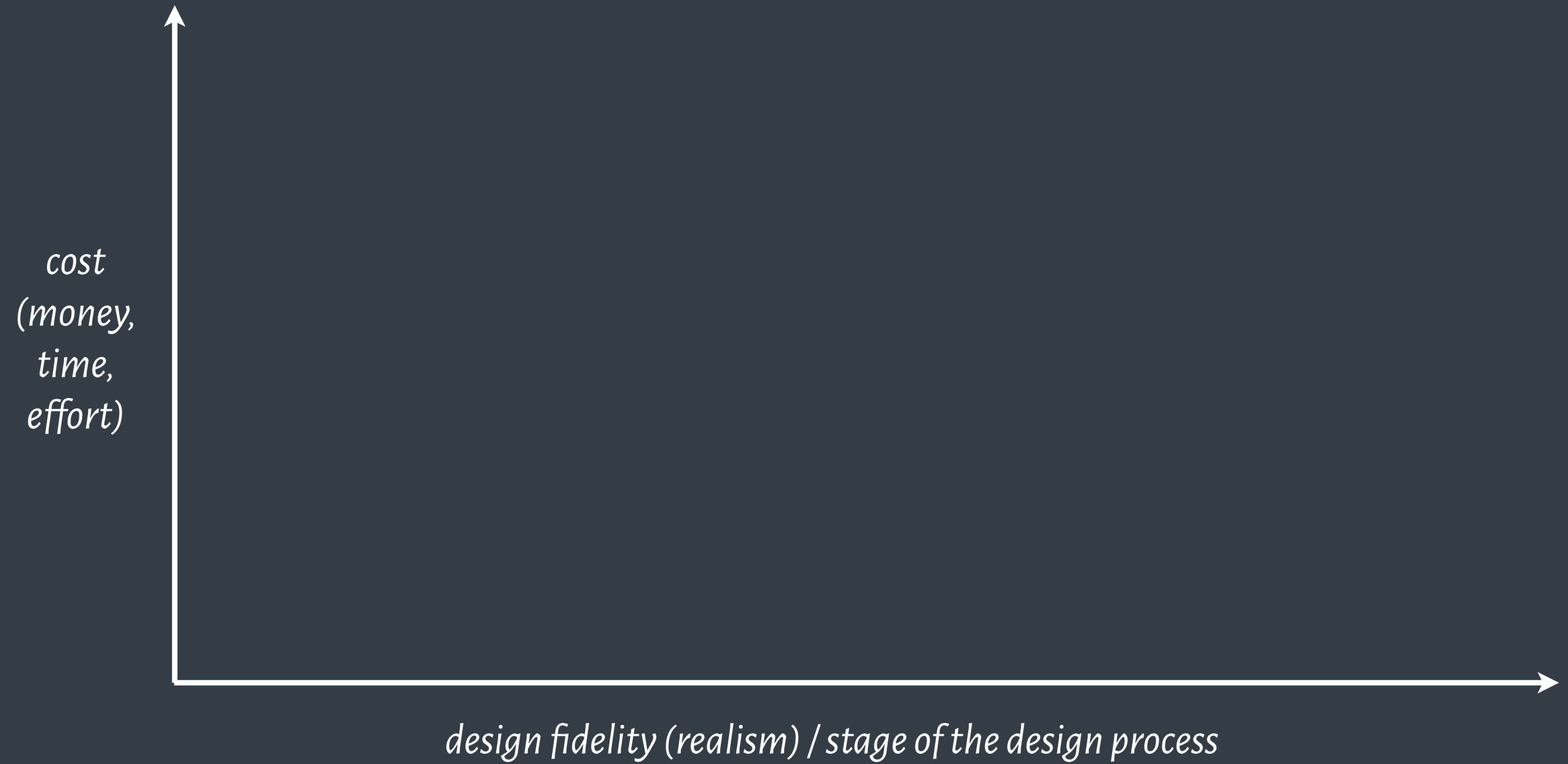
6.1040: Software Design

Evaluating Design

Arvind Satyanarayan & Max Goldman


cost
(money,
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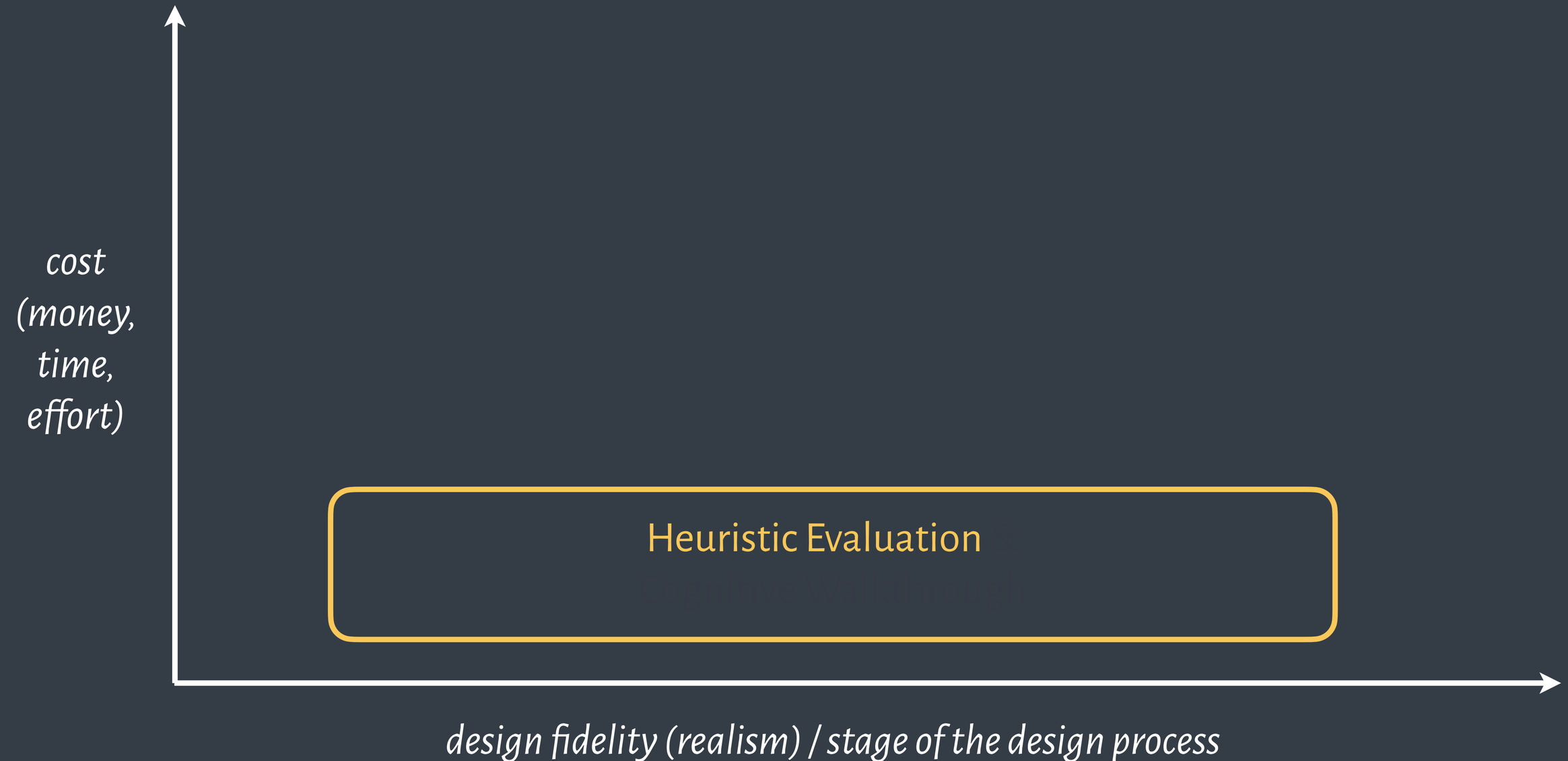
design fidelity (realism) / stage of the design process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Nielsen Norman Group

Jakob's Ten Usability Heuristics

1 Visibility *of* System Status

Designs should *keep users informed* about what is going on, through appropriate, timely feedback.

Interactive mall maps have to show people where they currently are, to help them understand where to go next.

2 Match between System and the Real World

The design should speak the users' language. Use words, phrases, and concepts *familiar to the user,* rather than internal jargon.

Users can quickly understand which stovetop control maps to each heating element.

3 User Control *and* Freedom

Users often perform actions by mistake. They *need a clearly marked "emergency exit"* to leave the unwanted action.

Just like physical spaces, digital spaces need quick "emergency" exits too.

4 Consistency *and* Standards

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

Check-in counters are usually located at the front of hotels, which meets expectations.

5 Error Prevention

Good error messages are important, but the best designs carefully *prevent problems* from occurring in the first place.

Guard rails on curvy mountain roads prevent drivers from falling off cliffs.

6 Recognition Rather Than Recall

***Minimize the user's memory load* by making elements, actions, and options visible. Avoid making users remember information.**

People are likely to correctly answer "Is Lisbon the capital of Portugal?".

7 Flexibility *and* Efficiency of Use

Shortcuts — hidden from novice users — may *speed up the interaction* for the expert user.

Regular routes are listed on maps, but locals with more knowledge of the area can take shortcuts.

8 Aesthetic *and* Minimalist Design

Interfaces should not contain information which is irrelevant. Every extra unit of information in an interface *competes* with the relevant units of information.

A minimalist three-legged stool is still a place to sit.

9 Recognize, Diagnose, *and* Recover from Errors

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

Wrong-way signs on the road remind drivers that they are heading in the wrong direction.

10 Help *and* Documentation

It's best if the design *doesn't need* any additional explanation. However, it may be necessary to provide documentation to help users complete their tasks.

Information kiosks at airports are easily recognizable and solve customers' problems in context and immediately.

NN/g

www.nngroup.com/articles/ten-usability-heuristics/

Guidelines for Human-AI Interaction

Microsoft

Heuristic Evaluation

Process.

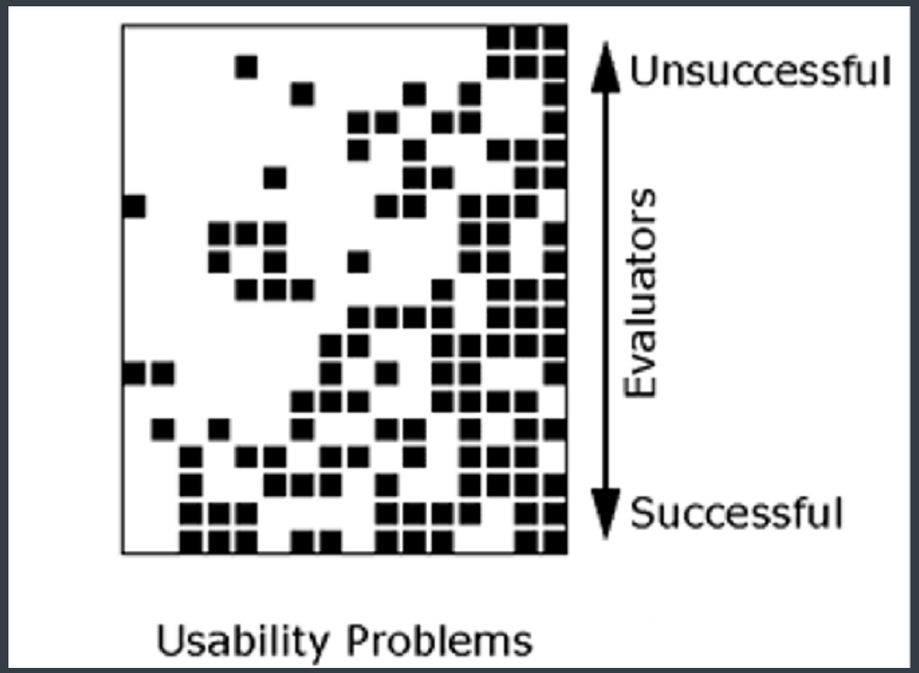
Convene a small set of **multiple evaluators** (~3-5) to examine UI.

Independently step through the design, check compliance with heuristics.

Only communicate at the end.

Pros and Cons.

- ✓ Can be conducted for any level of fidelity.
- ✓ Fast and cost effective.



From Jakob Neilsen, 1992.

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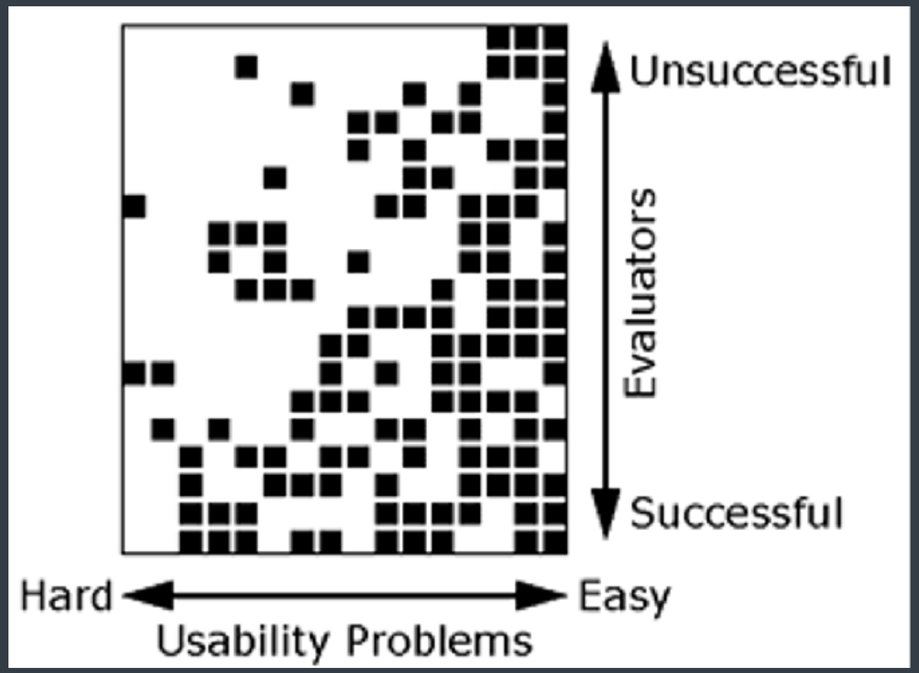
Pros and Cons.

