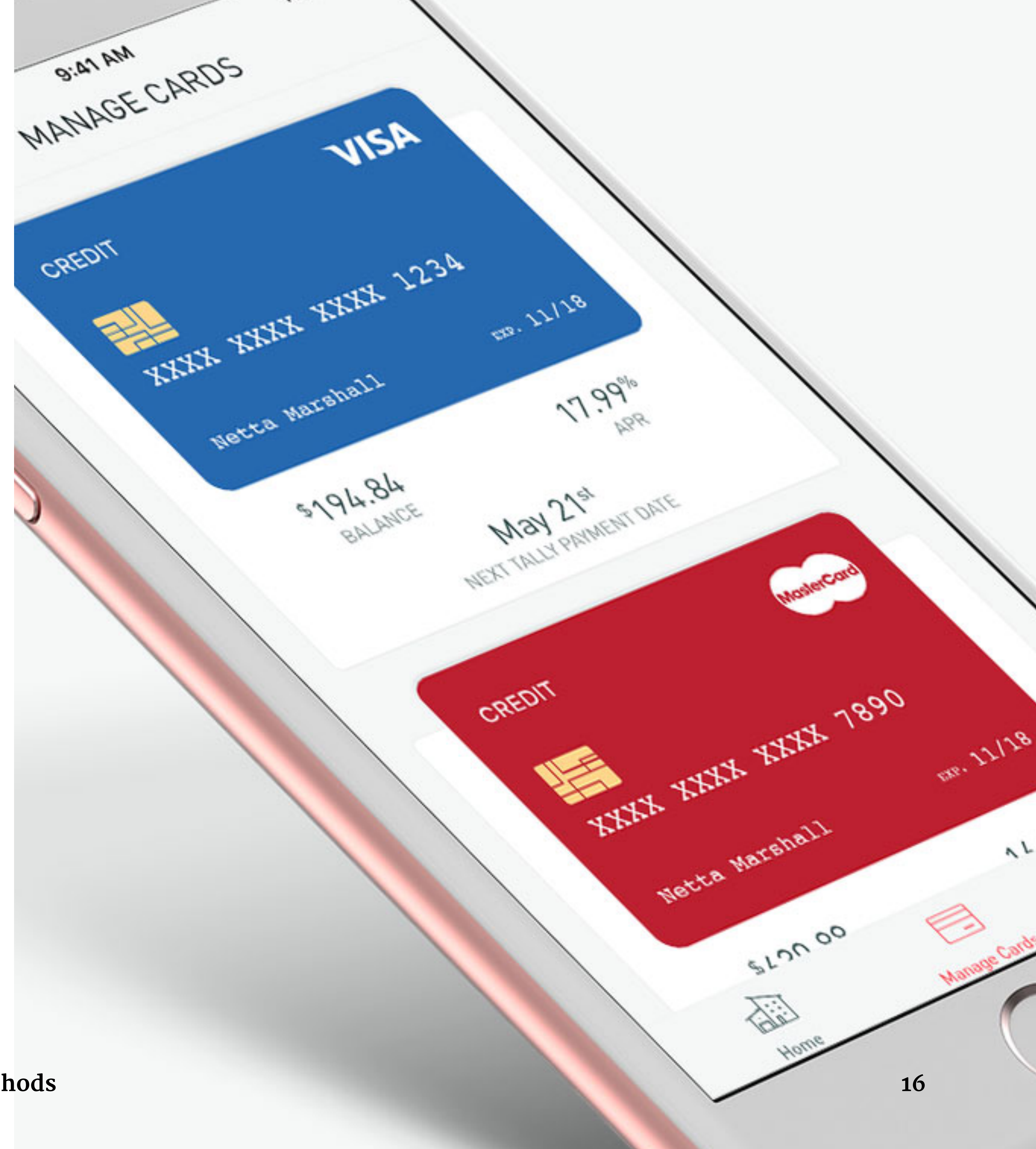


[3] NN/g: Visibility of system status

[4] Image source

# 2: Match between system and the real world[5] [6]

*The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.*



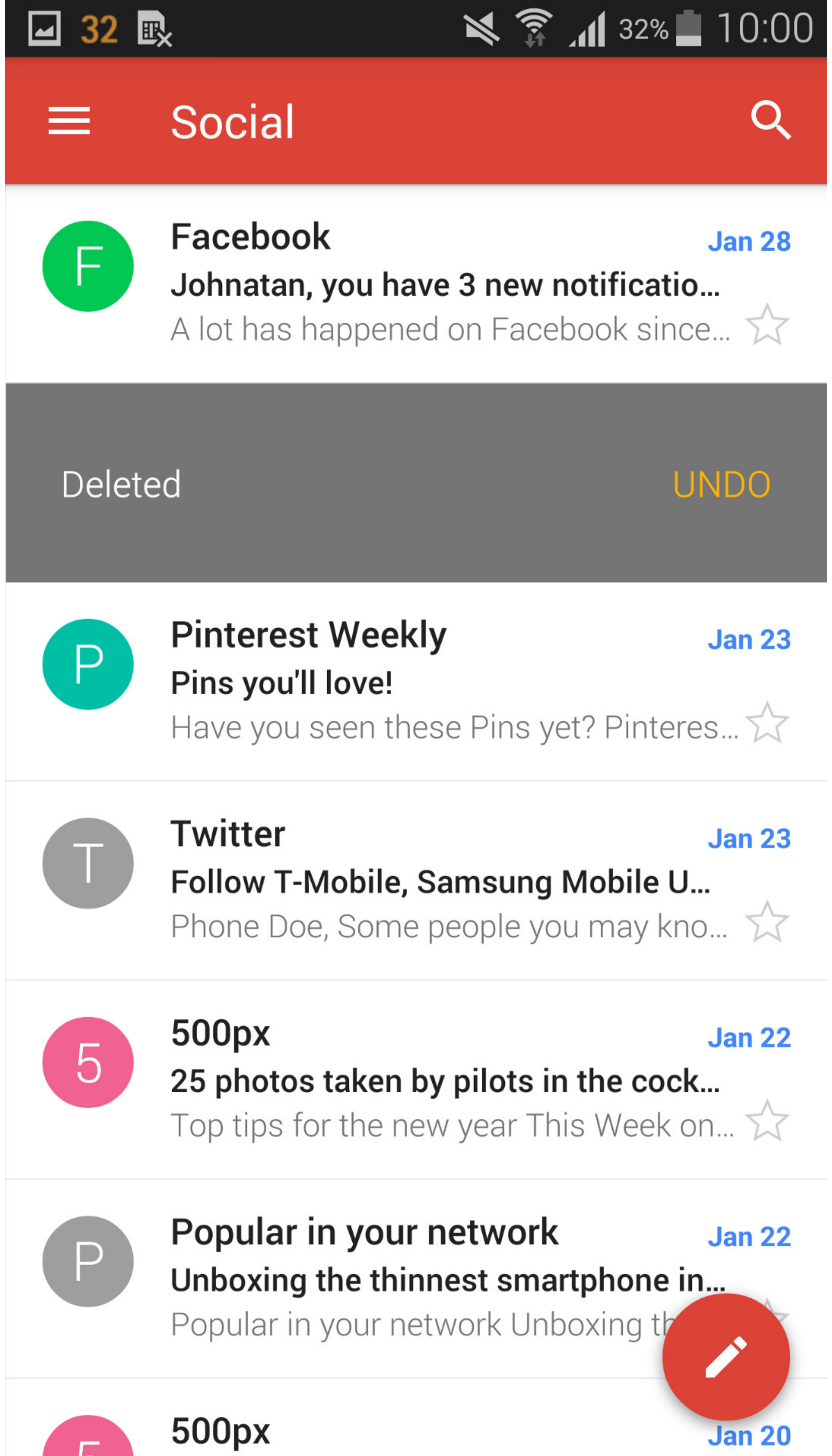
[5] NN/g: Match between system and the real world

[6] Image source

# 3: User control and freedom[7] [8]

*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.*

E.g., undo for delete/archive in email clients



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Johnatan, you have 3 new notificatio...
A lot has happened on Facebook since...

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500px Jan 20

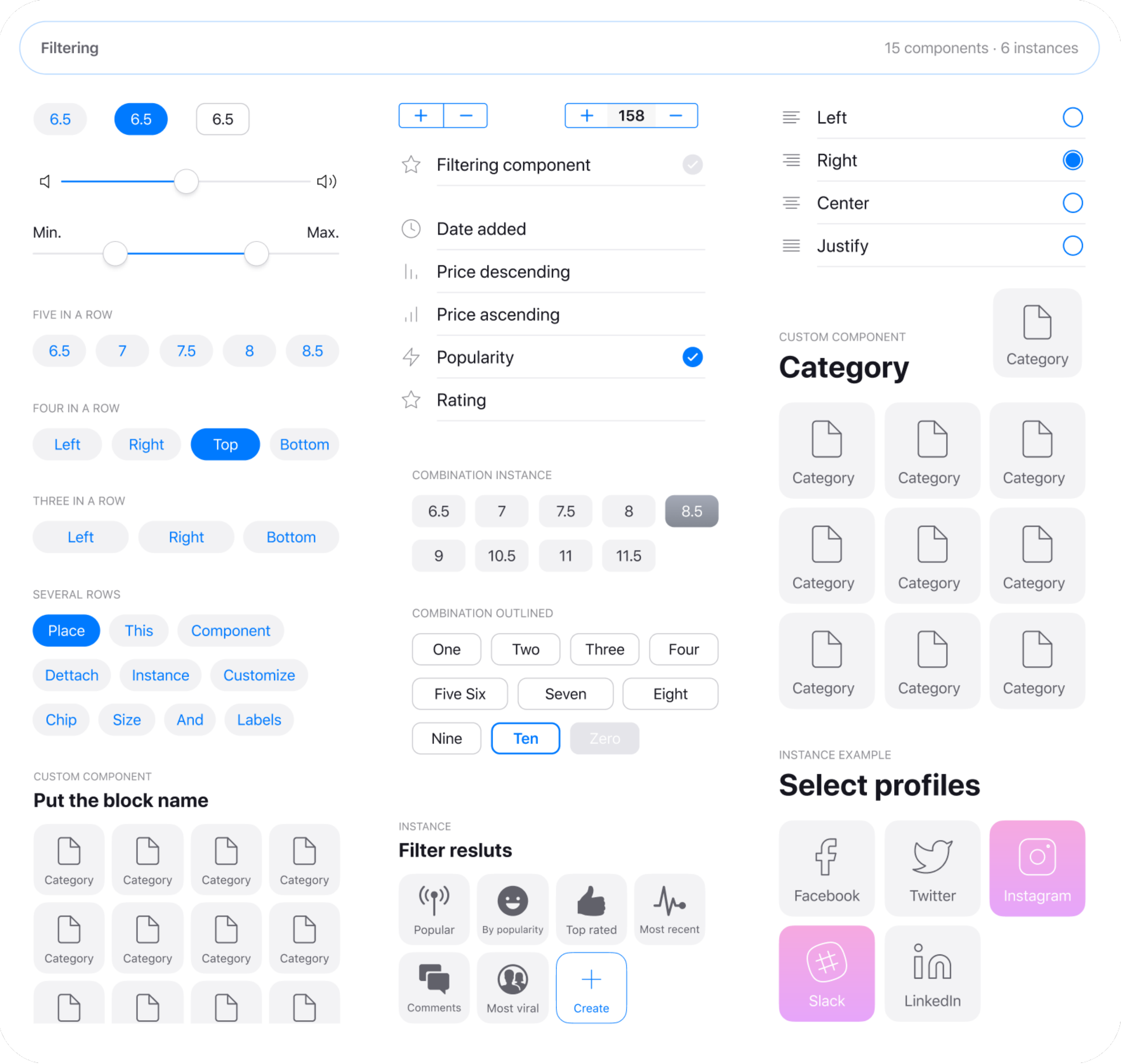
[7] NN/g: User control and freedom

[8] image source

# 4: Consistency and standards[9] [10]

*Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.*

E.g., component libraries to achieve consistency within an app; platform conventions to achieve consistency across apps.

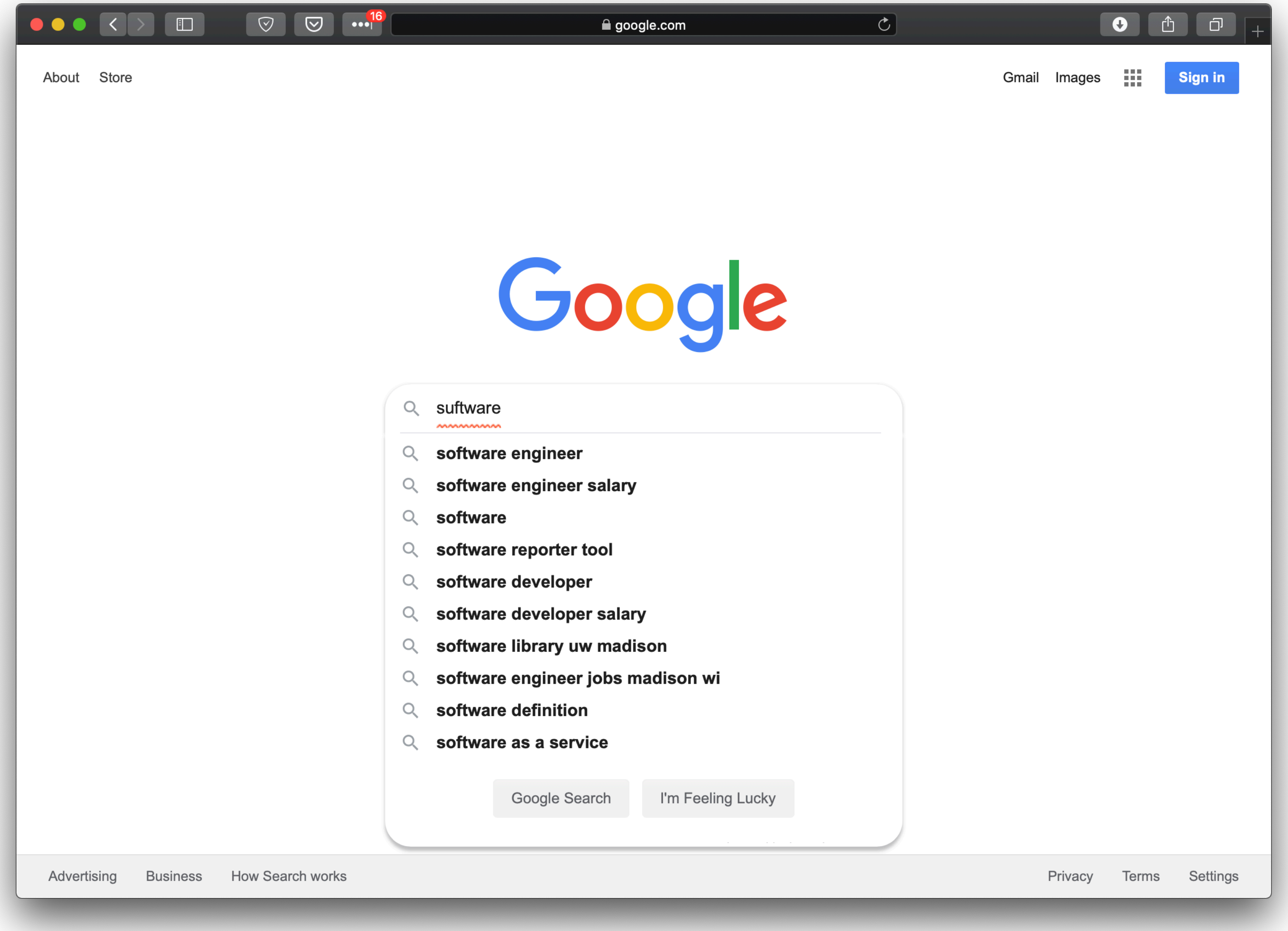


[9] NN/g: Consistency and standards

[10] Image source

# 5: Error prevention[11]

*Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.*



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- software engineer jobs madison wi
- software definition
- software as a service

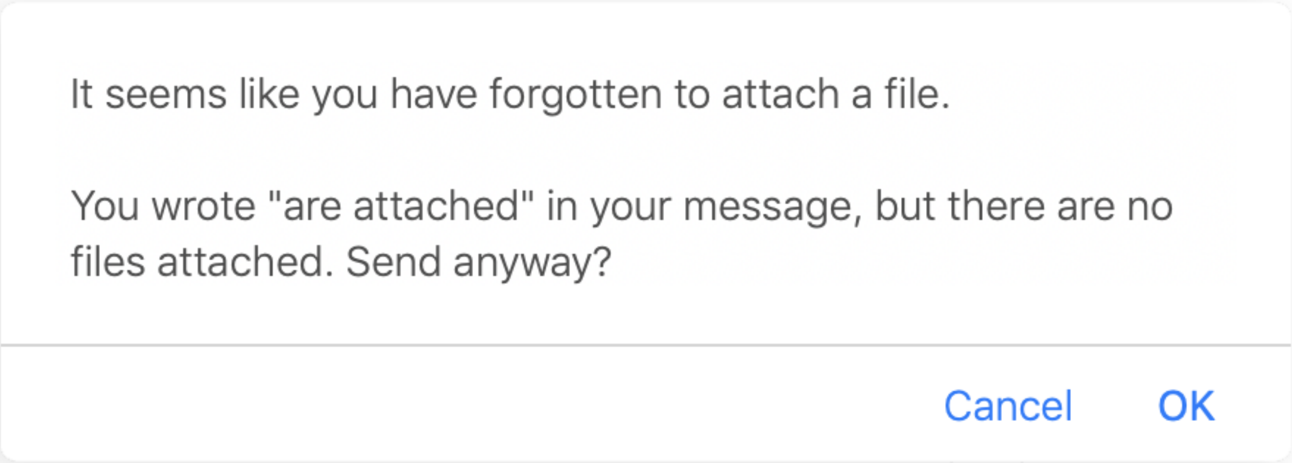
Google Search
I'm Feeling Lucky

Advertising
Business
How Search works
Privacy
Terms
Settings

[11] NN/g: Error prevention

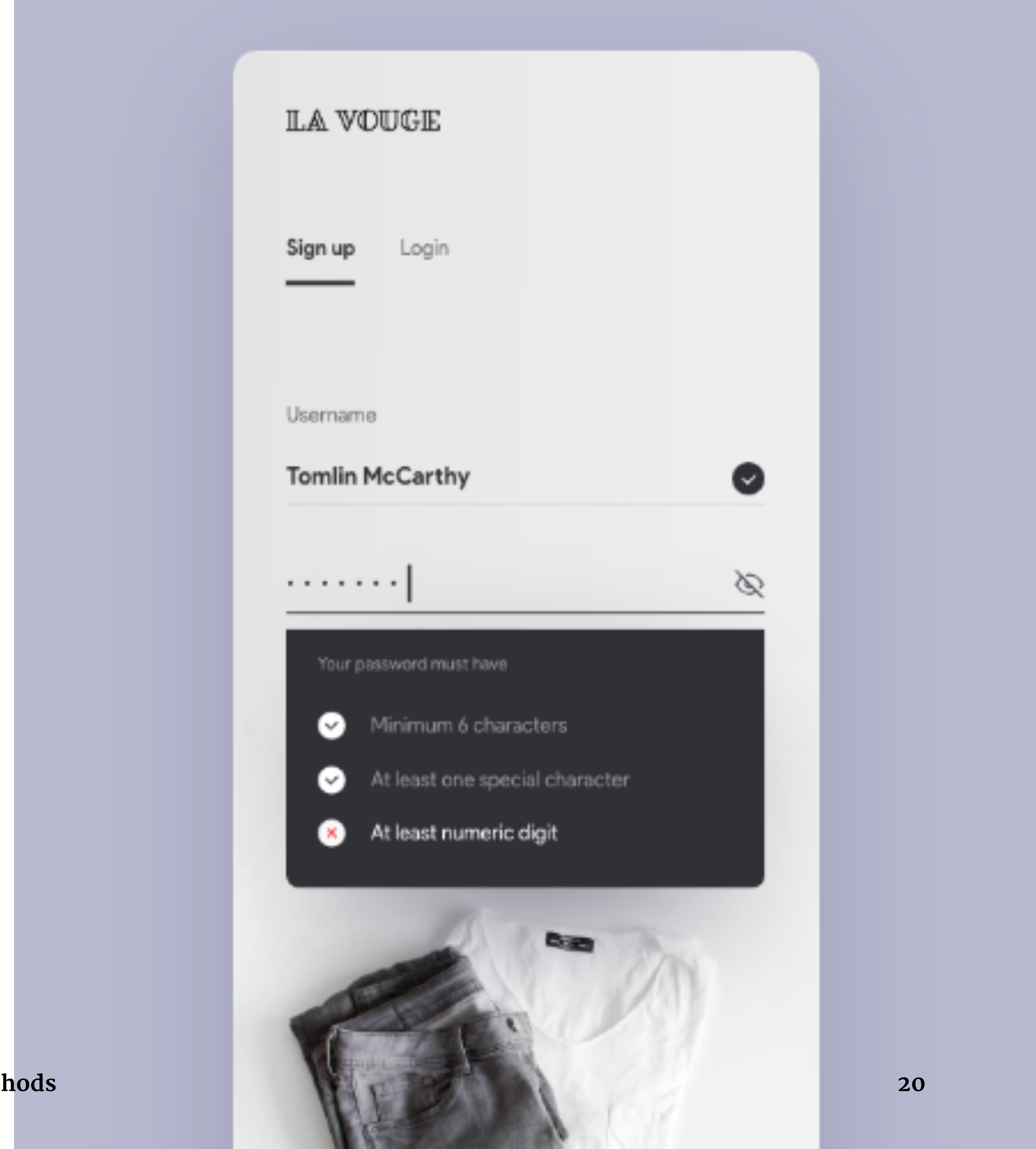
Examples:[12]

- Autocorrect in search
- Real-time feedback on new user names, password strength, etc.
- Attachment reminders in email clients



It seems like you have forgotten to attach a file.

You wrote "are attached" in your message, but there are no files attached. Send anyway?