- ✓ Can be conducted for any level of fidelity.
- ✓ Fast and cost effective.
- ✓ Allows user testing to focus on bigger issues.
- ✘ May miss problems or find "false positives"



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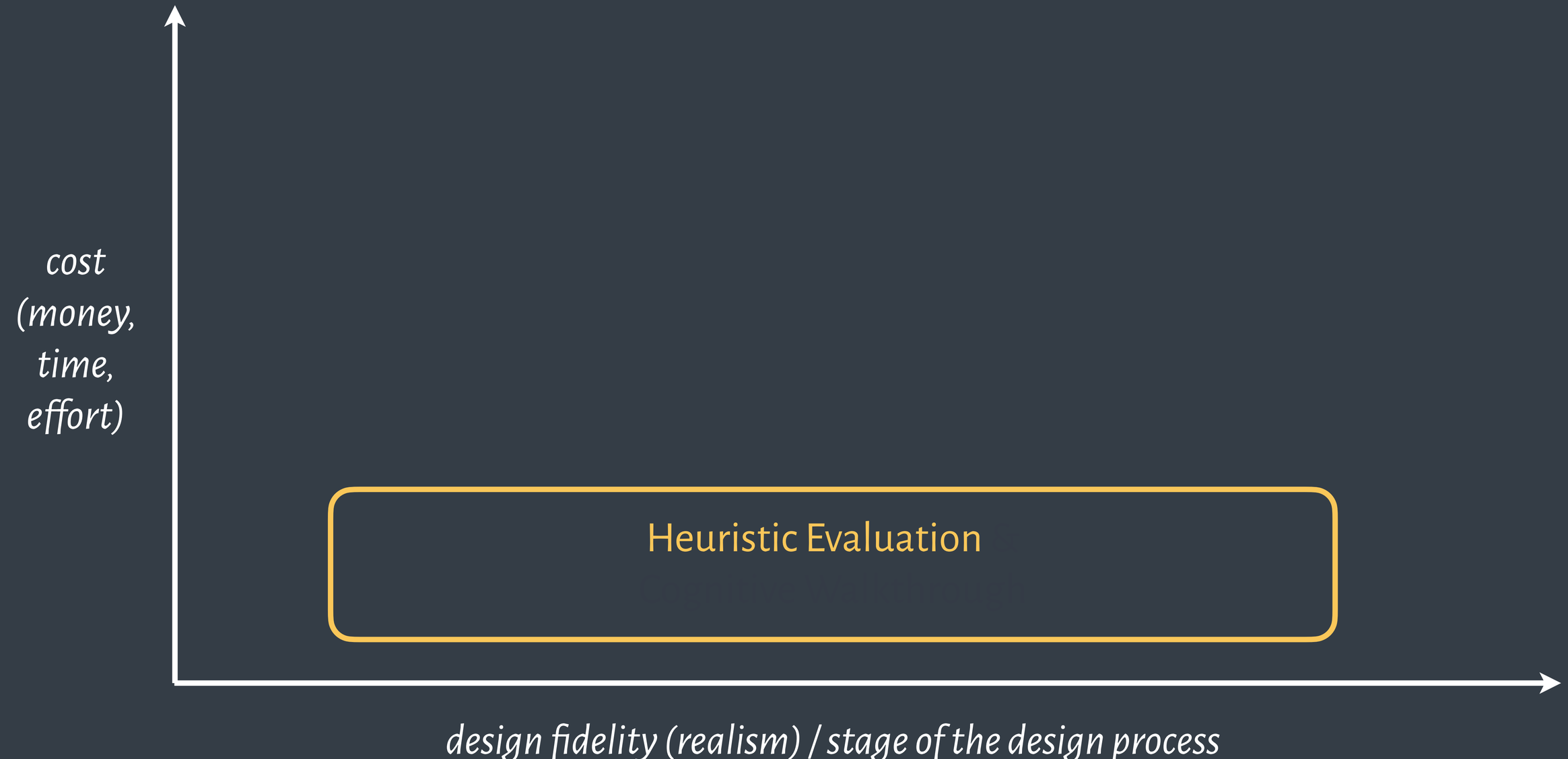
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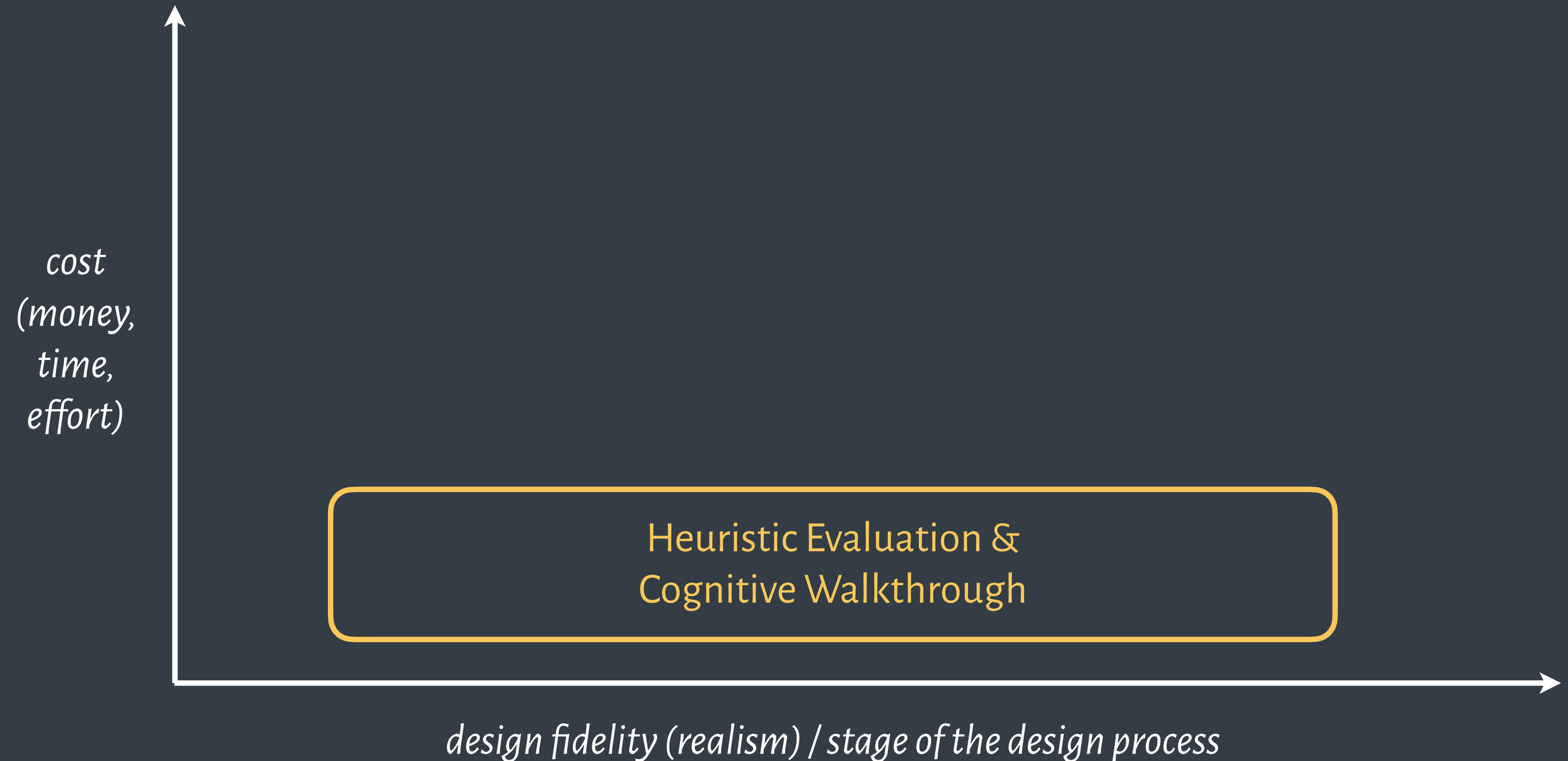
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Heuristic Evaluation &
Cognitive Walkthrough
design fidelity (realism) / stage of the design process

Gulf of Execution

the gap between a user's goal and
the means to execute that goal

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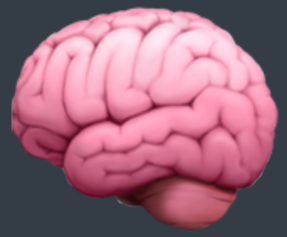
the gap between the system
output and a user's expectations

Gulf of Evaluation

How easily can a user...

Form an intention to act.

... know they need to do something?



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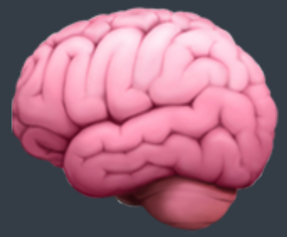

Gulf of Execution

the gap between a user's goal and the means to execute that goal

Figure out and carry out actions.

... notice the correct action is available, and associate it with what they're trying to do?

the gap between the system output and a user's expectations

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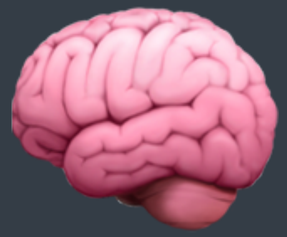

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Gulf of Evaluation

Perceive and interpret what happened.

... based on what occurs after the action is taken, know that it was the right thing to have done?

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Gulf of Execution

the gap between a user's goal and the means to execute that goal

Figure out and carry out actions.
... notice the correct action is available, and associate it with what they're trying to do?

the gap between the system output and a user's expectations

Gulf of Evaluation

Evaluate progress towards their goal.
... understand how they've made progress towards their larger goal?

Perceive and interpret what happened.
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Cognitive Walkthrough

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Process.

1. Brainstorm a set of tasks a user might wish to perform with your interface.
2. For each task, break it down into the specific sequence of actions a user needs to perform (and expected system responses) .
3. For each action, answer the 4 questions.
4. If you locate a problem, **pretend it has been fixed** and proceed to the next action.

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Tasks.

1. Withdraw $40 from my checking account.
2. Deposit a check into my checking account.
3. Check the balance of my savings account.

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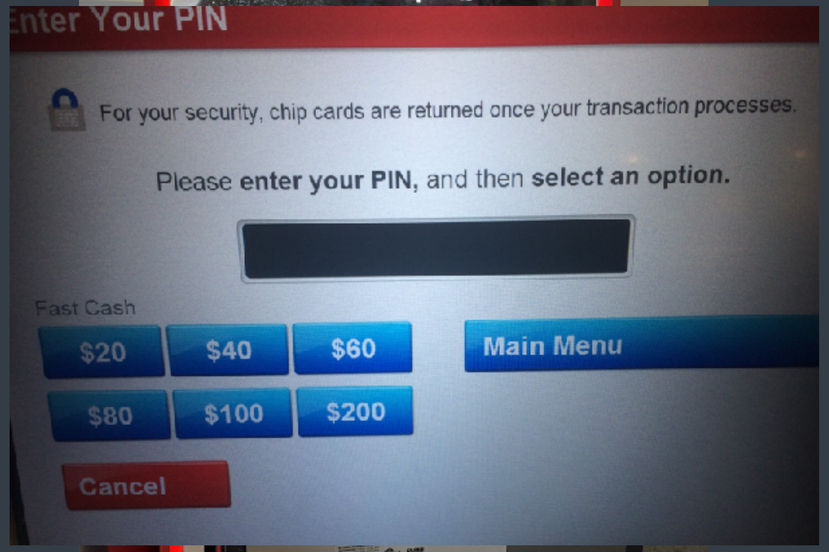

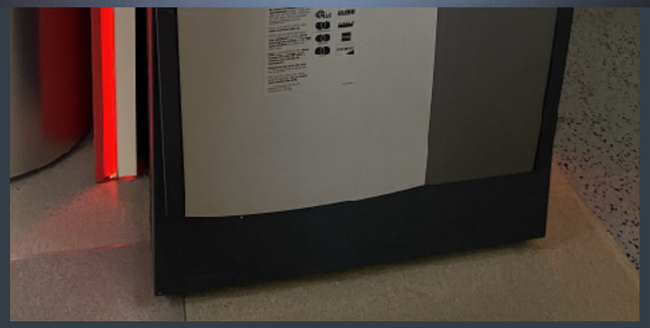

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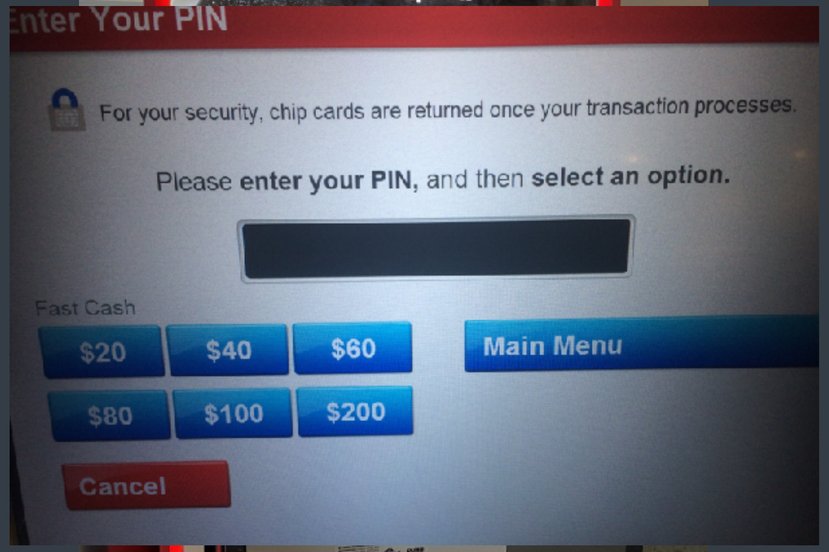