Username

Tomlin McCarthy ✓

••••••••|

Your password must have

✓ Minimum 6 characters

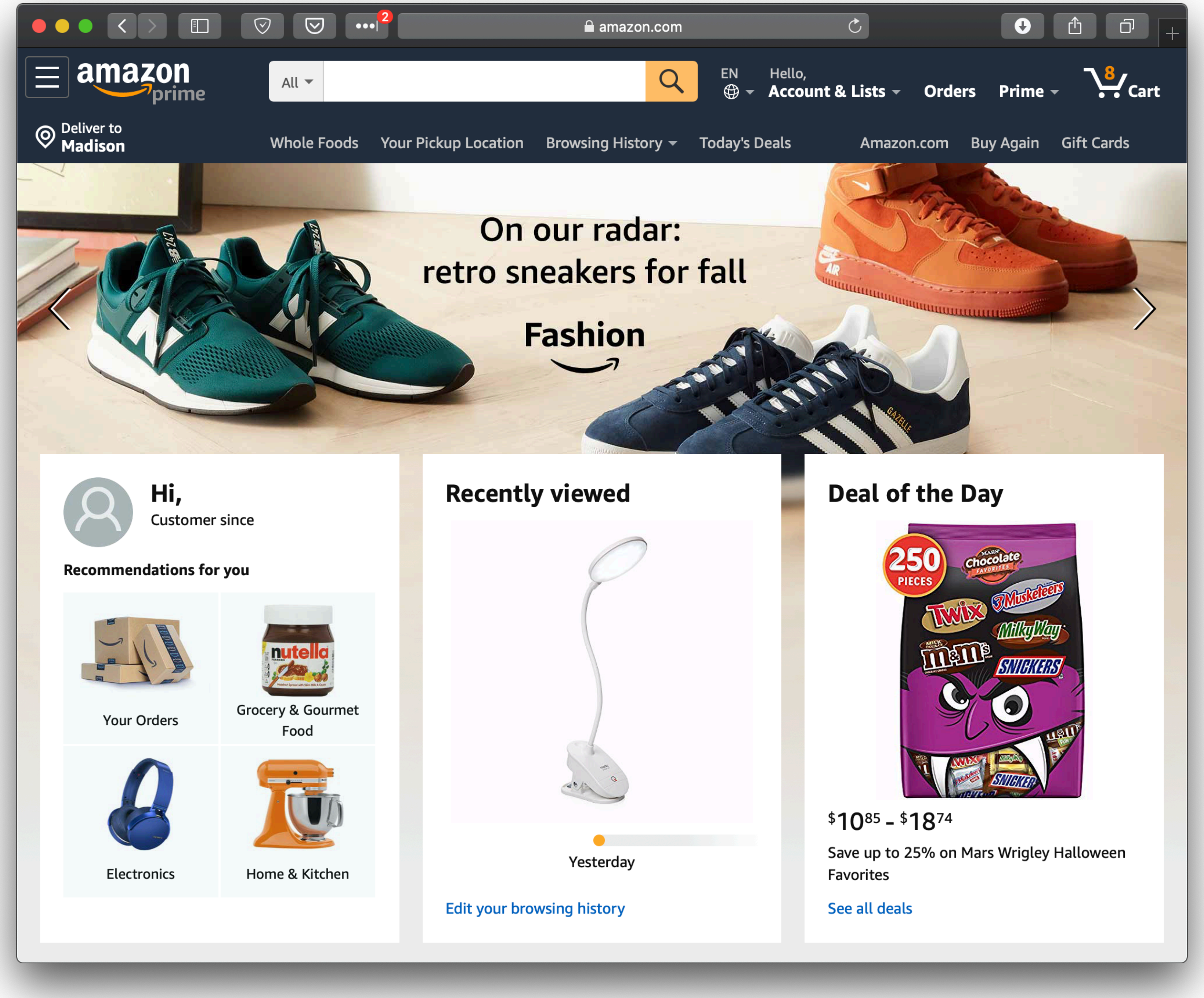
✓ At least one special character

✗ At least numeric digit

[12] Image source: Left, Right

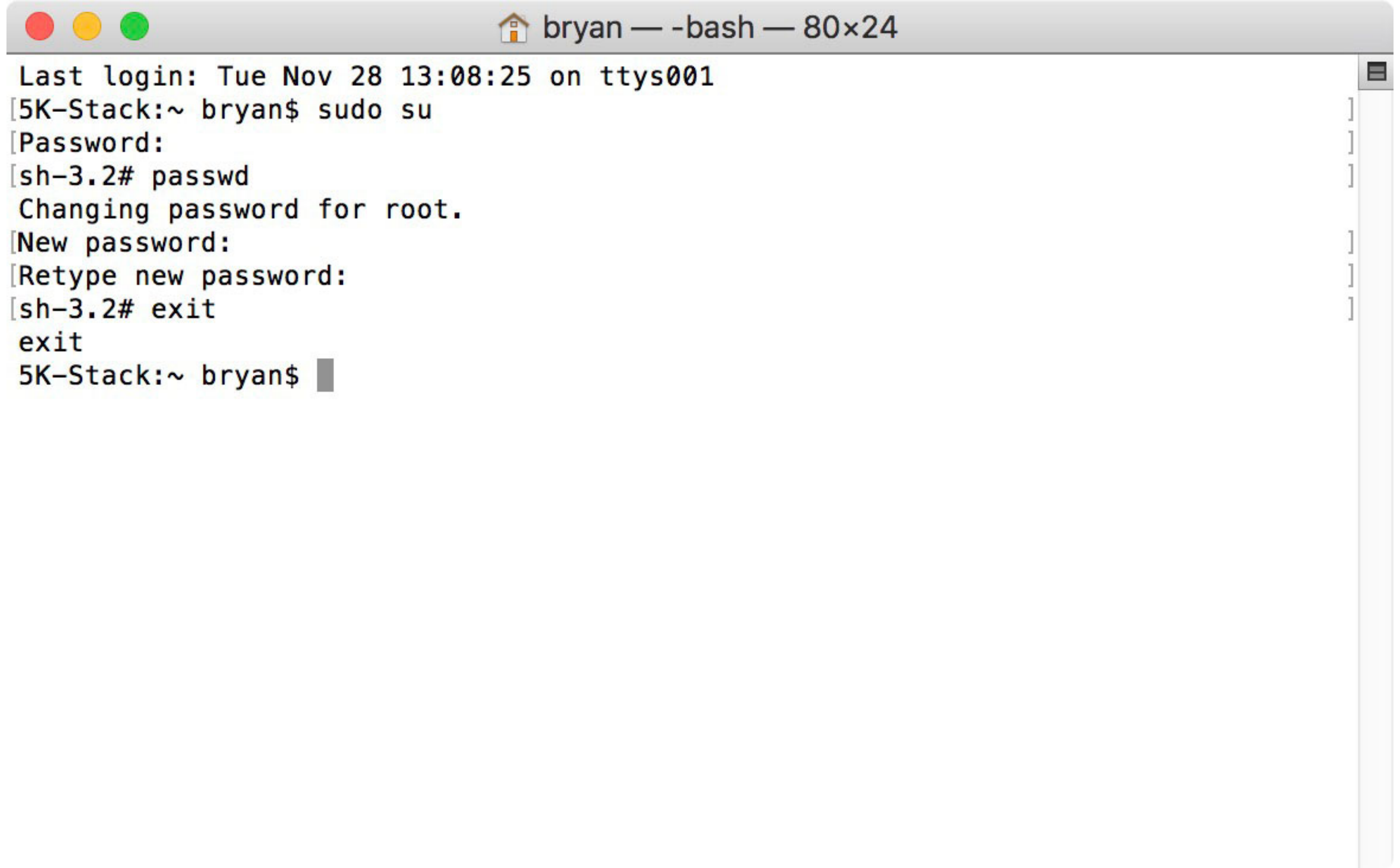
# 6: Recognition rather than recall[13]

*Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.*

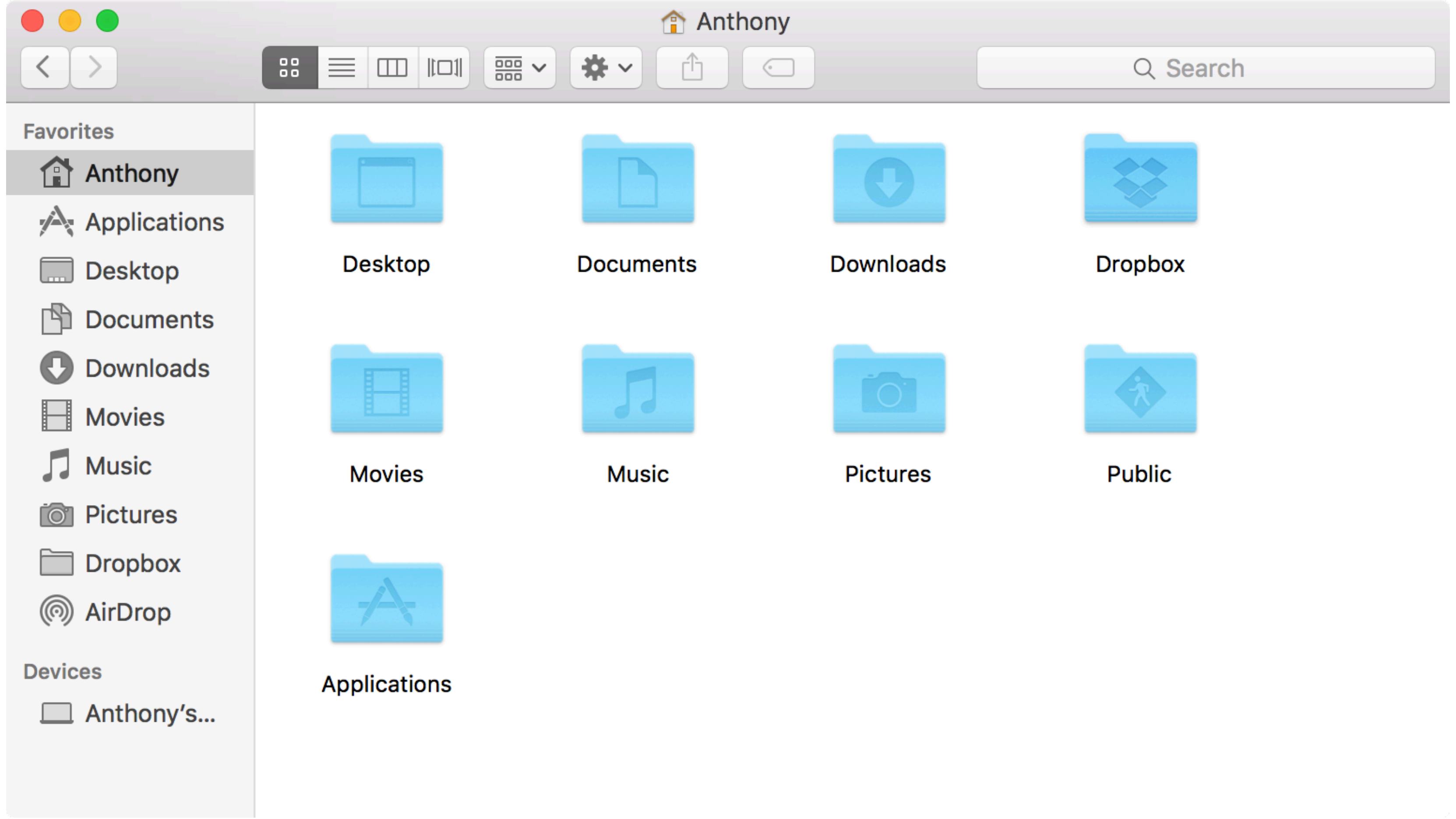


[13] NN/g: Recognition rather than recall

[14]



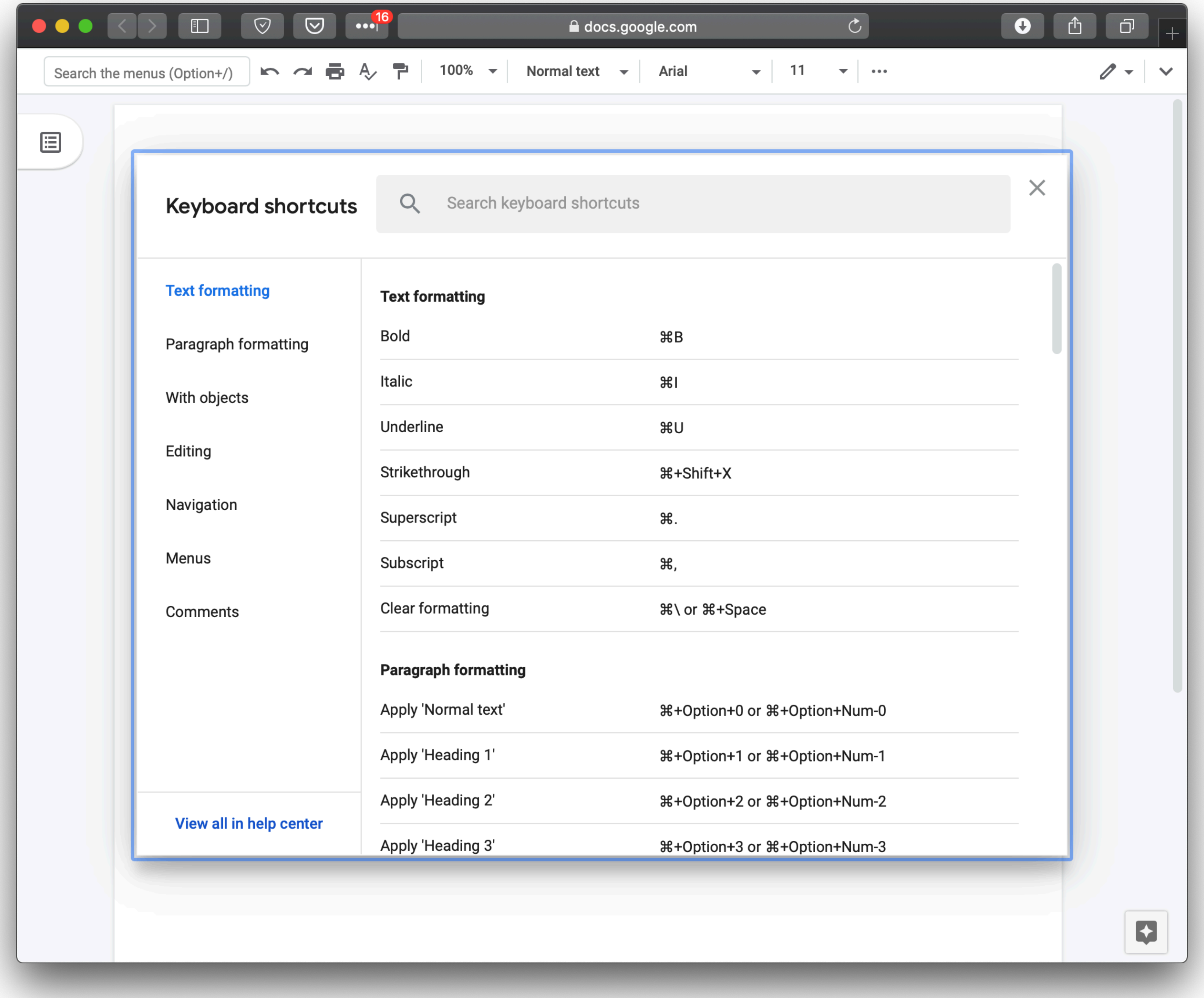
```
Last login: Tue Nov 28 13:08:25 on ttys001
[5K-Stack:~ bryan$ sudo su
[Password:
[sh-3.2# passwd
Changing password for root.
[New password:
[Retype new password:
[sh-3.2# exit
exit
5K-Stack:~ bryan$ 
```



[14] Image source: Left, Right

# 7: Flexibility and efficiency of use[15]

*Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.*



Keyboard shortcuts

**Text formatting**

| | |
|---|---|
| Bold | ⌘B |
| Italic | ⌘I |
| Underline | ⌘U |
| Strikethrough | ⌘+Shift+X |
| Superscript | ⌘. |
| Subscript | ⌘, |
| Clear formatting | ⌘\ or ⌘+Space |

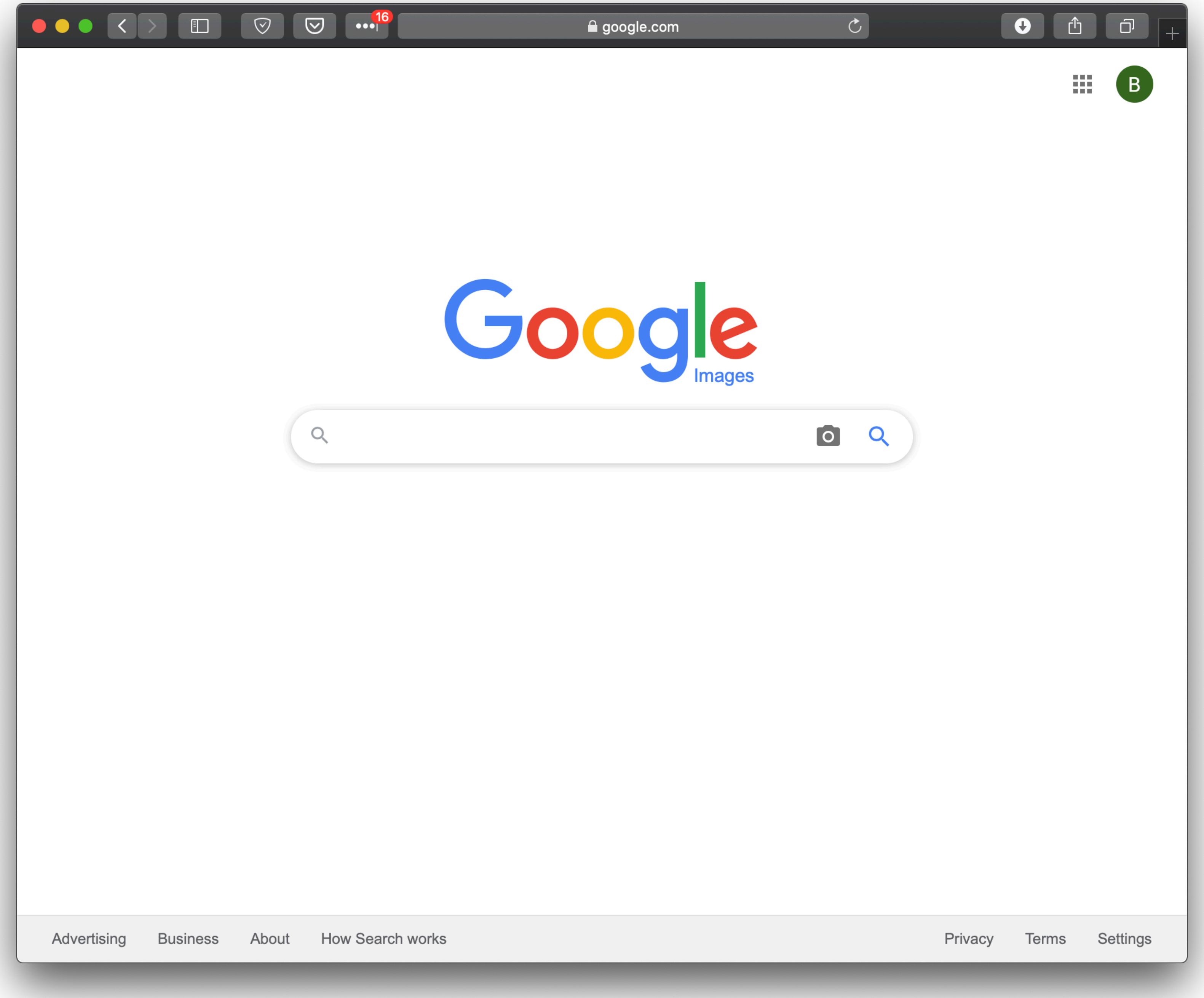
**Paragraph formatting**

| | |
|---|---|
| Apply 'Normal text' | ⌘+Option+0 or ⌘+Option+Num-0 |
| Apply 'Heading 1' | ⌘+Option+1 or ⌘+Option+Num-1 |
| Apply 'Heading 2' | ⌘+Option+2 or ⌘+Option+Num-2 |
| Apply 'Heading 3' | ⌘+Option+3 or ⌘+Option+Num-3 |

[15] NN/g: Flexibility and efficiency of use

# 8: Aesthetic and minimalist design[16]

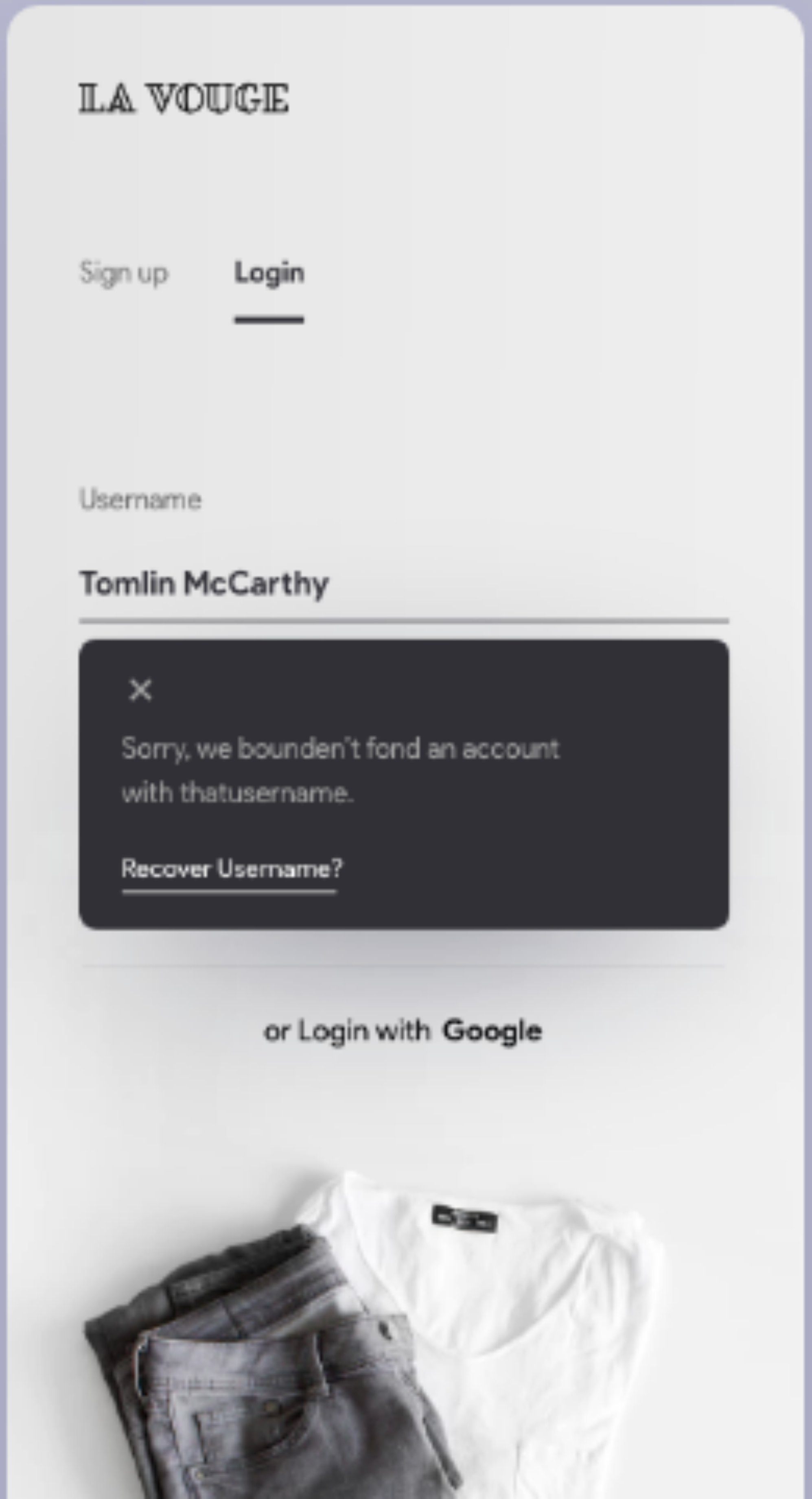
*Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.*



[16] NN/g: Aesthetic and minimalist design

# 9: Help users recognize, diagnose, and recover from errors[17] [18]

*Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.*



Username

Tomlin McCarthy

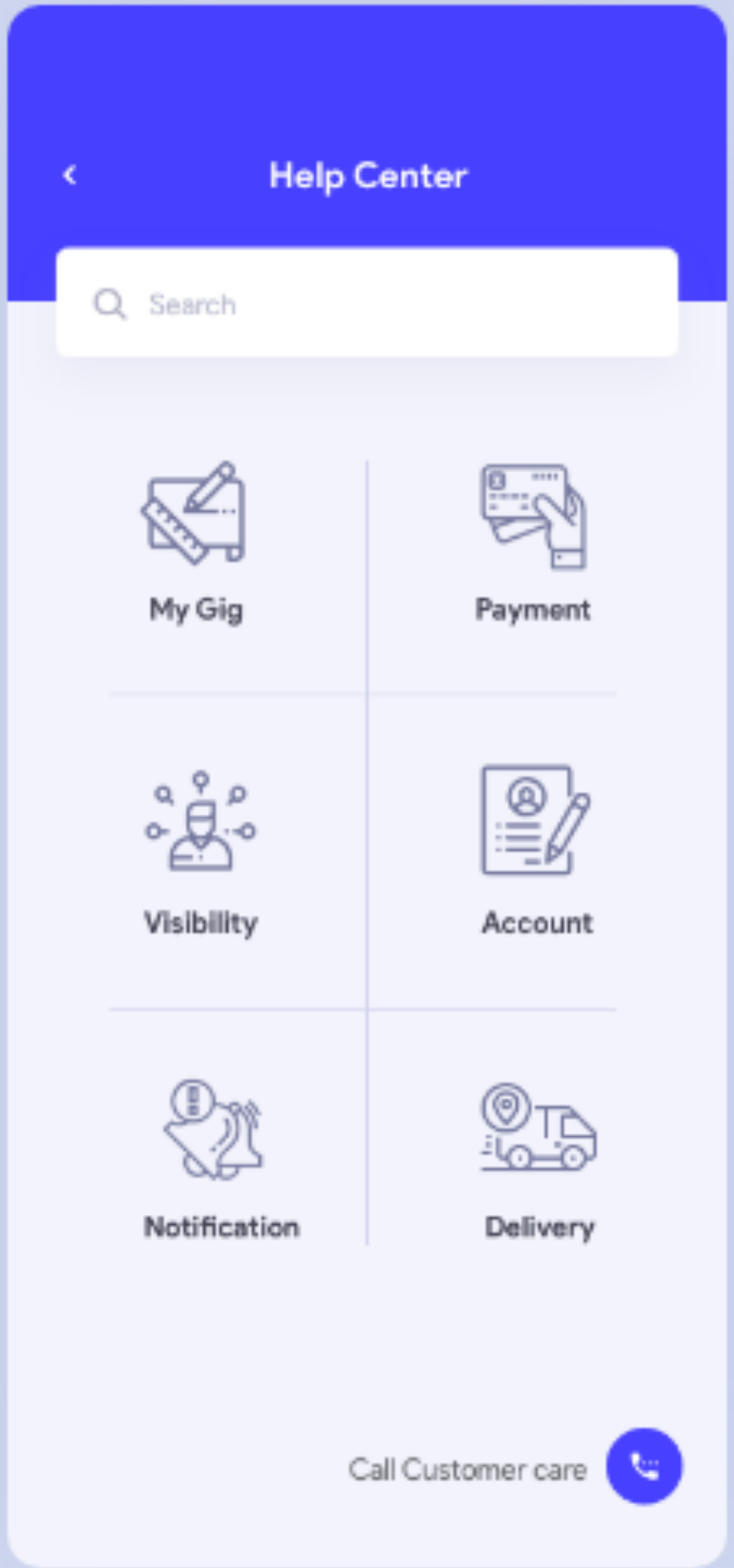
Sorry, we bounden't fond an account with thatusername.