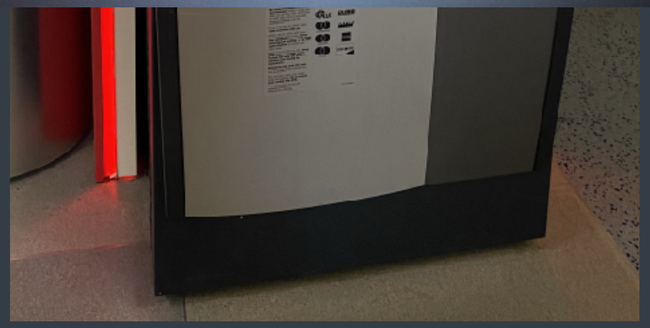

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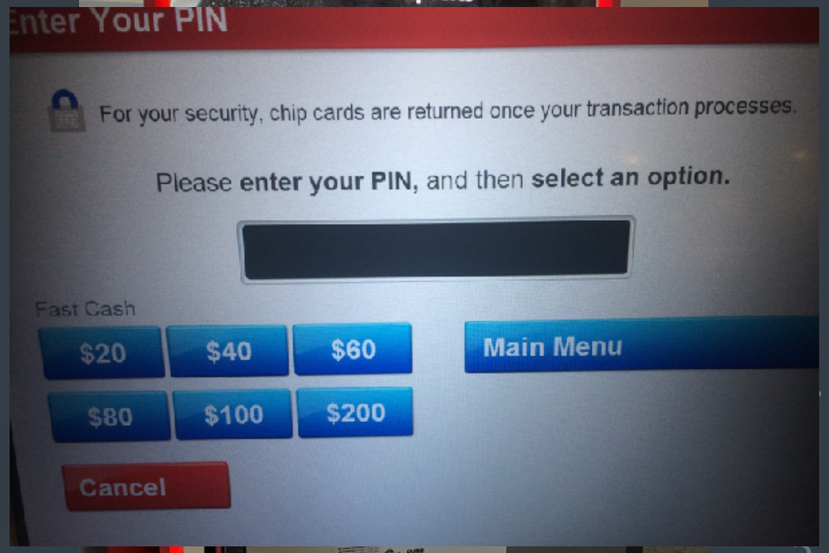

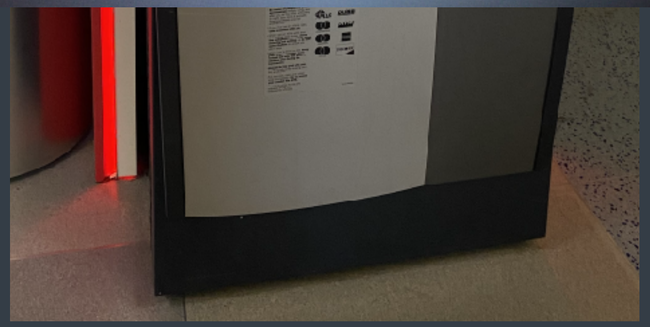

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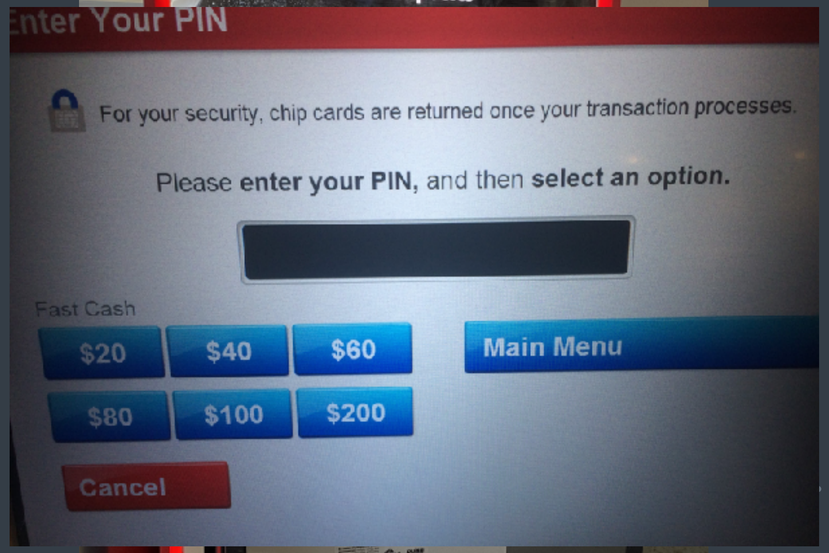

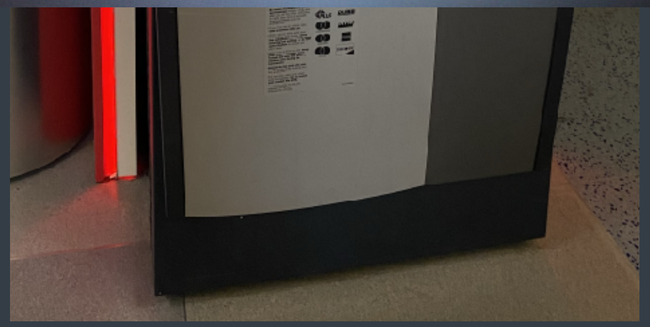

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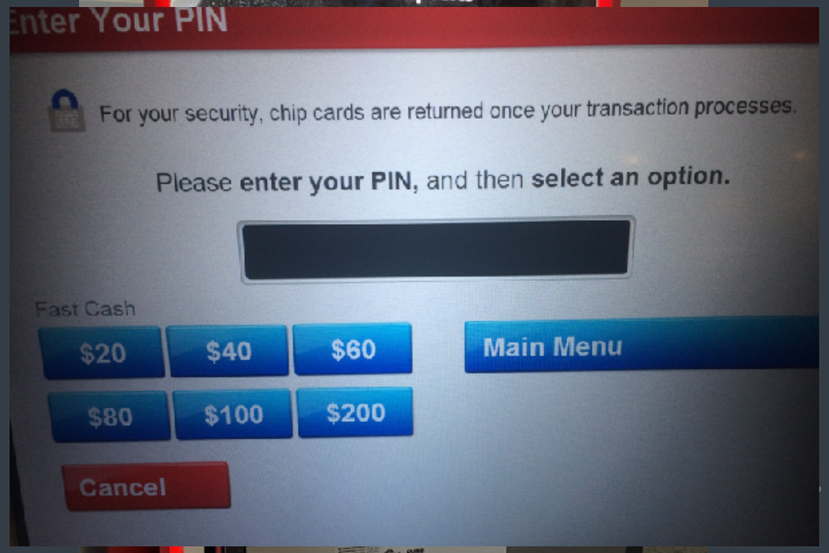

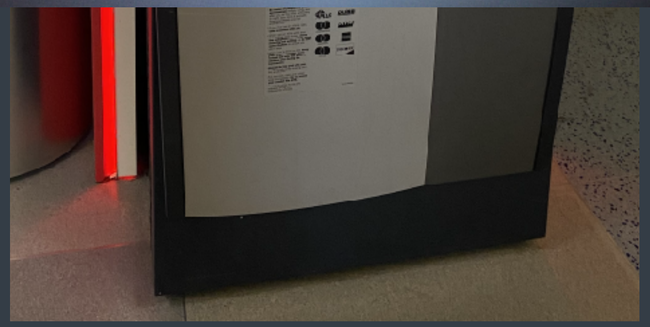

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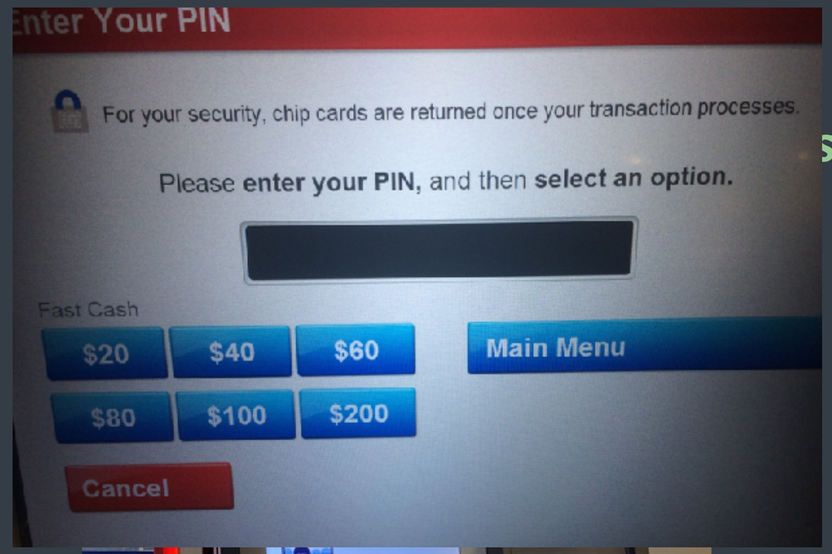

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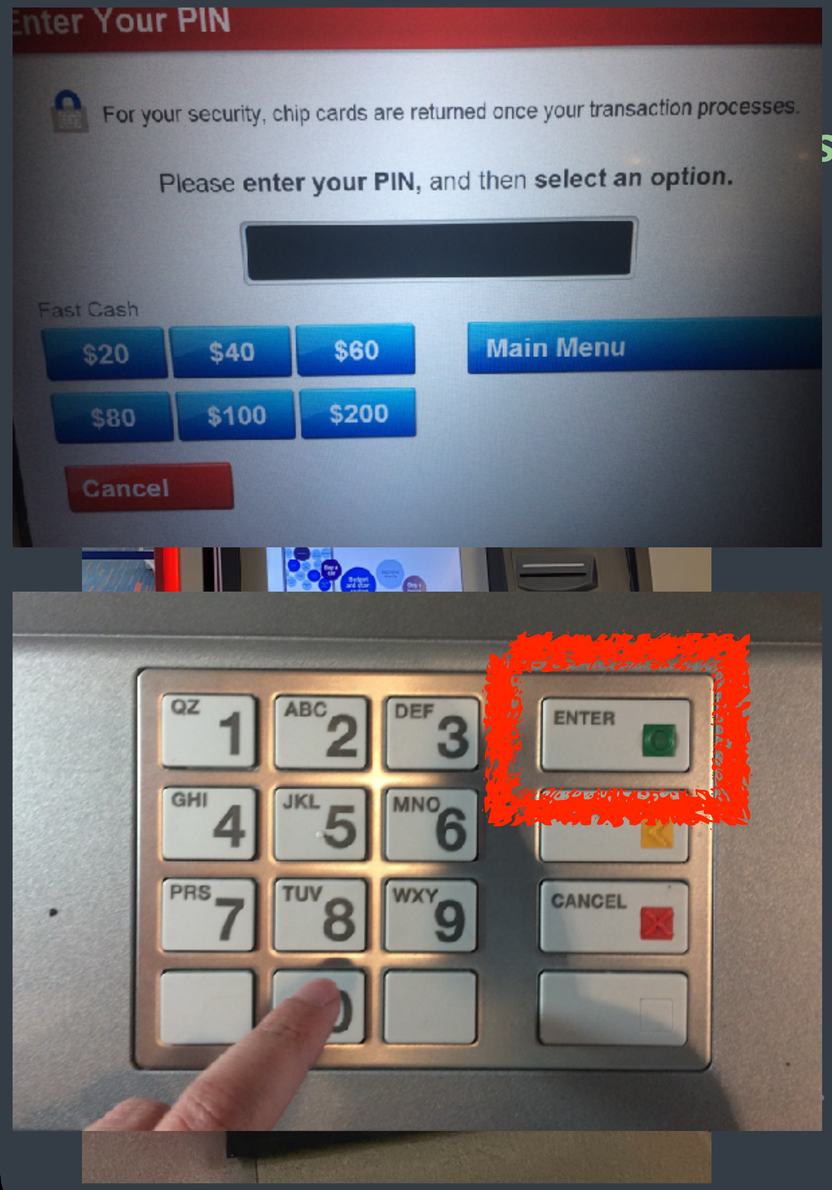

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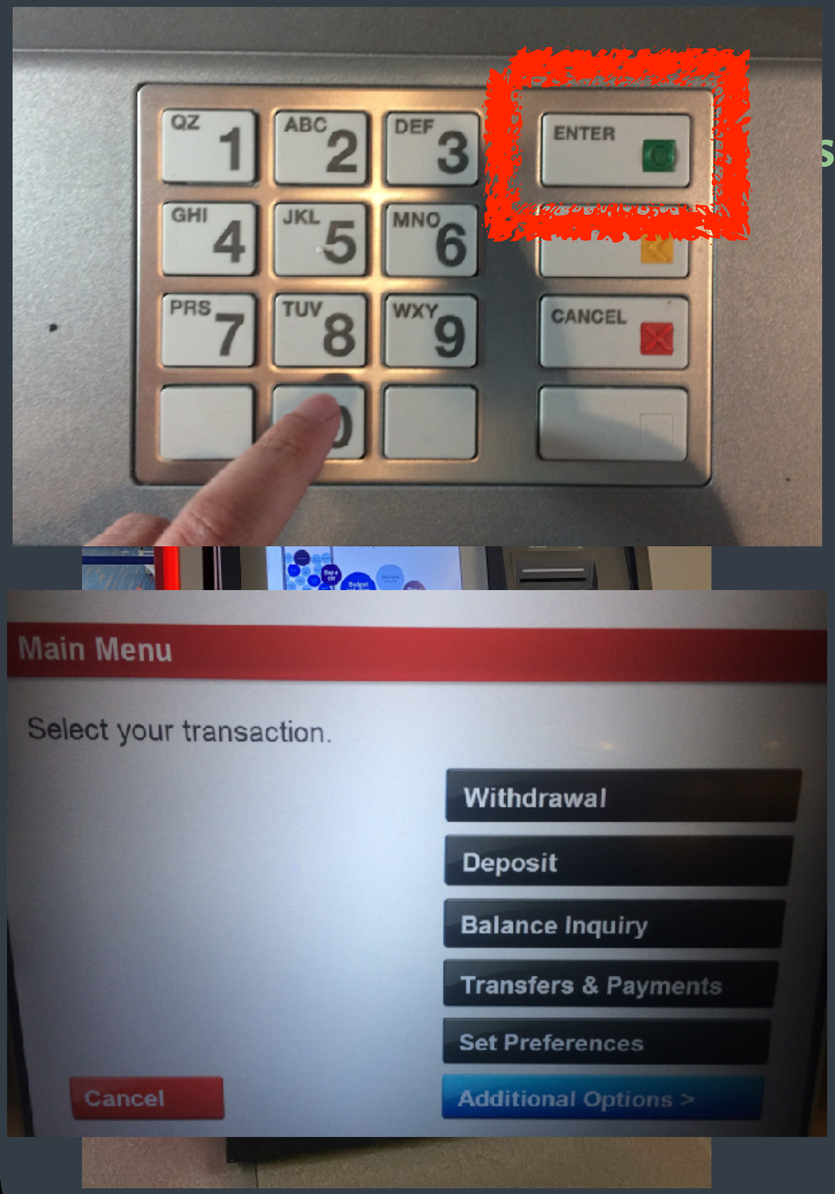