[17] NN/g: Help users recognize, diagnose, and recover from errors

[18] Image source

# 10: Help and documentation[19] [20]

*Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.*

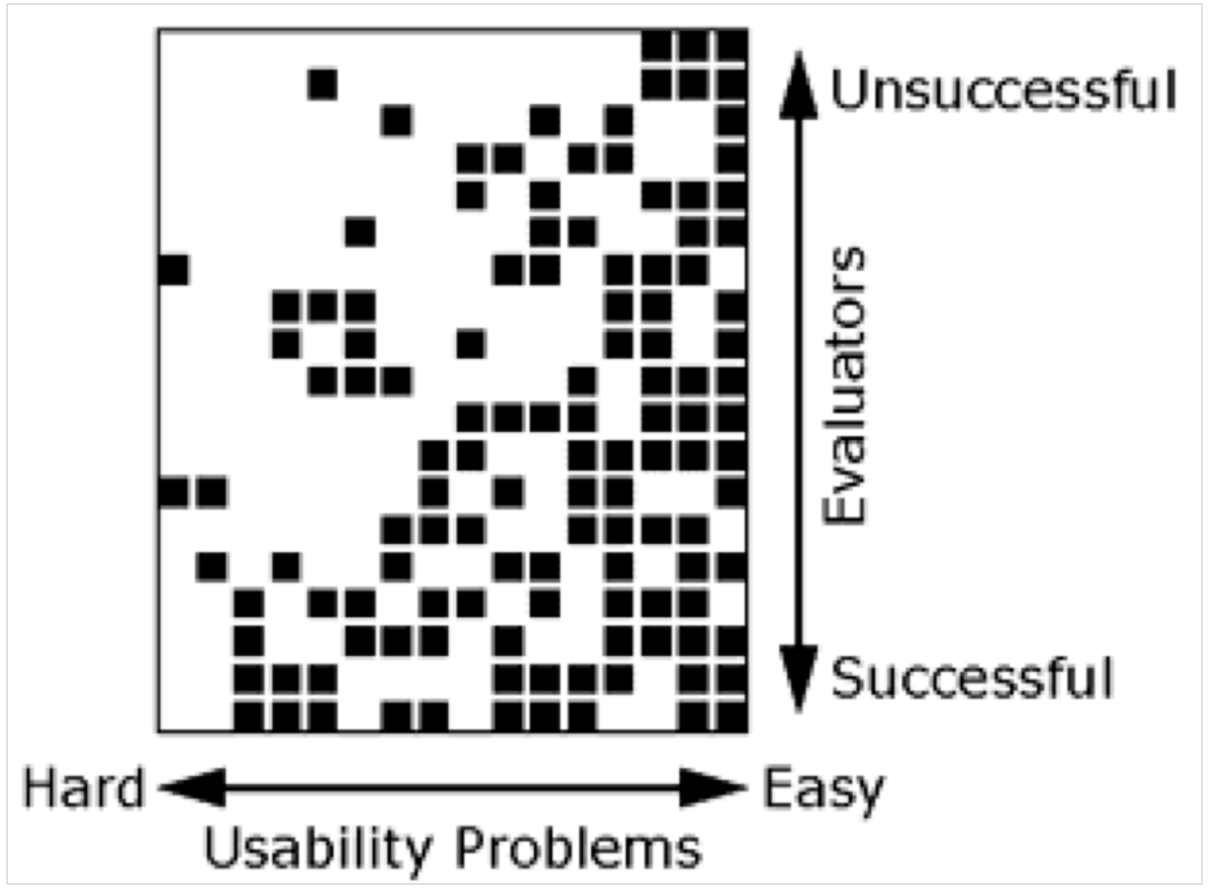


[19] NN/g: Help and documentation

[20] Image source

# Process[21]

1. Identify 3–5 usability experts with domain knowledge; determine the heuristics to use;
2. Each inspector individually reviews as feature/screen/page for each heuristic;
3. Inspectors merge and prioritize their findings, brainstorm solutions, report conclusions.



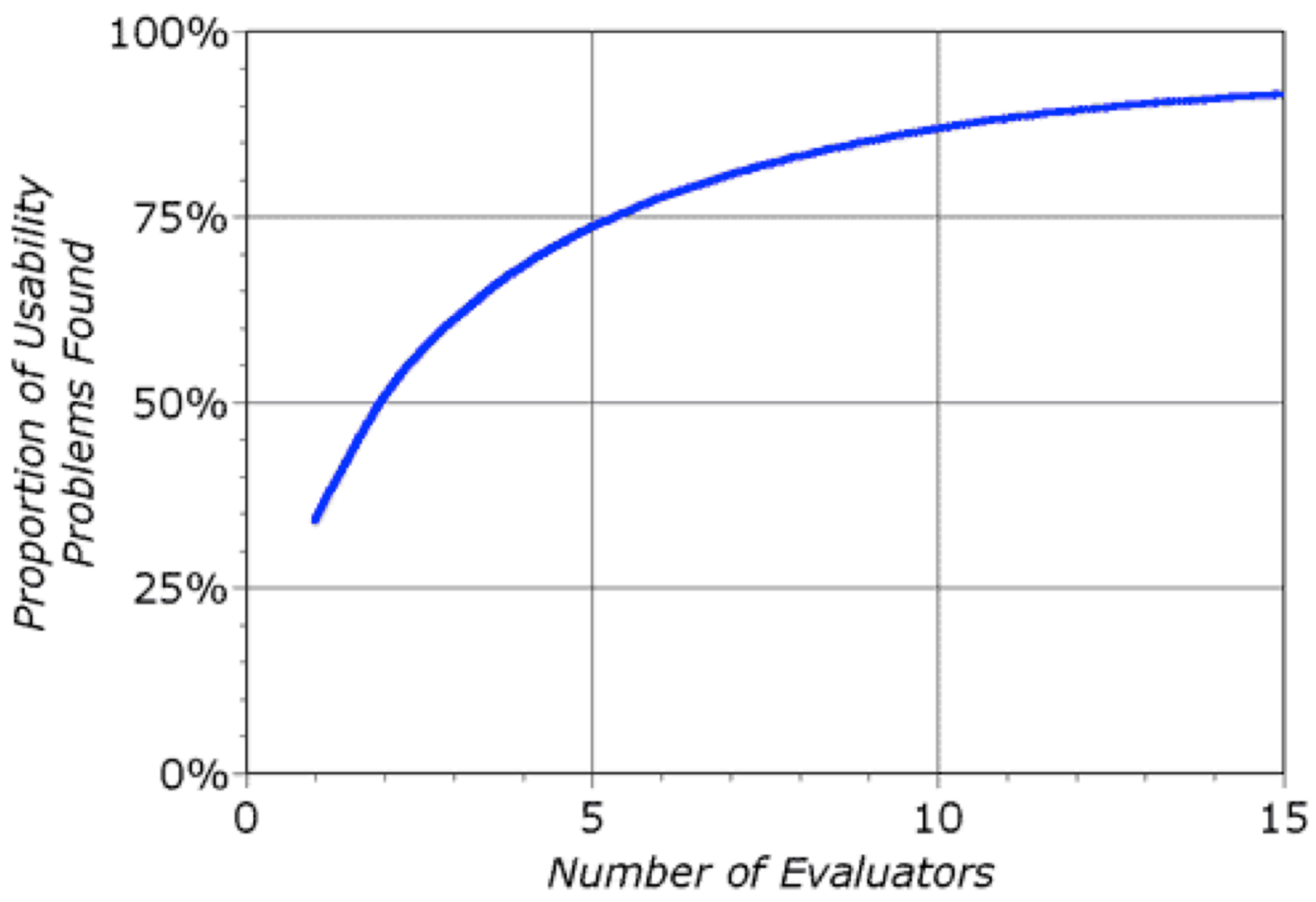
[21] NN/g: How to Conduct a Heuristic Evaluation

# How many evaluators are needed?

The rule of thumb is 3–5.[22]

$$ProblemsFound(i) = N(1 - (1 - l)^i)$$

- $i$ independent evaluators
- $N$ total number of usability problems in the interface
- $l$ the proportion of all usability problems found by a single evaluator



[22] Image source

# Heuristic Evaluation Reporting[23]

**Definition:** A document that highlights the top three to five usability problems and suggested solutions.

[23] A good heuristics evaluation report example

Heuristic evaluation reports usually include:

1. Prototype screen, page, location of the problem
2. Name of heuristic
3. Reason for reporting as negative or positive
4. Scope of problem
5. Severity of problem (high/medium/low)
6. Justification of severity rating
7. Suggestions to fix
8. Possible trade-offs (why the fix might not work)

# Severity Ratings

| Code | Category | Recommendation |
|---|---|---|
| **4** | Usability catastrophe | *Imperative to fix before product can be released* |
| **3** | Major usability problem | *Important to fix, so should be given high priority* |
| **2** | Minor usability problem | *Fixing this should be given low priority* |
| **1** | Cosmetic problem only | *Need not be fixed unless extra time is available on project* |
| **0** | ~ | *Team does not agree that issue impacts system usability* |

# Pros & Cons of Heuristic Evaluation

**Pros:**

- Inexpensive and intuitive
- Can be used frequently and any time during the design process
- Effective at early stages of design
- Serves as a training tool for designers

## Cons:

- Does not capture all aspects of usability
- Does not provide a comprehensive understanding of the interaction
- Might discourage user testing
- May result in false positives

# Further Reading on Heuristic Evaluation

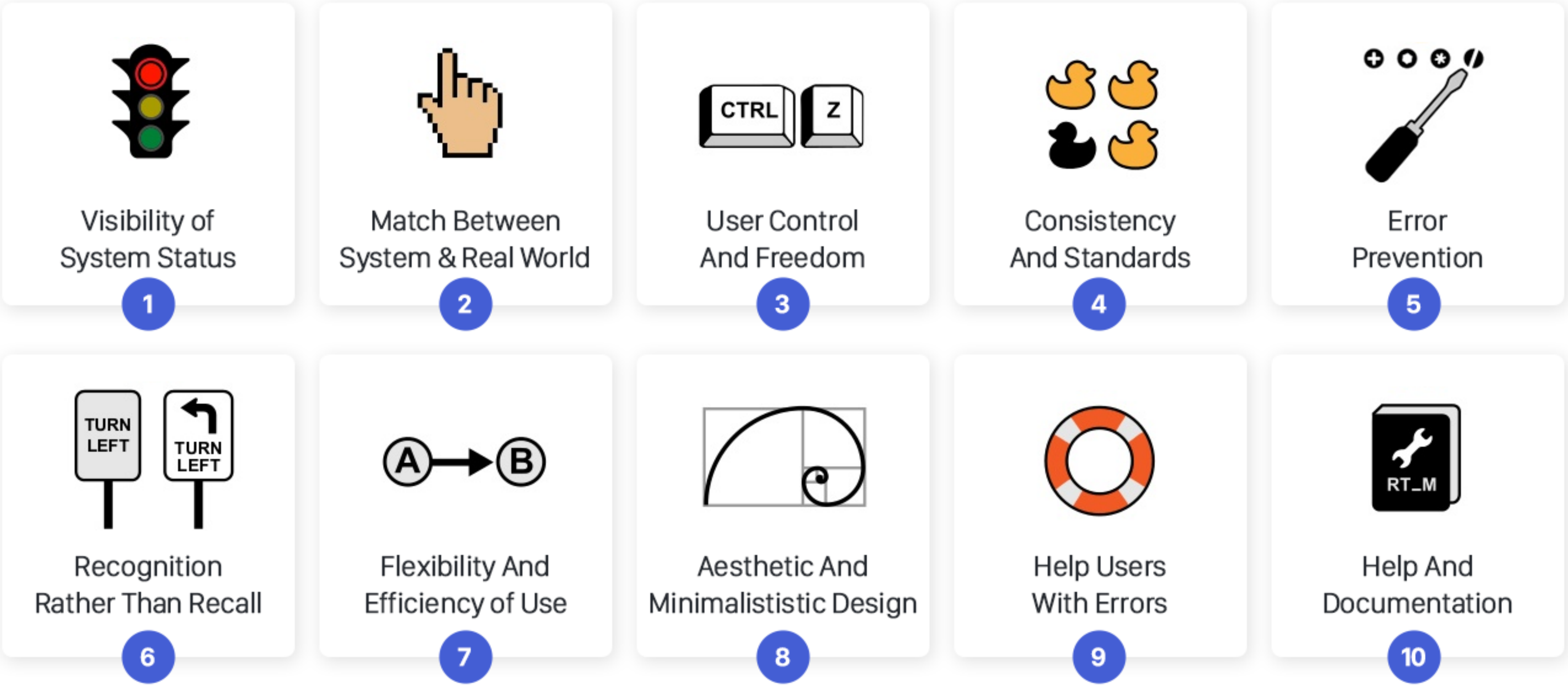
- UX Collective article with great examples
- Videos and articles by Jacob Nielsen

# TopHat Quiz

TOP HAT

# In-Class Activity

[24]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Visibility of System Status
1
Match Between System & Real World
2
User Control And Freedom
3
Consistency And Standards
4
Error Prevention
5
Recognition Rather Than Recall
6
Flexibility And Efficiency of Use
7
Aesthetic And Minimalistic Design
8
Help Users With Errors
9
Help And Documentation
10

[24] UX Collective

# Cognitive Walkthrough

# Cognitive Walkthrough

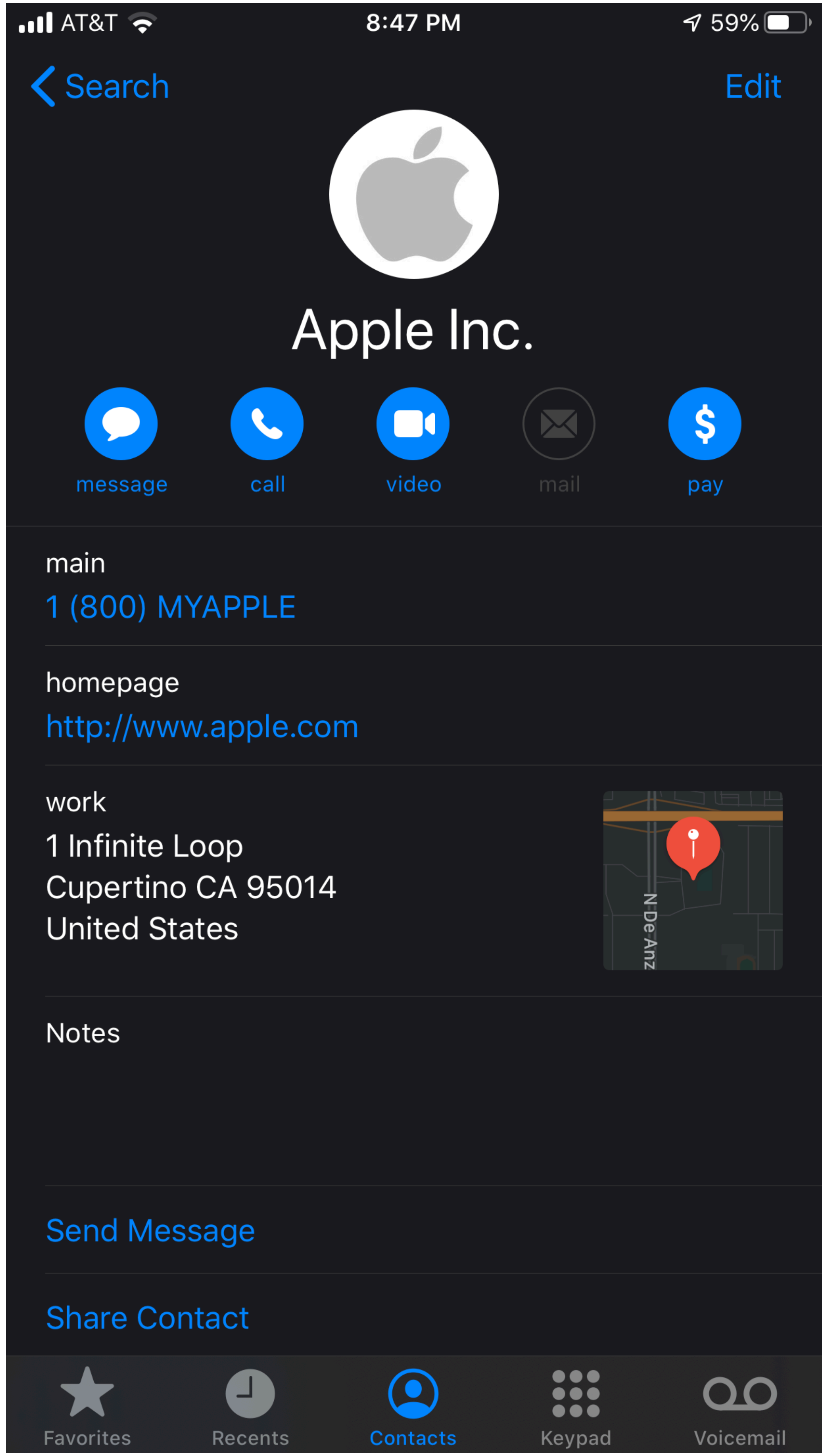
**Definition:** Expert review method where a usability specialist assesses the *learnability* and *discoverability* of a design by posing and answering a set of questions.

# What do we need to perform a cognitive walkthrough?

- A prototype
- A user profile
- Set of tasks
- Sequences of actions

# Question 1[25]

*Will the user try and achieve the right outcome?*



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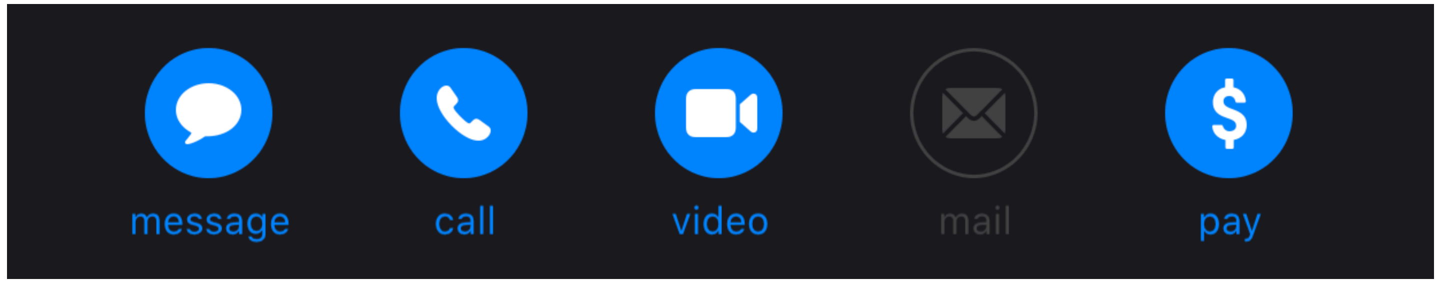
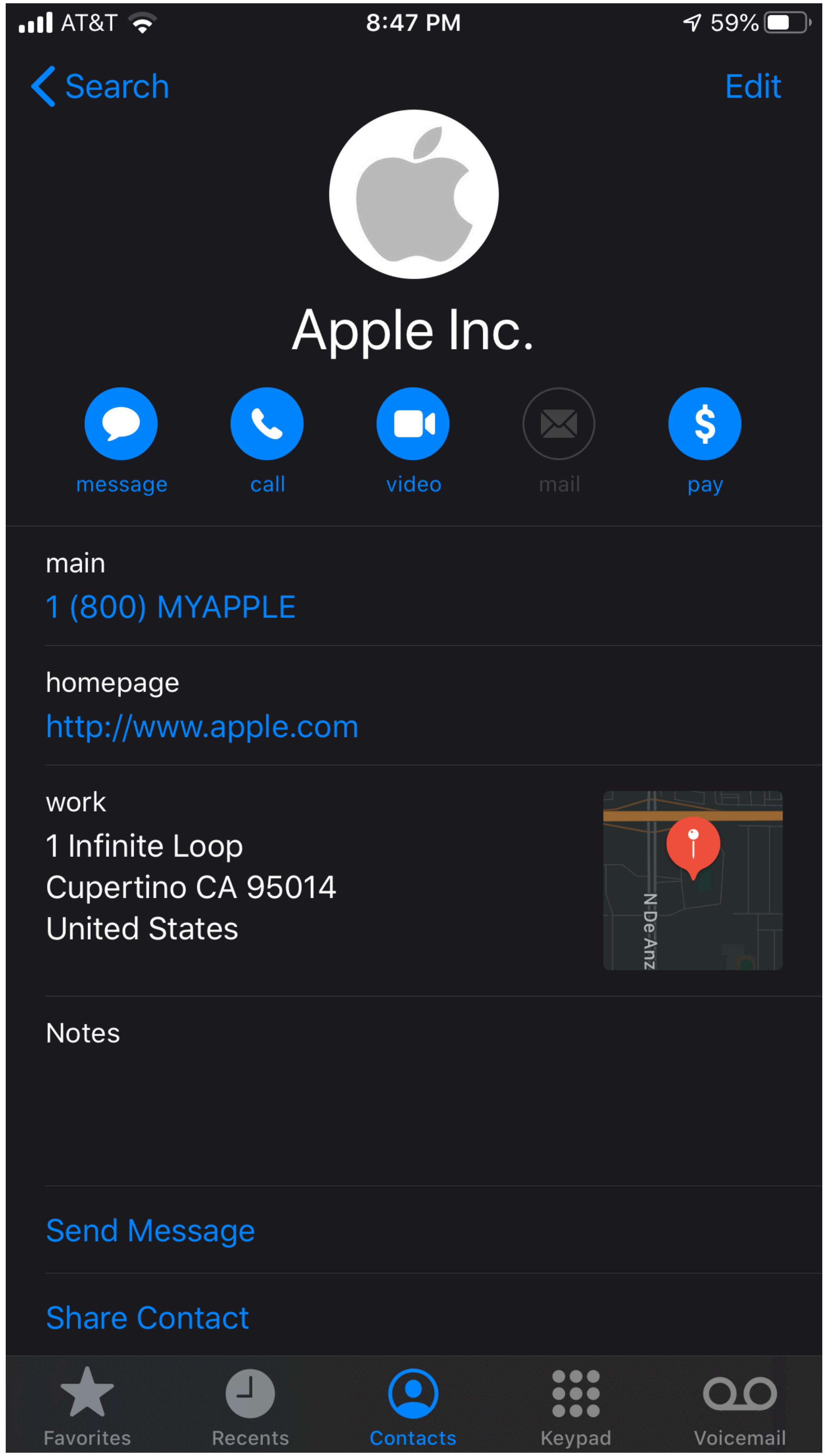
[25] Image source

# Question 2

*Will the user notice that the correct action is available to them?*

Does the design support the user's mental modal, knowledge, and prior experience to achieve the outcome?