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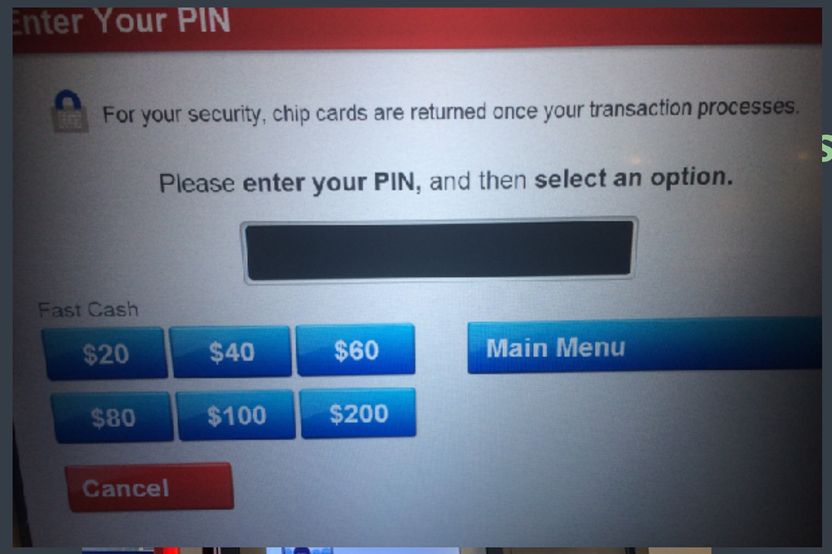

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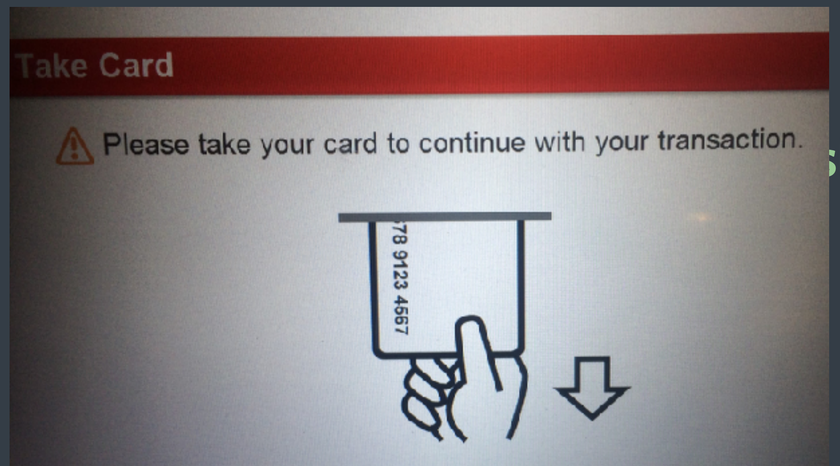

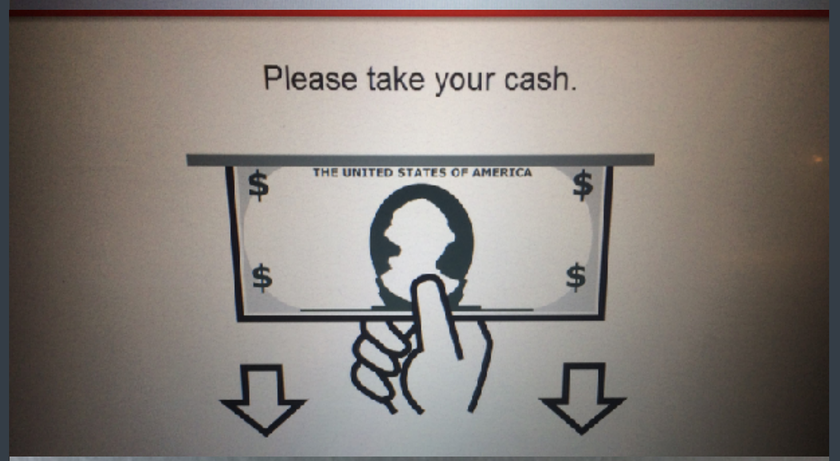

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(1) Yes.

(2) Yes.

(3) Yes. But message could be friendlier/ clearer.

(4) Yes.

Deposit a check into my

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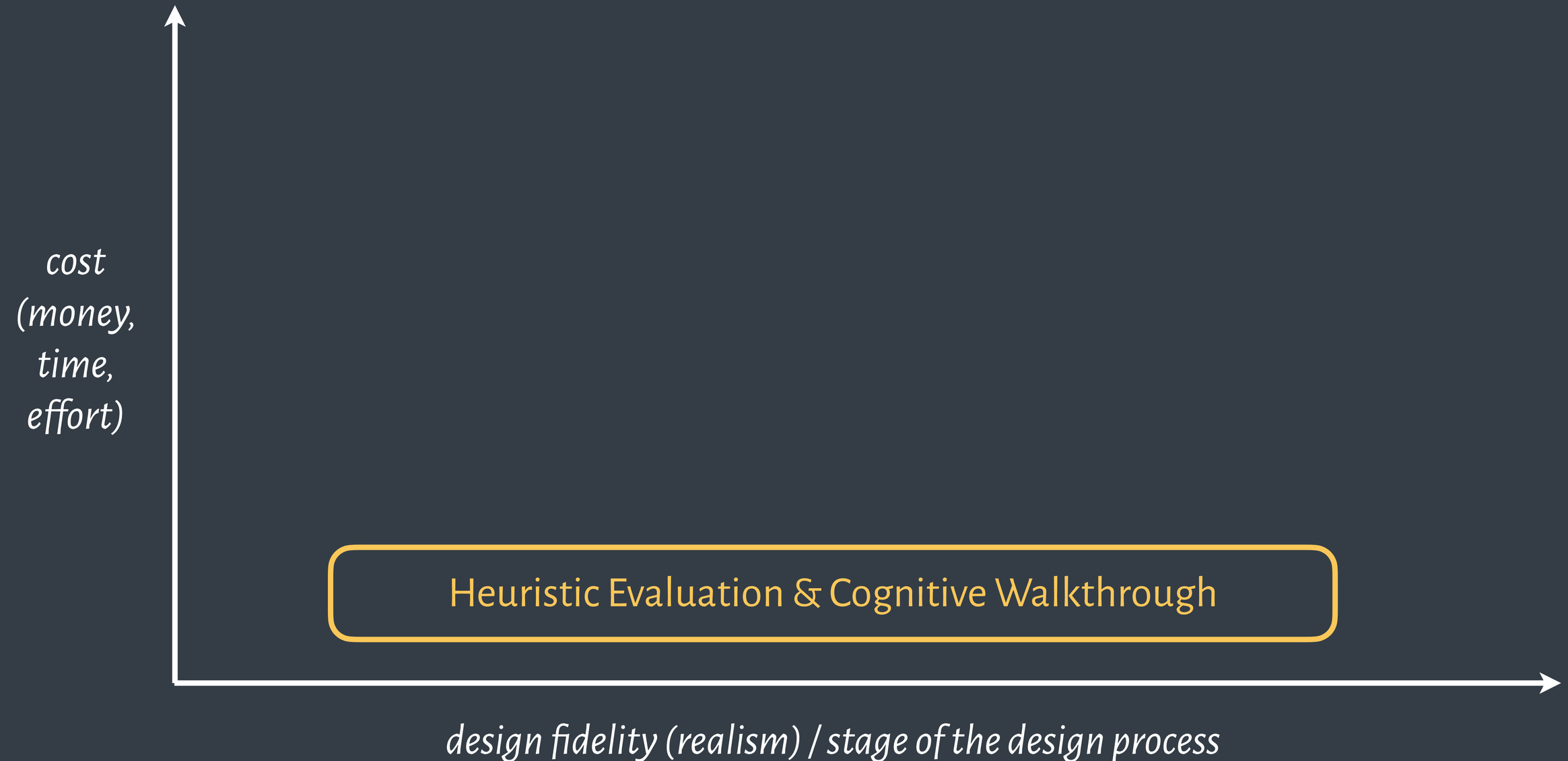
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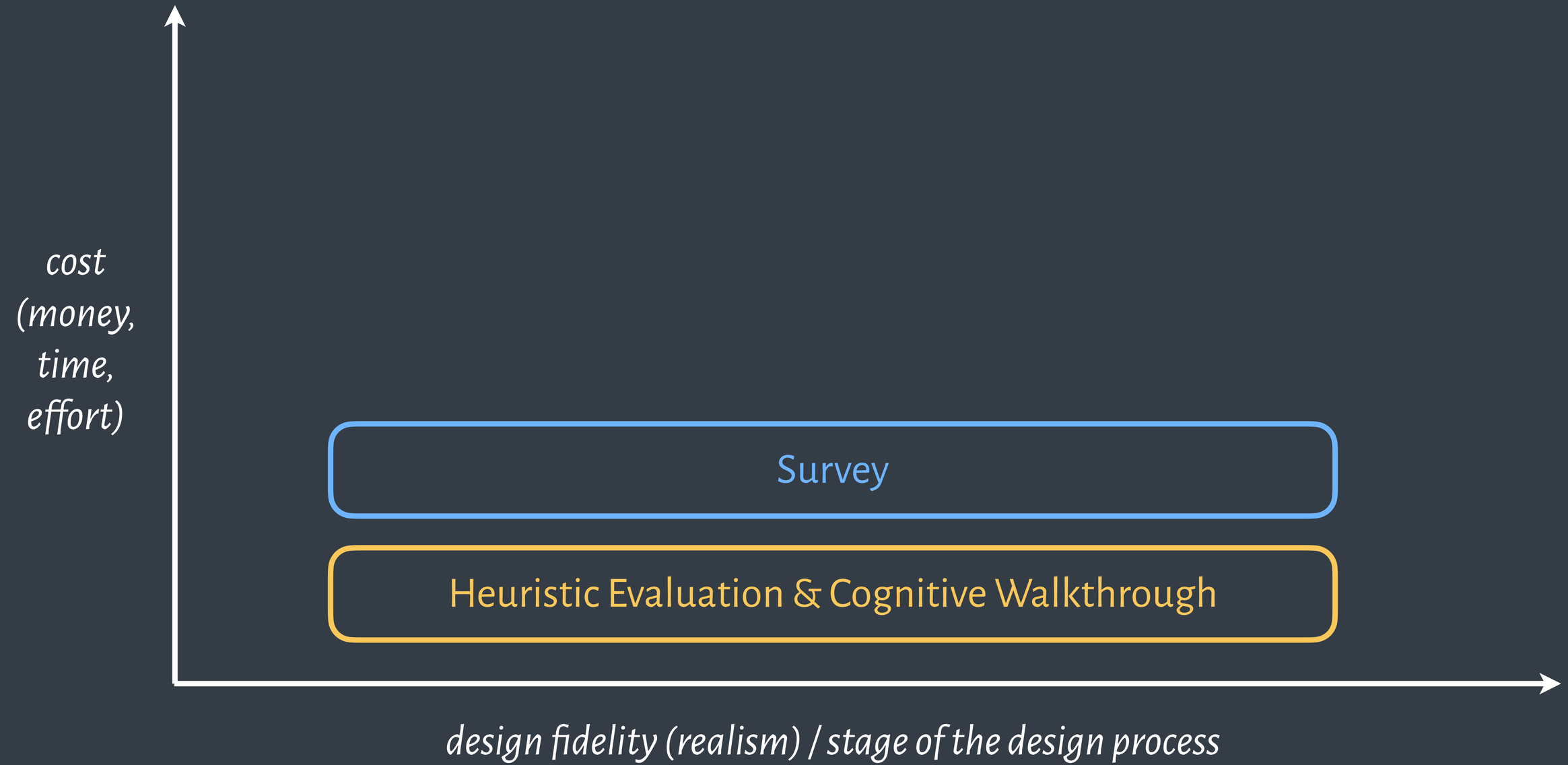
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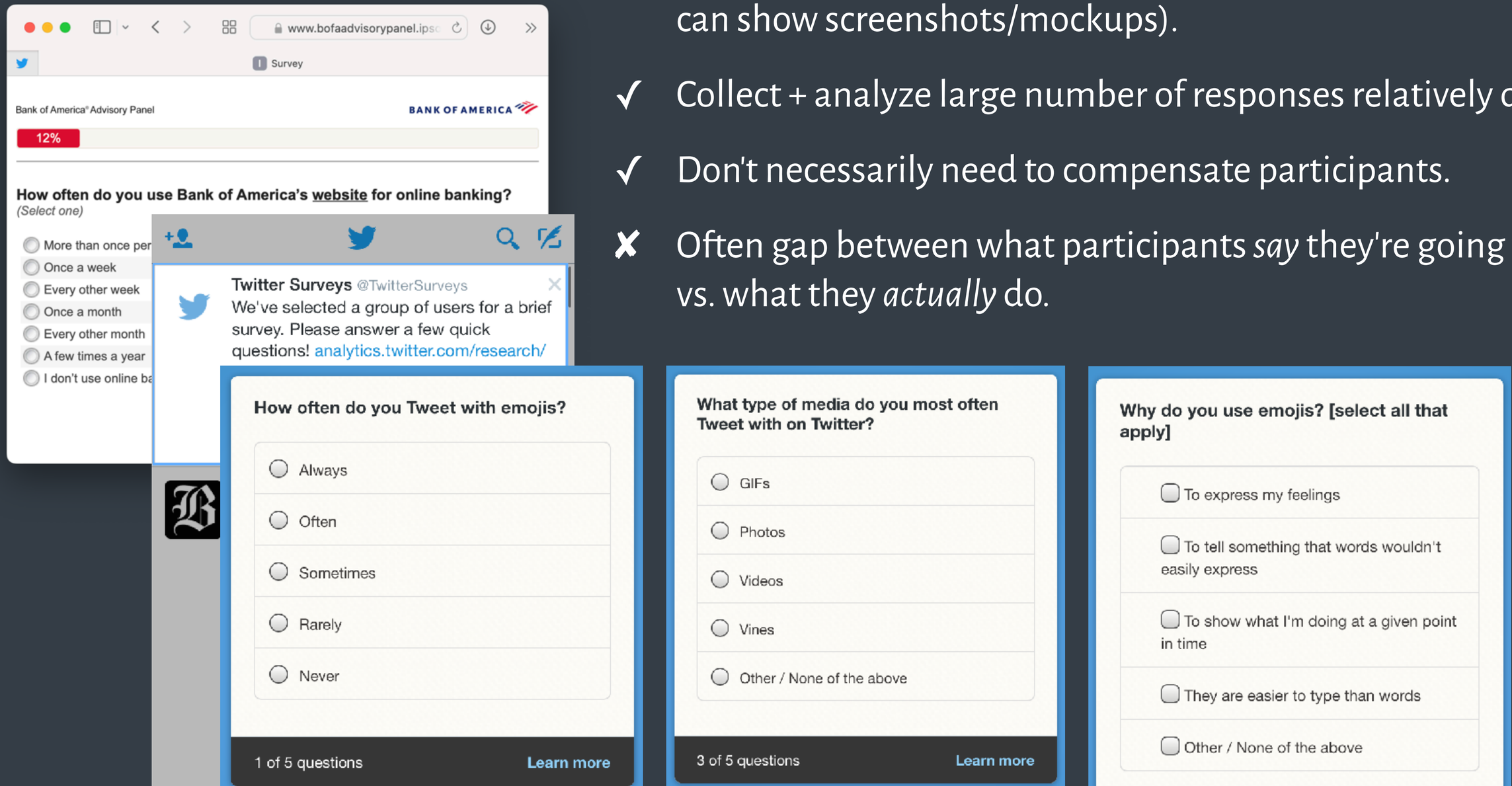
Survey
Heuristic Evaluation & Cognitive Walkthrough
design fidelity (realism) / stage of the design process

Surveys

Measuring user preferences.

- ✓ Relatively cheap to construct (e.g., can be purely textual, or can show screenshots/mockups).
- ✓ Collect + analyze large number of responses relatively quickly.
- ✓ Don't necessarily need to compensate participants.
- ✘ Often gap between what participants *say* they're going to do vs. what they *actually* do.



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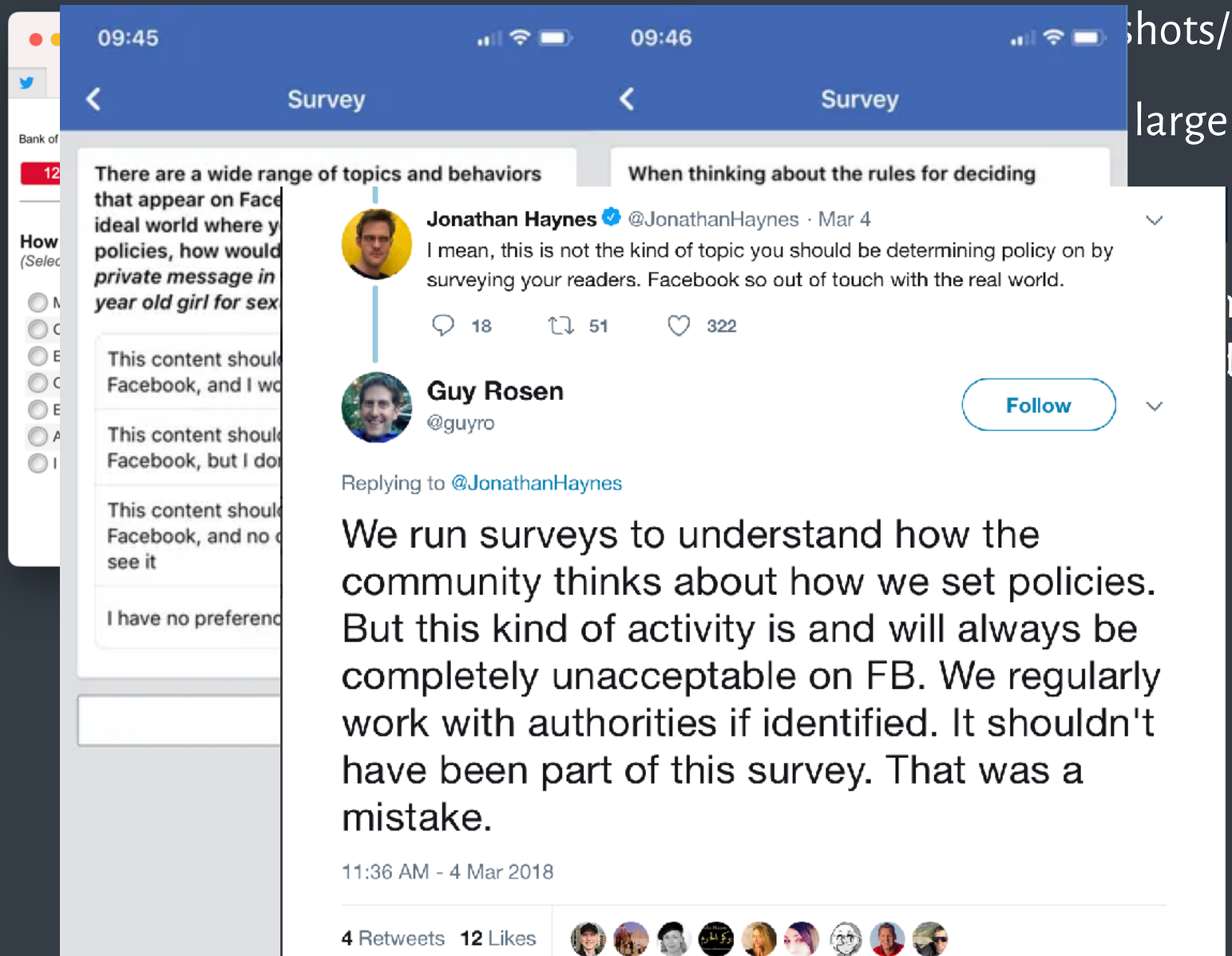
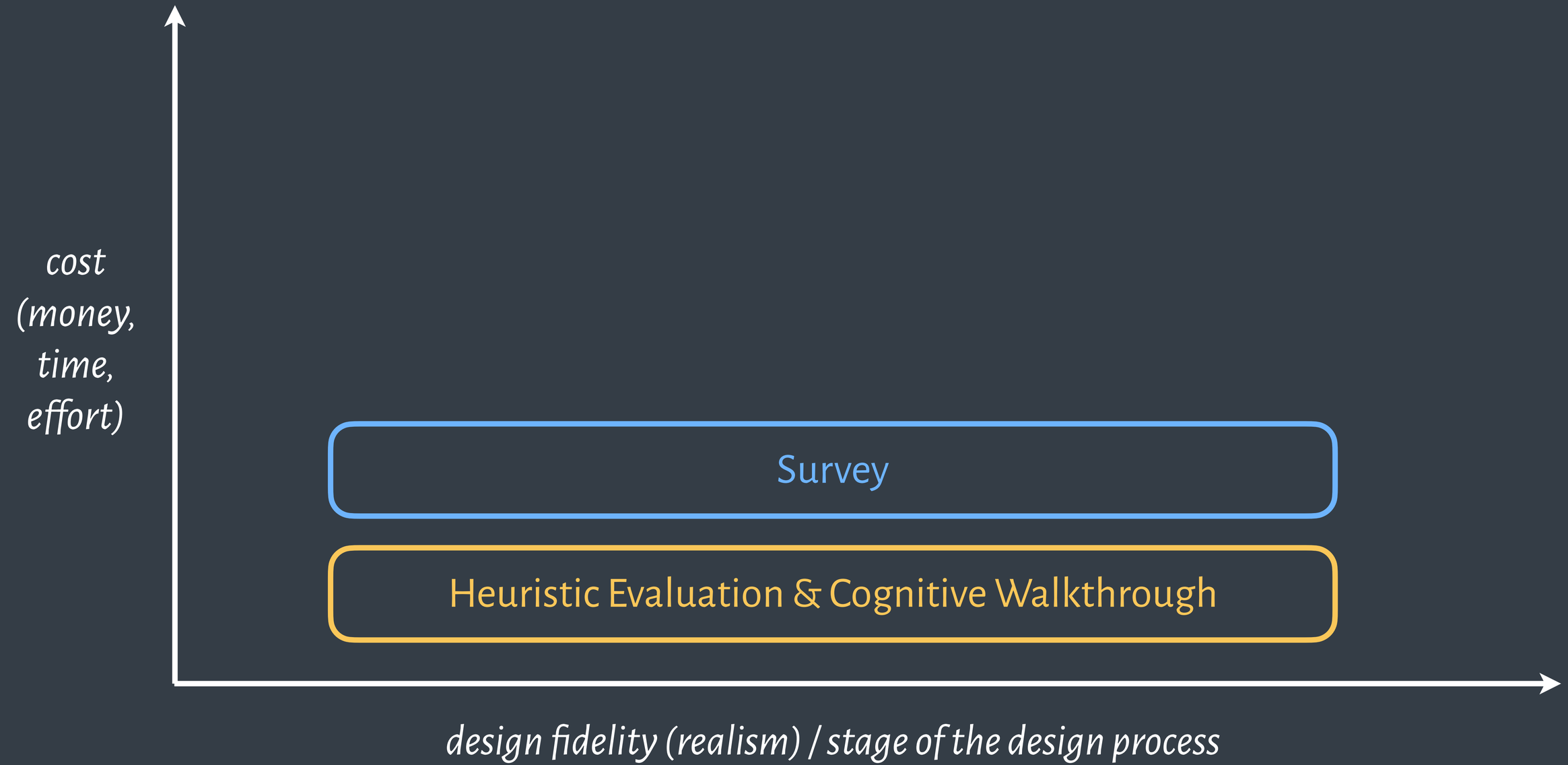
✗ Designing surveys can be difficult.




cost
(money,
time,
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Survey
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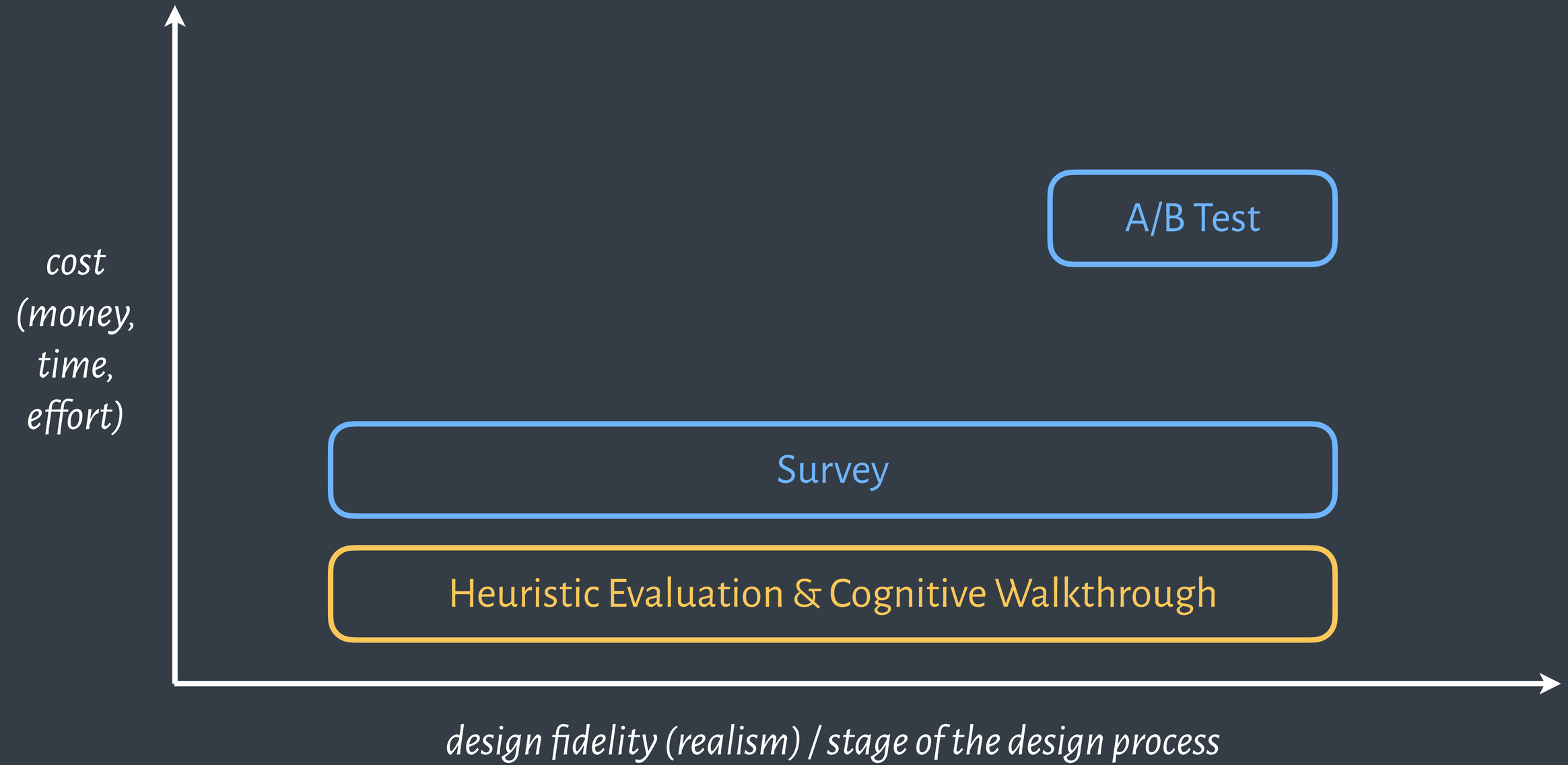
cost
(money,
time,
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A/B Test
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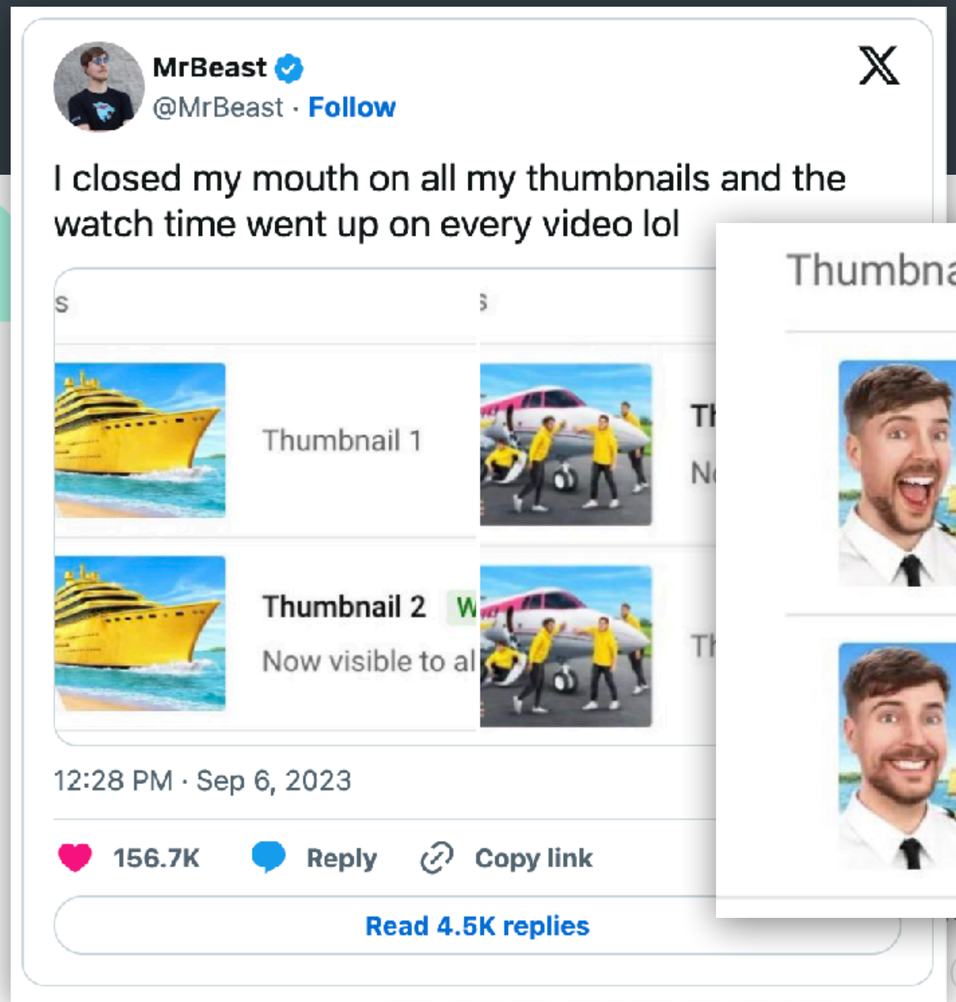
A/B Testing