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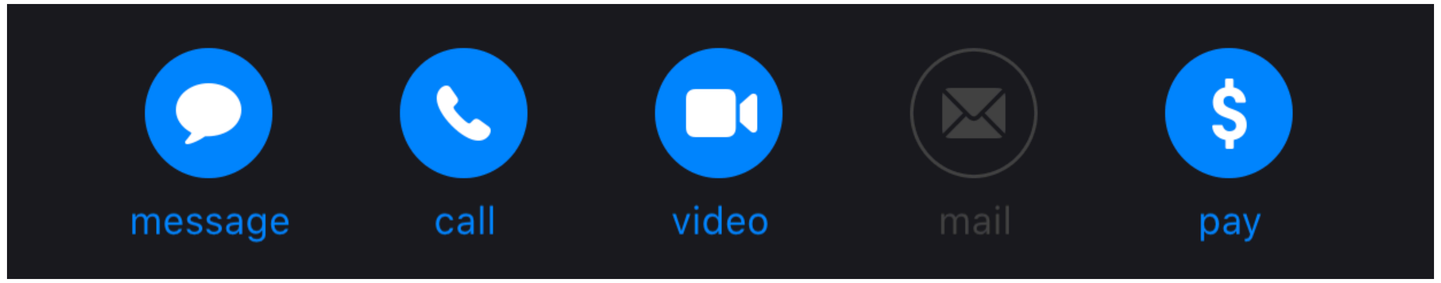
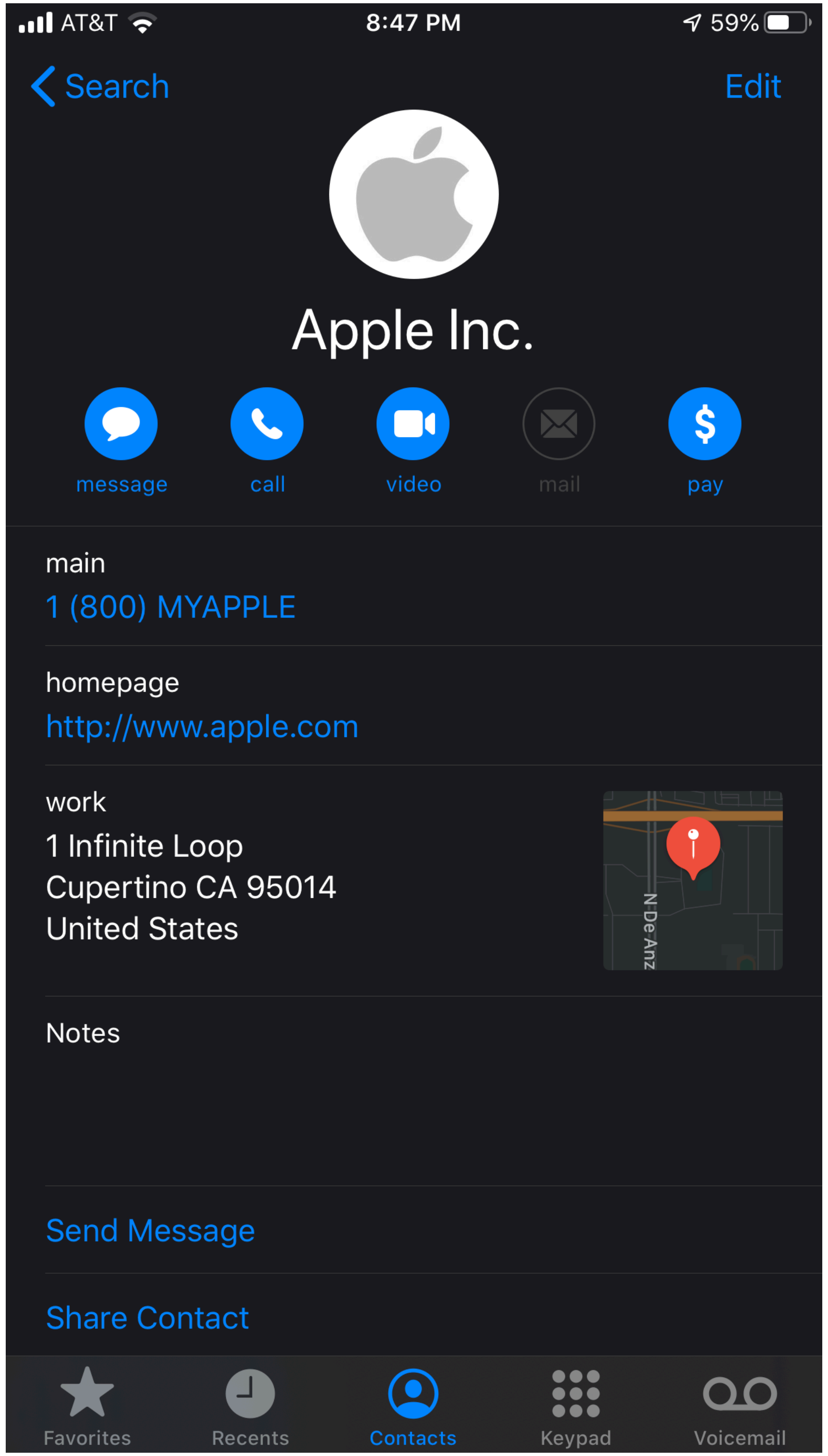
# Question 3

*Will the user associate the correct action with the outcome they expect to achieve?*

Does the visibility, availability, and accessibility of the design element support the action?





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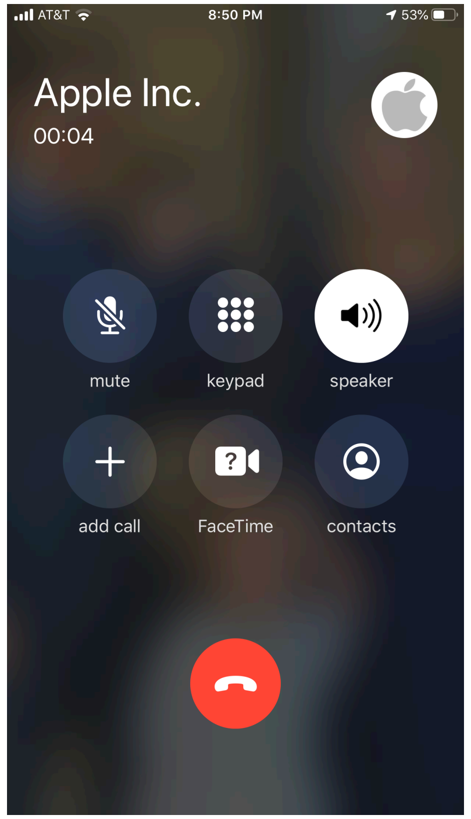
# Question 4

*If the correct action is performed; will the user see that progress is being made towards their intended outcome?*



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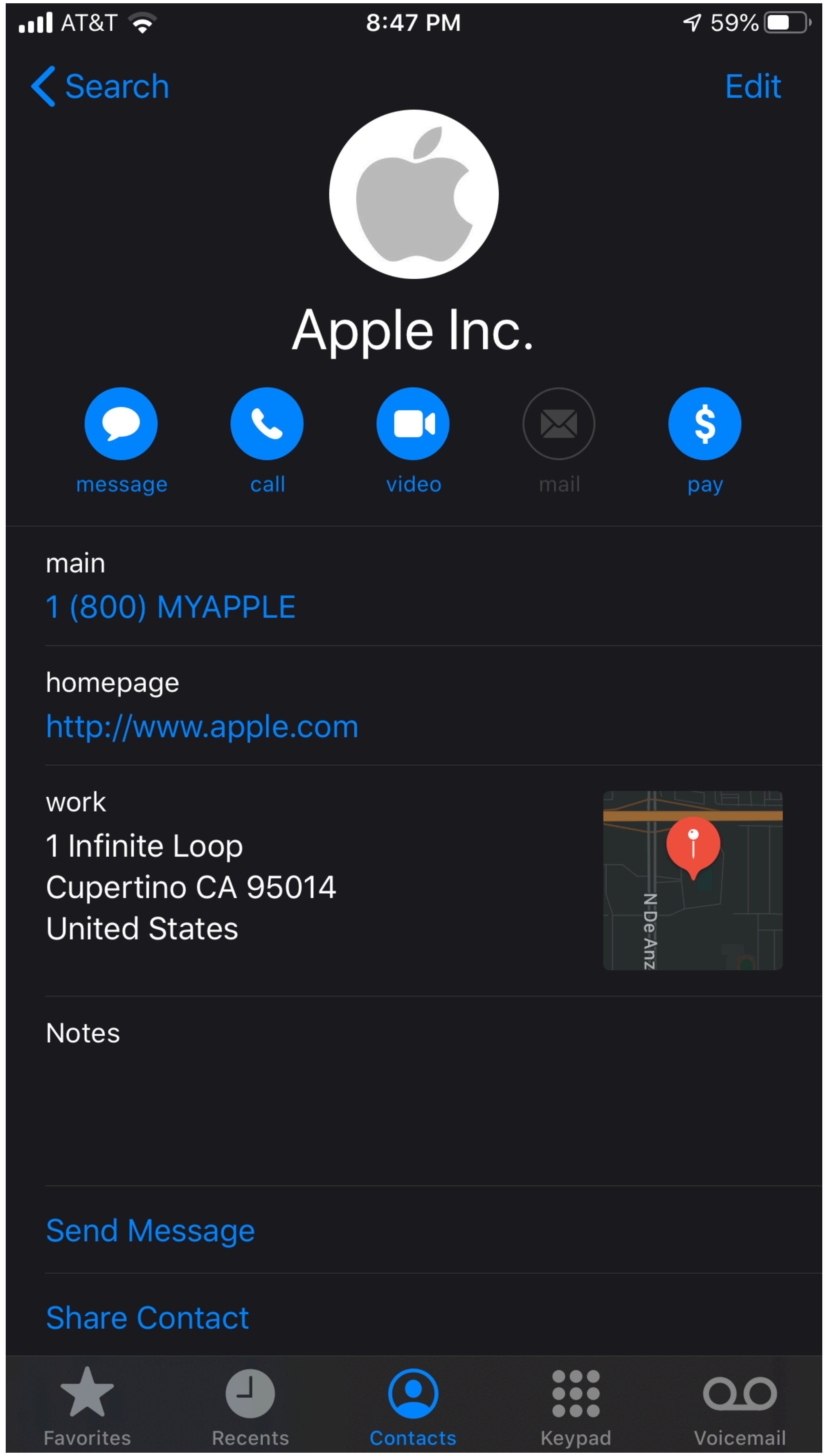

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# Pros & Cons of Cognitive Walkthrough

**Pros:**

- Powerful for:
  - Walk-up-and-use interfaces
  - New concepts/forms of interaction
  - Systems designed for various user profiles
- Can be performed frequently and at any stage of the design process

# Pros & Cons of Cognitive Walkthrough

**Const:**

- Focuses only on discoverability/learnability
- Best when used with usability testing

# Further Reading on Cognitive Walkthrough

- UX Collective: Assessing usability with Cognitive Walkthrough
- Usability body of knowledge
- Cognitive Walkthroughs
  - Cognitive walkthrough template

# In-Class Activity

# Assignment Preview

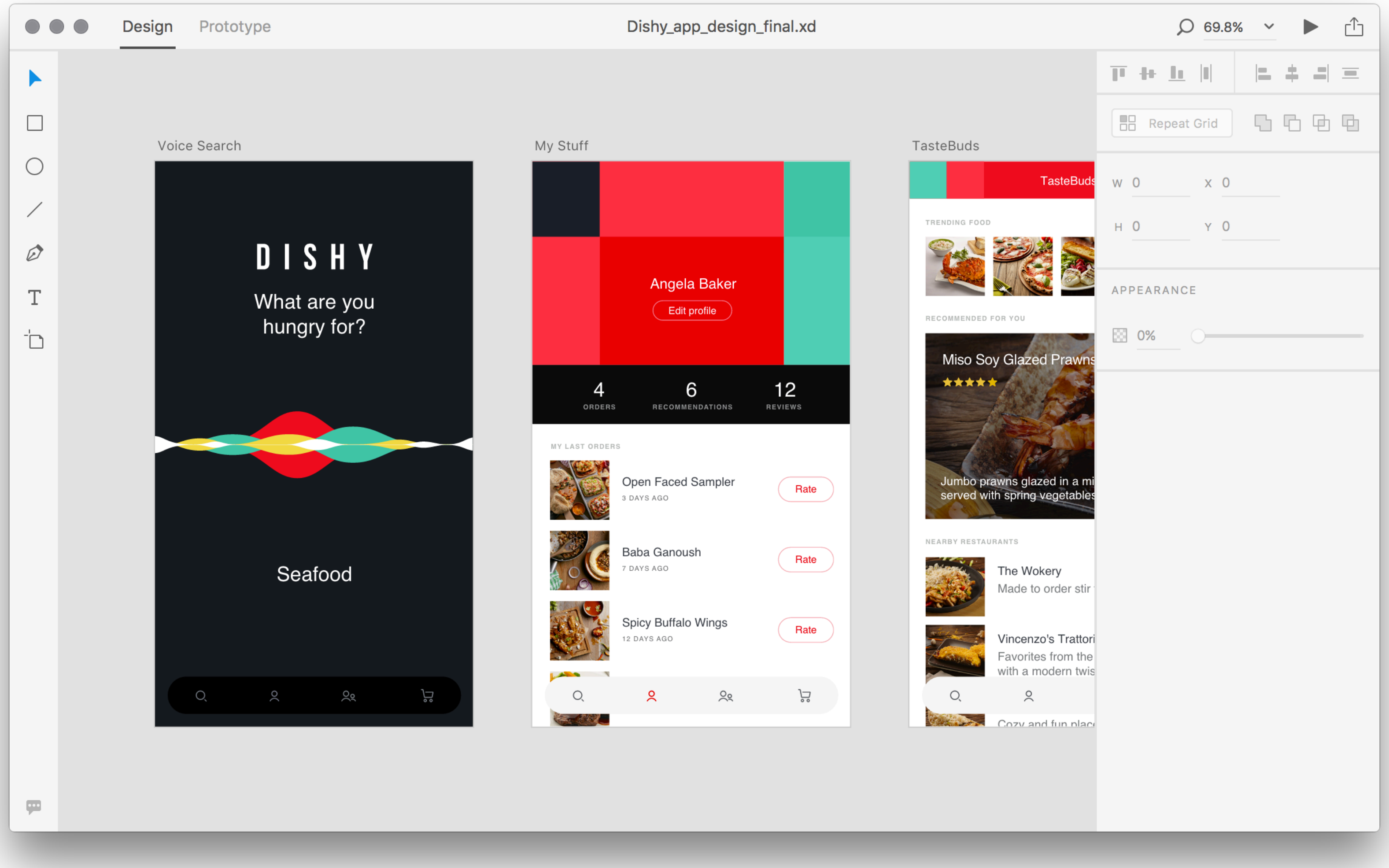
# Design 06: Usability Heuristics (2 points)

You will practice heuristic evaluation to improve your design for the Module 1 deliverable.