Compare two alternatives.

50% of users see option (A), 50% of users see option (B).

Determine measures of success — e.g., sign ups, click through rates, engagement, etc.



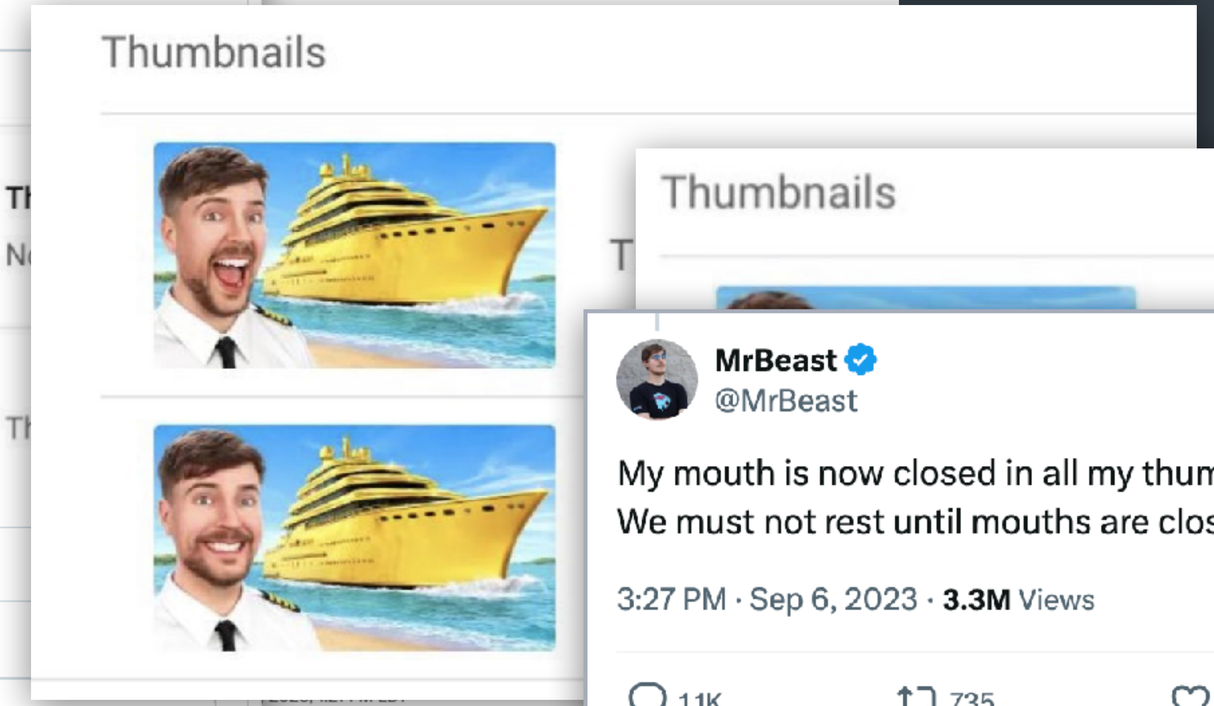


Image: MrBeast

If you buy something from a Verge link, Vox Media may
a commission. See our ethics statement.

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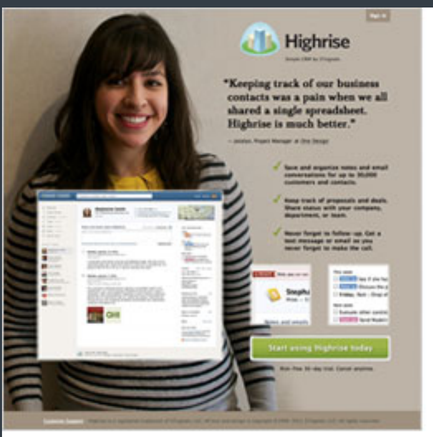
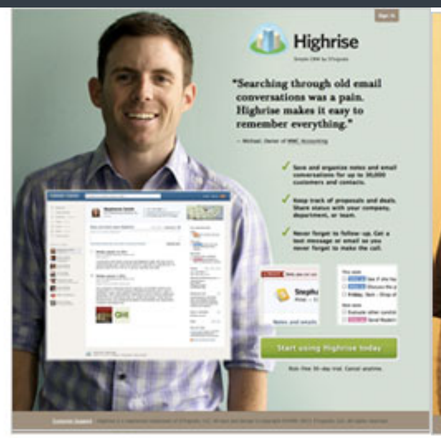


JOCELYN



MICHAEL

WILL

JOHN

MARI

BRIAN

A/B Testing

Compare two alternatives.

50% of users see option (A), 50% of users see option (B).

Determine measures of success — e.g., sign ups, click through rates, engagement, etc.

✓ Can be cheap to run if changes are relatively targeted.

✘ Encourages hill-climbing — marginal improvements that mask opportunities for bigger changes.

The New York Times

Putting a Bolder Face on Google

Give this article

By Laura M. Holson

Feb. 28, 2009

A defender
Marissa M
look and fe
engine.
Noah Berge

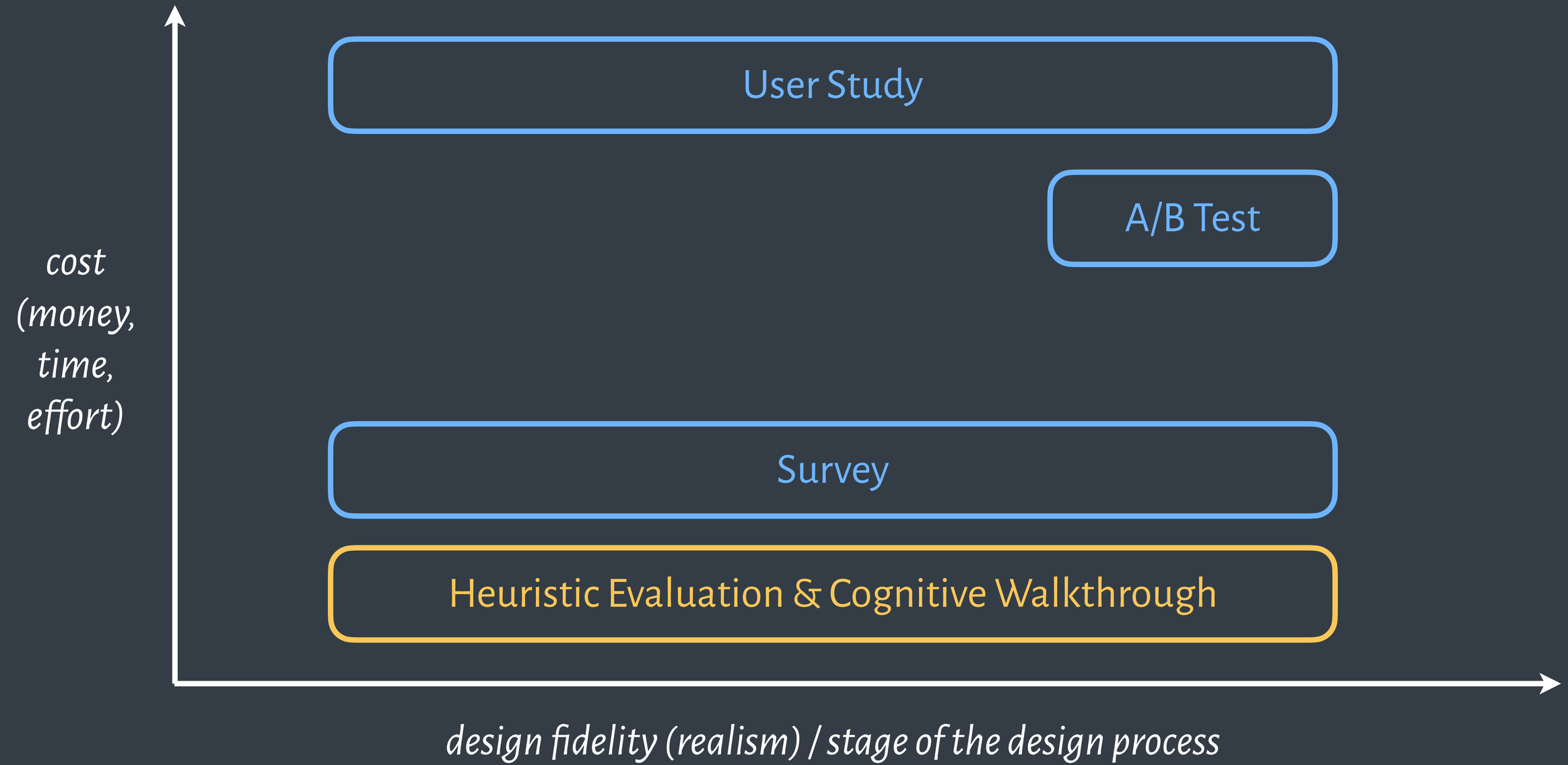
A designer, Jamie Divine, had picked out a blue that everyone on his team liked. But a product manager tested a different color with users and found they were more likely to click on the toolbar if it was painted a greener shade.

As trivial as color choices might seem, clicks are a key part of Google's revenue stream, and anything that enhances clicks means more money. Mr. Divine's team resisted the greener hue, so Ms. Mayer split the difference by choosing a shade halfway between those of the two camps.

Her decision was diplomatic, but it also amounted to relying on her gut rather than research. Since then, she said, she has asked her team to test the 41 gradations between the competing blues to see which ones consumers might prefer.

Yes, it's true that a team at Google couldn't decide between two blues, so they're testing 41 shades between each blue to see which one performs better. I had a recent debate over whether a border should be 3, 4 or 5 pixels wide, and was asked to prove my case. I can't operate in an environment like that. I've grown tired of debating such minuscule design decisions. There are more exciting design problems in this world to tackle.

— Doug Bowman (Google's first visual designer), March 2009.


User Study
A/B Test
Survey
Heuristic Evaluation & Cognitive Walkthrough
cost (money, time, effort)
design fidelity (realism) / stage of the design process

User Study

Gold standard. Bring participants into your lab/office.

Have them use your design — set them specific tasks, or leave it open-ended.

Can use any/all prior methods — e.g., surveying, interviewing, comparing alternatives—and **at any level of design fidelity**.


LIFE Saver
American
Red Cross

User Study

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Have them use your design — set them specific tasks, or leave it open-ended.

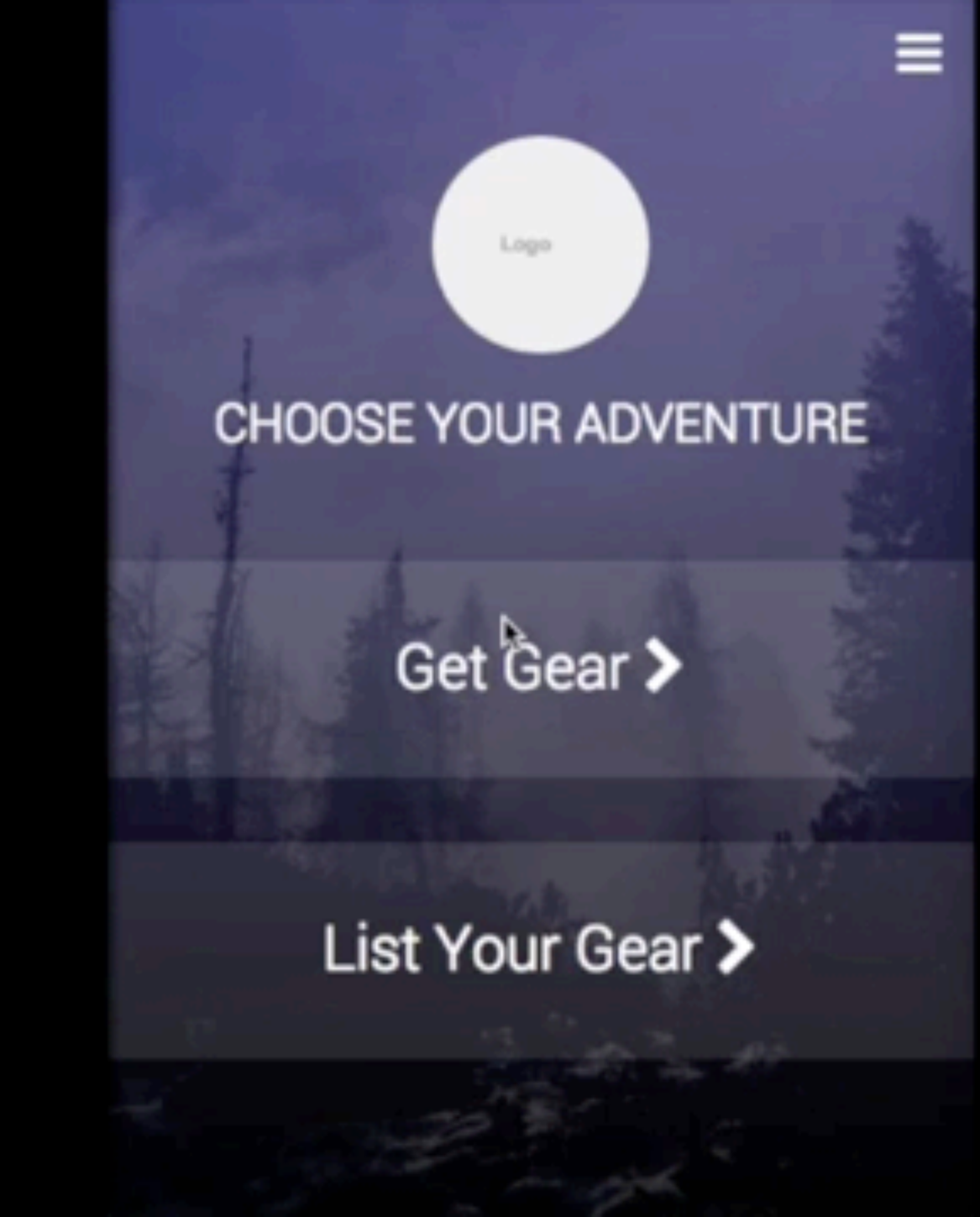
Can use any/all prior methods — e.g., surveying, interviewing, comparing alternatives—and **at any level of design fidelity**.

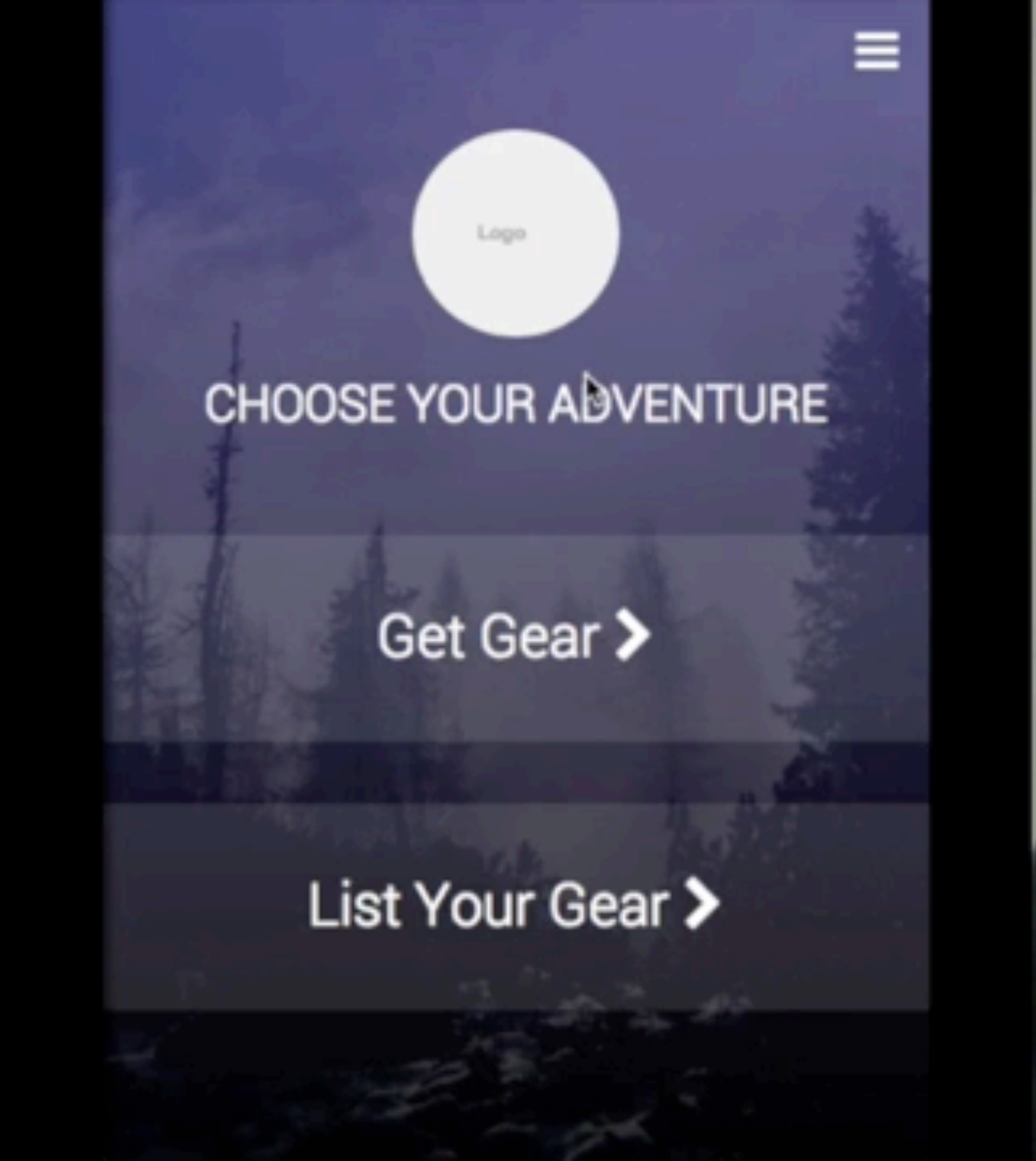
Observe your participant's **process.**

Ask them to talk out loud while performing tasks (**think aloud**). Thinking out loud feels very strange to participants, so they will often fall silent. **Prompt them** to keep talking.

- tell us what you are *thinking*
- tell us what you are *trying to do*
- tell us what *questions* come up as you perform the task
- tell us the things you *read* on screen

Try not to help them. Pre-decide on where you might intervene. Only help if they are completely unable to make progress.


Logo
CHOOSE YOUR ADVENTURE
Get Gear
List Your Gear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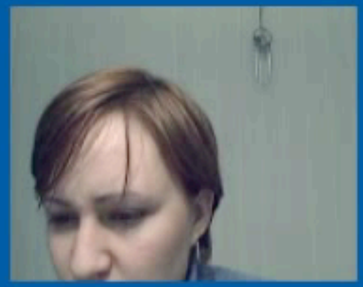

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- Search by Community
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- Hiring
- Compensation/Benefits
  - Employer Sponsored Benefit Plans
  - Government Sponsored Benefit Plans
  - Payroll Information
  - Laws and Regulations
- Labour Law at a Glance
- Layoffs and Terminations
- Training & Development
- Employee & Labour Relations
- Health & Safety
- Organizations and Associations
- HR Planning

Compensation/Benefits: Laws & Regulations

Information concerning payroll administration, including payroll guides and deduction tables, is provided by Canada Revenue and Customs Agencies for **all** businesses. Most employers establishing private benefit plans are covered by provincial regulations. **Select the regulation type below and "Next"** to find the appropriate legislation. If you are not sure which regulations apply, review the list of business activities under "Federally Regulated" to ensure you are not covered by whese laws and regulations.

○ Provincially regulated -- Select a Province --

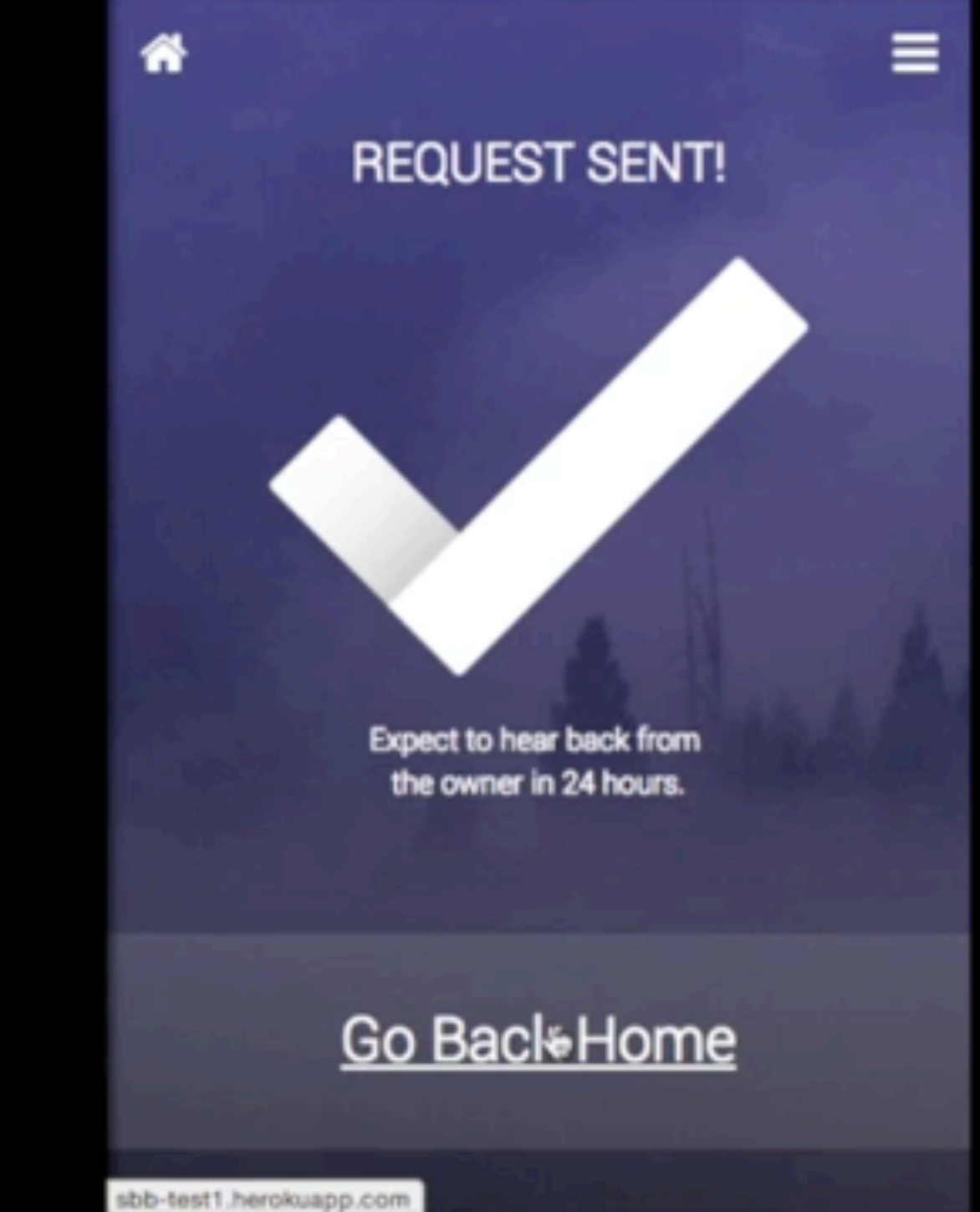
- All other business not listed below

○ Federally regulated

- Interprovincial and international services such as: railways; highway transport; telephone, telegraph, and cable systems; pipelines; canals; ferries, tunnels, and bridges; shipping and shipping services;
- Radio and television broadcasting, including cablevision;
- Air transport, aircraft operations, and aerodromes;
- Banks;
- Protection and preservation of fisheries as a natural resource;
- Grain elevators; flour and seed mills, feed warehouses and grain-seed cleaning plants; uranium mining and processing.

Done Internet

start Human Resources Ma... 8:21 PM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Expect to hear back from the owner in 24 hours.
Go Back Home
sbb-test1.herokuapp.com

User Study: Ethical Considerations

User studies can be **stressful** and **distressing**.

- People can leave in tears if they think mistakes/confusion/etc. *reflect poorly on them*.
- People might *unintentionally reveal private information*.
- Can be *coercive* if there are power imbalances.