- **Step 1.** Prototype your design
- **Step 2.** Review the heuristics
- **Step 3.** Identify potential violations
- **Step 4.** Develop design recommendations
- **Step 5.** Update your design

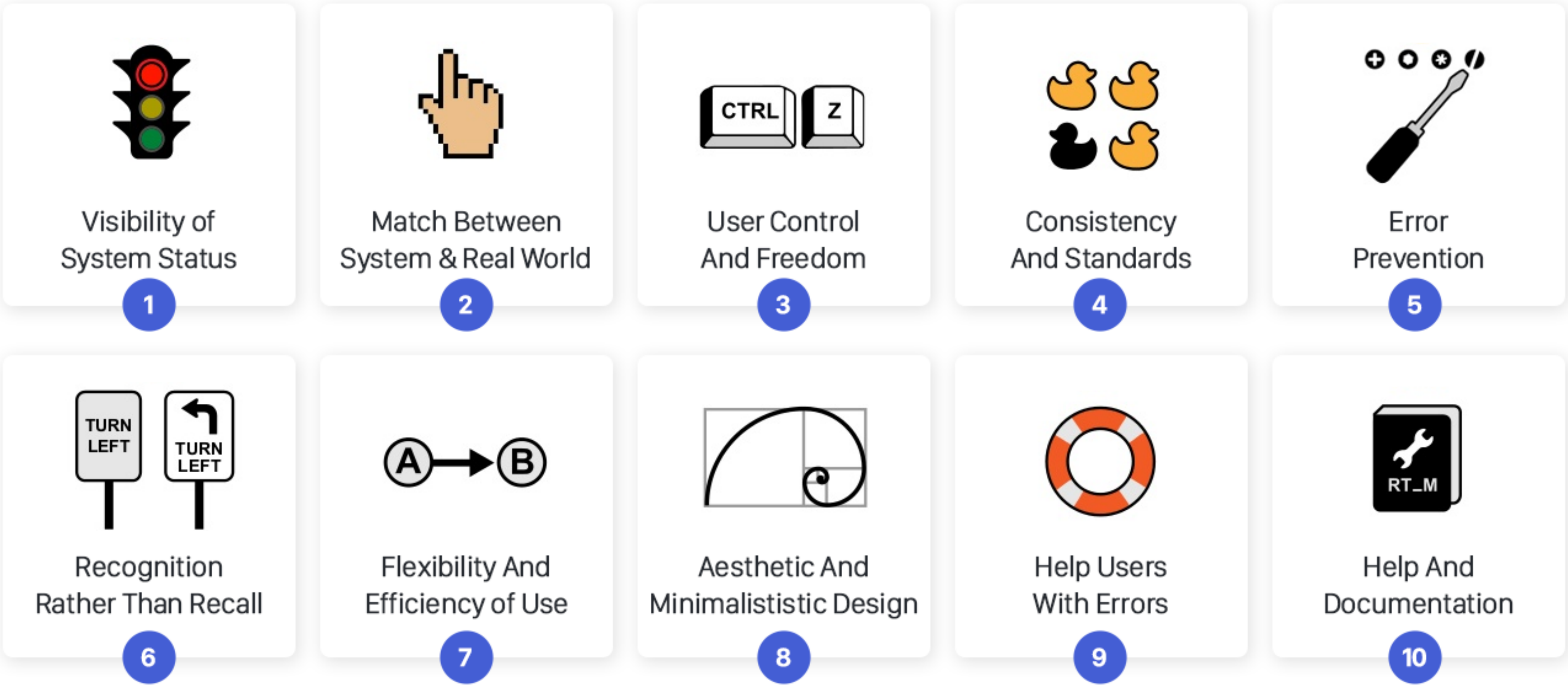
# Step 1 Prototype your design[26]

Create a working prototype using Adobe XD that captures the main functionality of your design.



[26] Image source

# Step 2. Review the heuristics[27]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Aesthetic And Minimalistic Design
8
Help Users With Errors
9
Help And Documentation
10

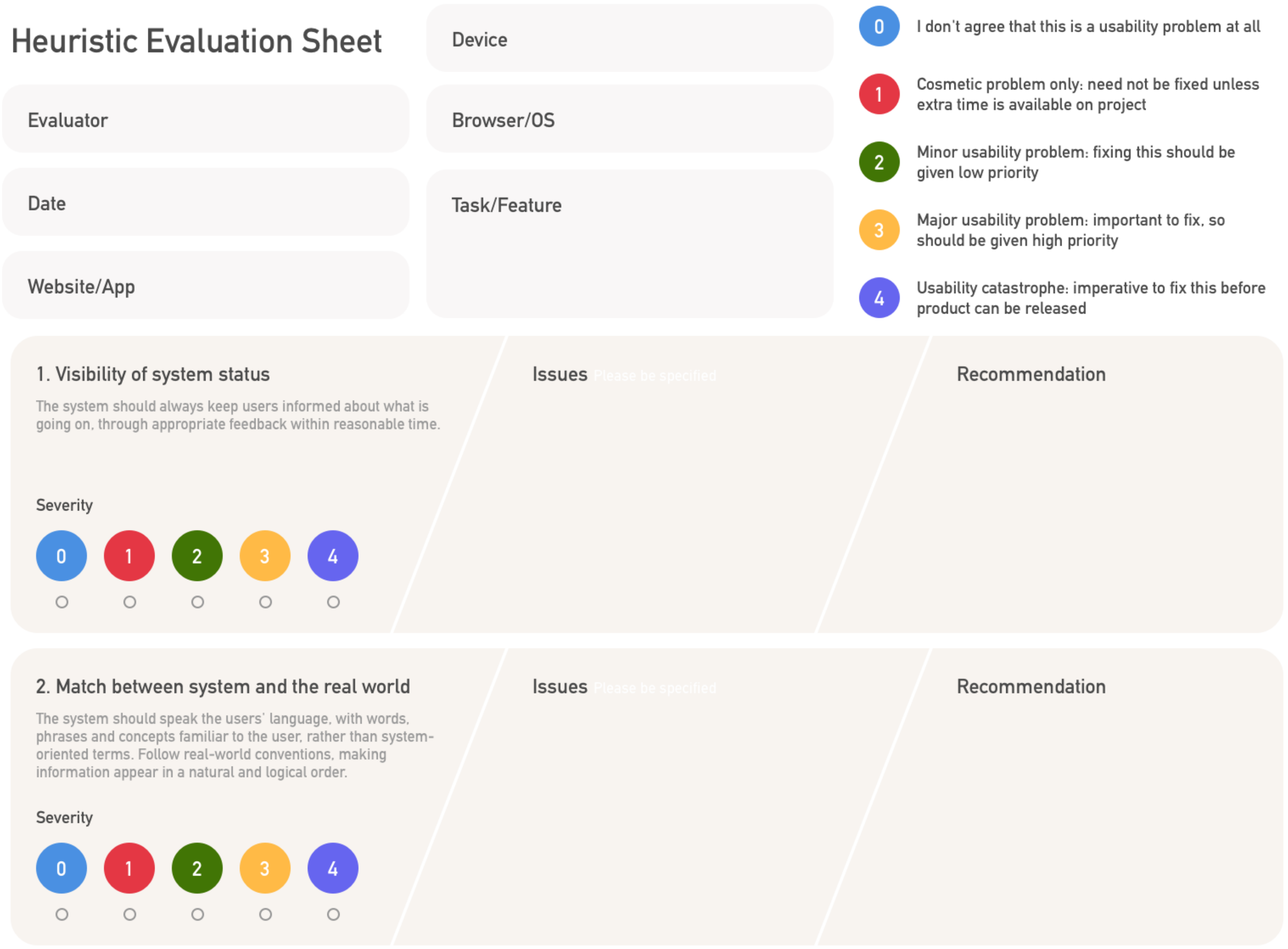
[27] UX Collective

# Step 3. Identify potential violations[28]

Report the violations you identified in a table and mark them on screenshots.

Determine severity.

Usually, heuristic evaluation sheets are used for this step. We will use a simpler table.



Heuristic Evaluation Sheet

Evaluator

Date

Website/App

Device

Browser/OS

Task/Feature

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

1. Visibility of system status

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

Severity

0 ○ 1 ○ 2 ○ 3 ○ 4 ○

Issues Please be specified

Recommendation

2. Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

Severity

0 ○ 1 ○ 2 ○ 3 ○ 4 ○

Issues Please be specified

Recommendation

Credit by Hsin-Jou Lin

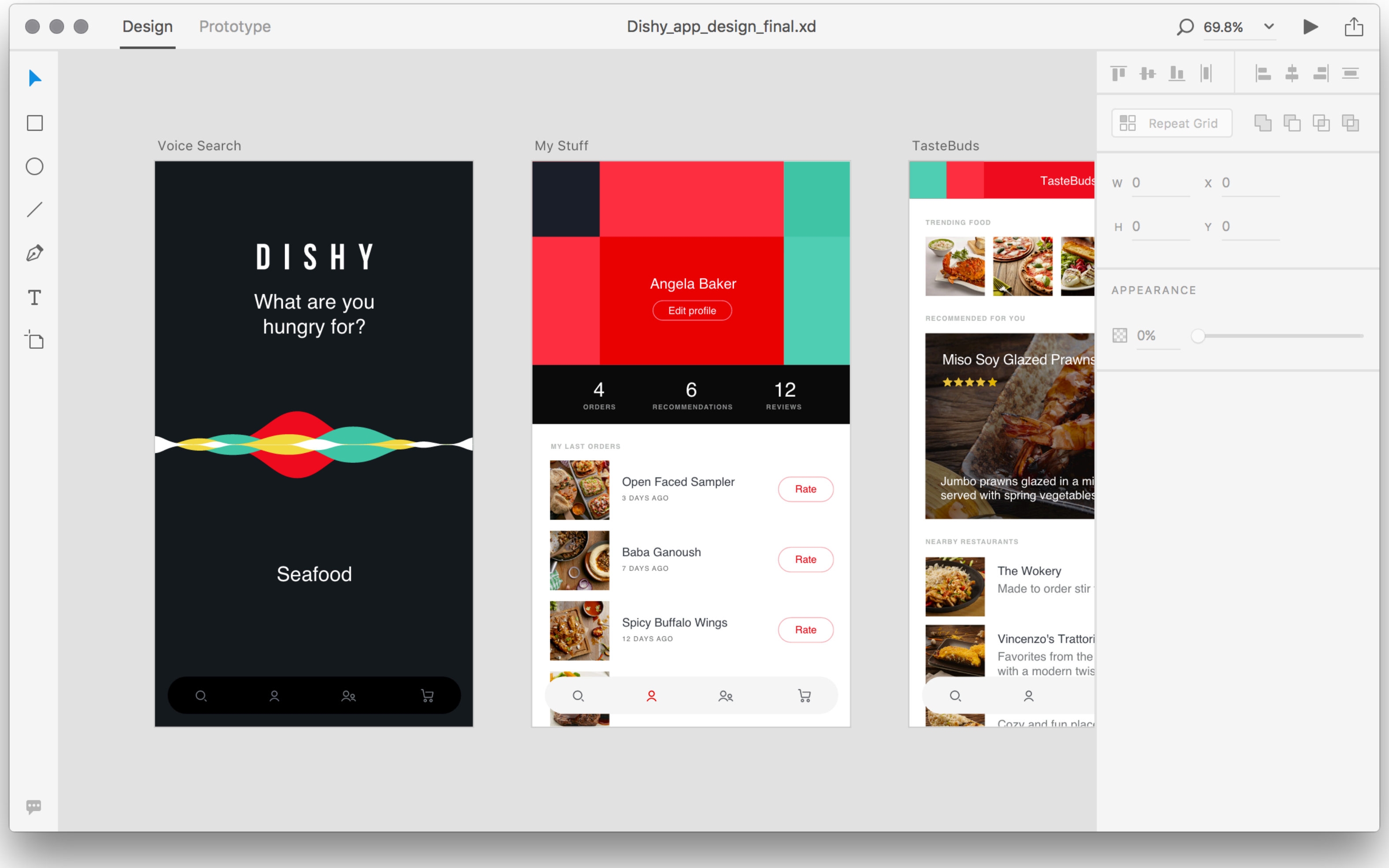
[28] Image source

# Step 4. Develop design recommendations

For each violation, recommend a design solution.

# Step 5. Update your design[29]

An updated Adobe XD prototype that will serve as the basis for your Module 1 deliverable.



[29] Image source

# Good luck!

# What did we learn today?

- What is usability evaluation?
- What are rapid/expert methods?
    - Heuristic evaluation
    - Cognitive walkthrough
- Assignment preview