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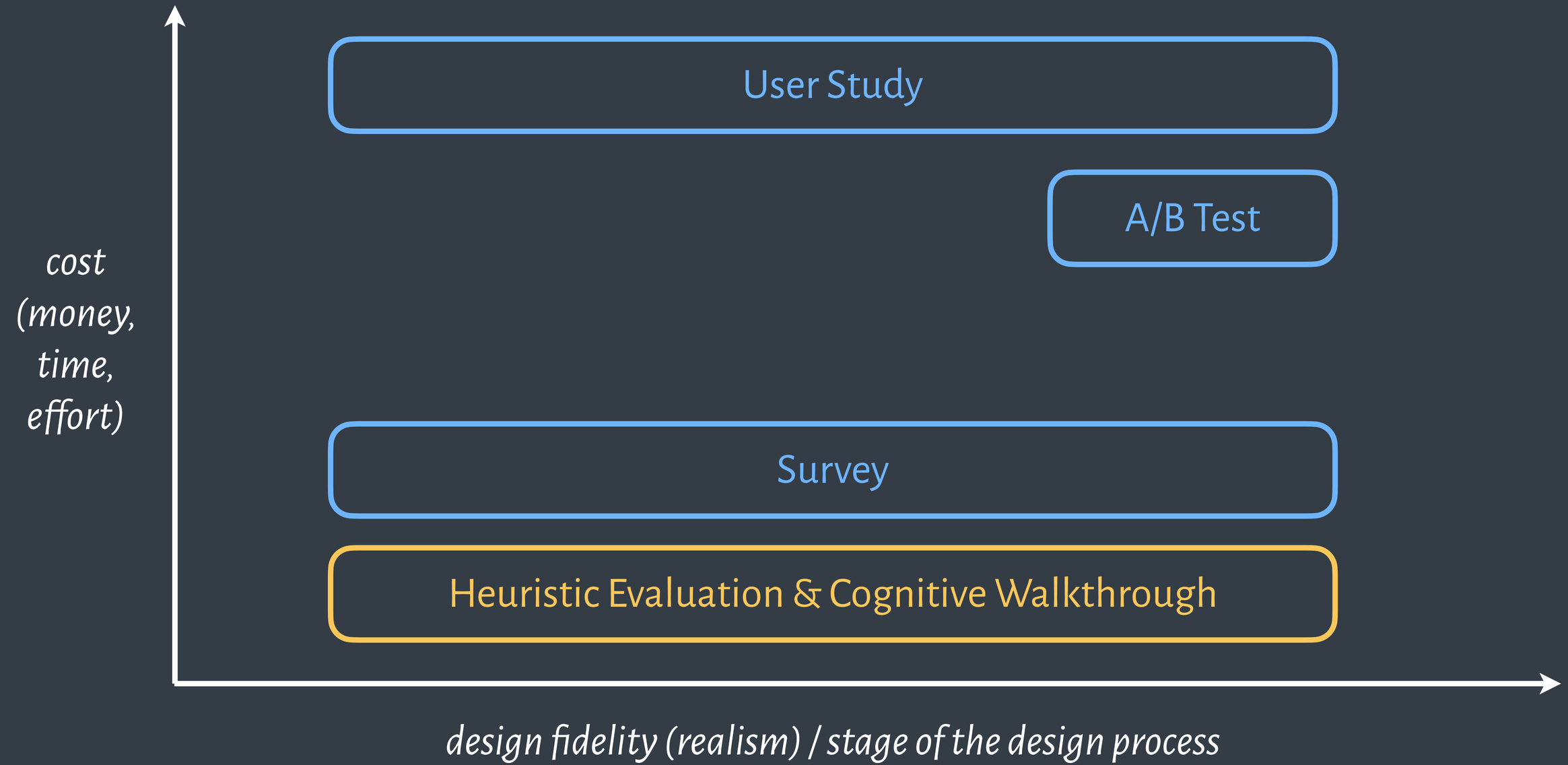
You have a responsibility to alleviate these issues:

- Participation should be **voluntary**. Solicit informed consent, without pressure to participate.
- Respect people's time, and compensate them fairly.
- Tell them they can stop at any time.
- Emphasize that you are testing the system, not the participant.
- Debrief people after the test is over.
- Anonymize data as much as possible. Store in a secure location.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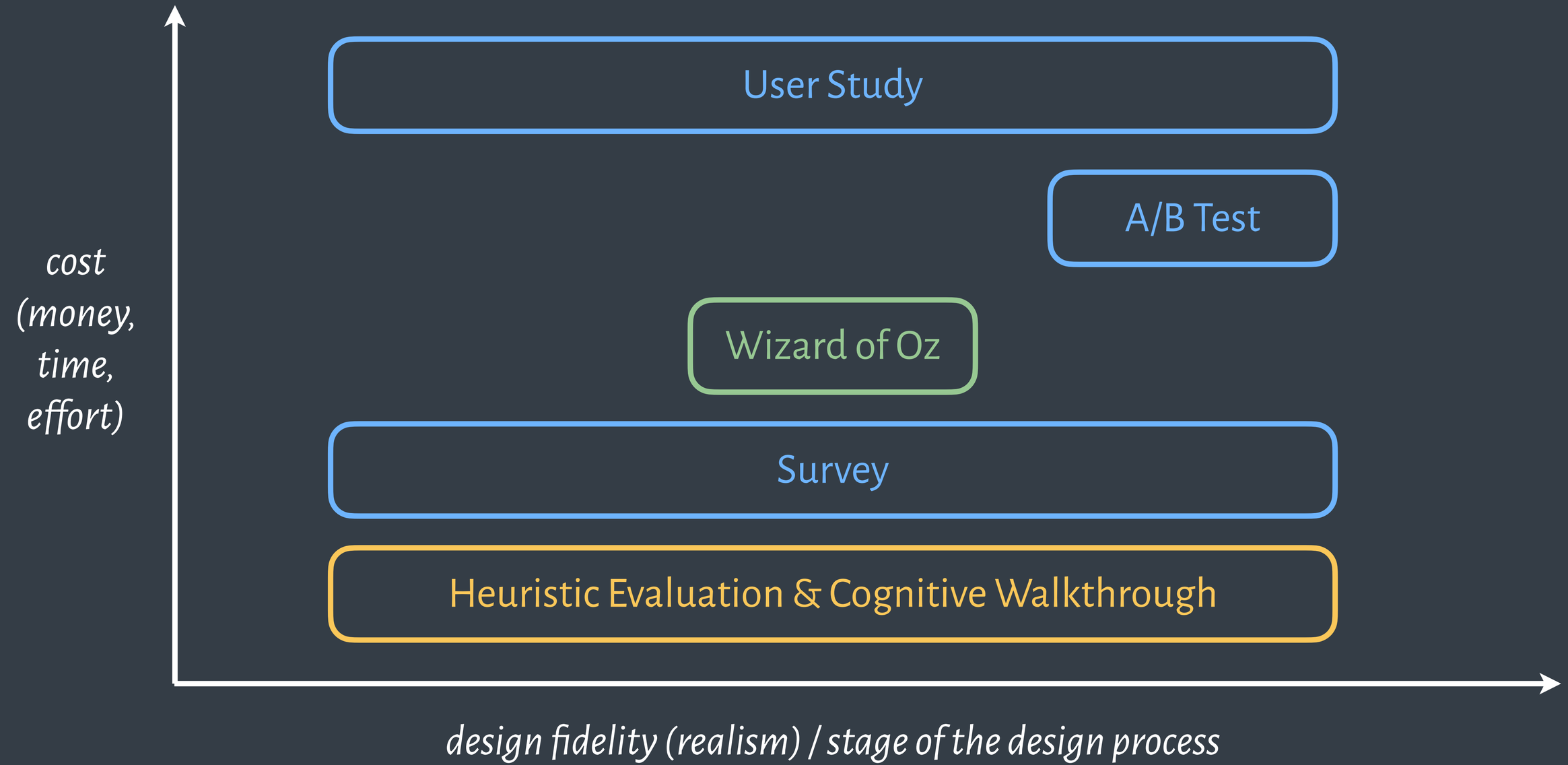
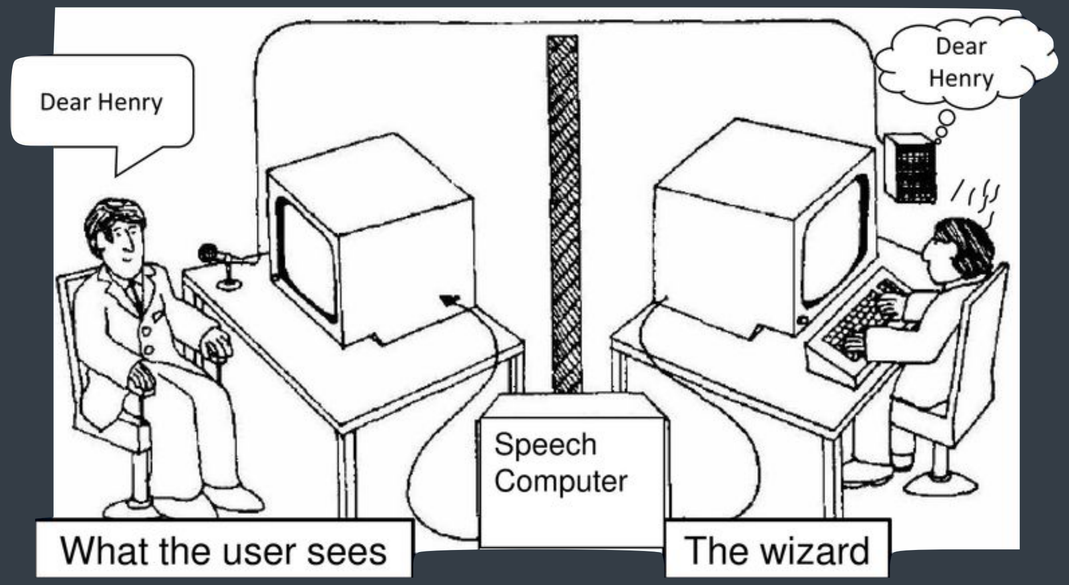

User Study
A/B Test
Wizard of Oz
Survey
Heuristic Evaluation & Cognitive Walkthrough
cost (money, time, effort)
design fidelity (realism) / stage of the design process

Wizard of Oz Technique

Make an interactive application without (much) code:

- Front end interface (hard to fake this part).
- (Remote) wizard controls the responses/backend.
- Must take less time/money than building the real thing.



Listening typewriter. Gould et al. 1984

Wizard of Oz Technique

Map out scenarios and application flow

What should happen in response to user behavior?

Put together interface "skeletons"

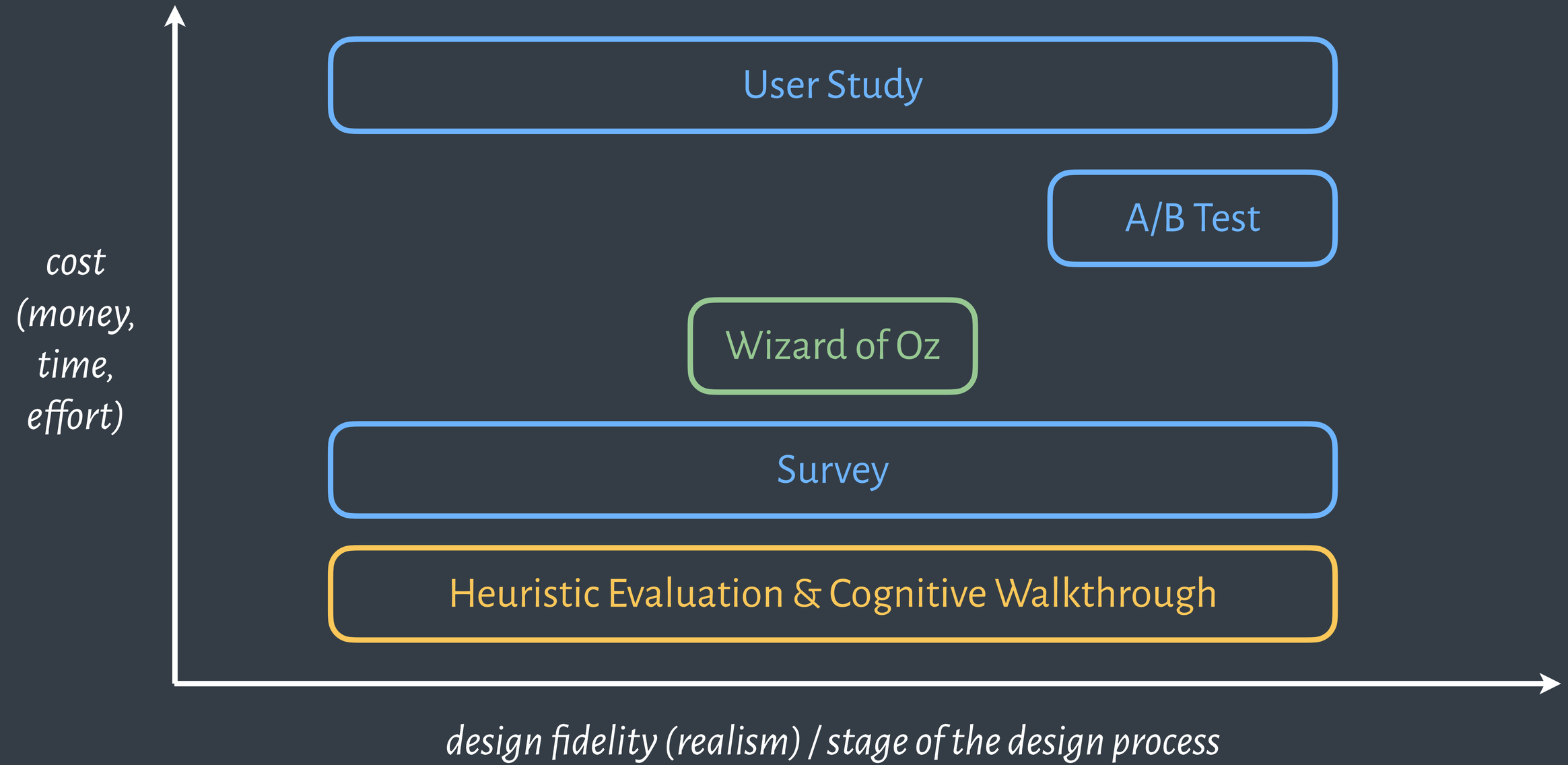
Develop "hooks" for wizard input

Where and how the wizard will provide input (e.g., selecting the next screen, entering text, entering a zone, recognizing speech, etc.)

Must be possible to replace later with computer

Rehearse wizard role with a colleague.


9
Camel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