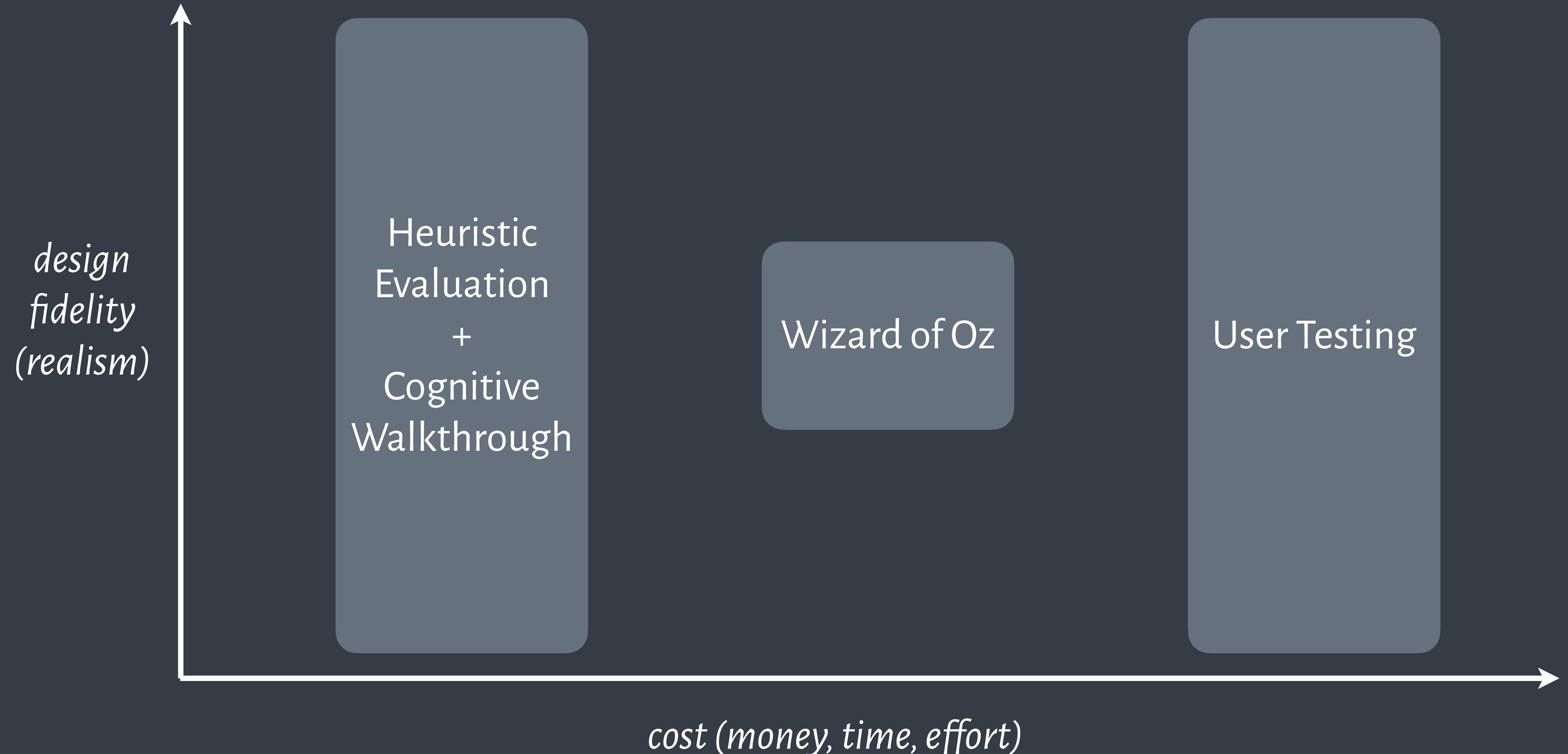
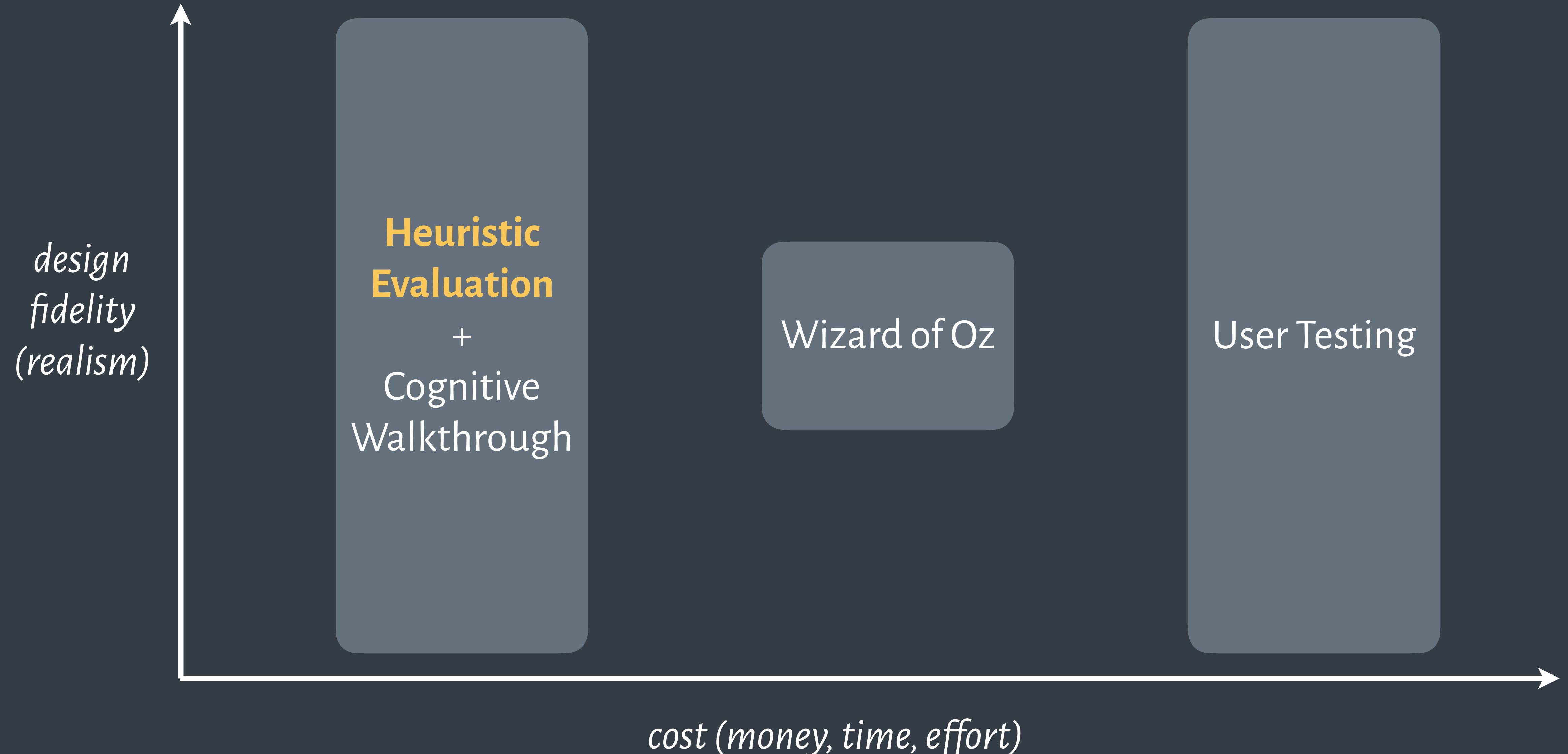


6.1040: Software Studio

Evaluating Designs & User Testing

Arvind Satyanarayan & Daniel Jackson





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.

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.

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.

Nielsen Norman Group

Jakob's Ten Usability Heuristics

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.

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.

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.

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.

Guidelines for Human-AI Interaction

1 INITIALLY

Make clear what the system can do

Help the users understand what the AI system is capable of doing.

2 INITIALLY

Make clear how well the system can do what it can do.

Help the user understand how often the AI system may make mistakes.

3 DURING INTERACTION

Time services based on context.

Time when to act or interrupt based on the user's current task and environment.

4 DURING INTERACTION

Show contextually relevant information.

Display information relevant to the users' current task and environment.

5 DURING INTERACTION

Match relevant social norms.

Ensure the experience is delivered in a way that users would expect, given their social and cultural context.

6 DURING INTERACTION

Mitigate social biases.

Ensure the AI system's language and behaviors do not reinforce undesirable and unfair stereotypes and biases.

INITIALLY

7 WHEN WRONG

Support efficient invocation.

Make it easy to invoke or request the AI system's services when needed.

8 WHEN WRONG

Support efficient dismissal.

Make it easy to dismiss or ignore undesired system services.

9 WHEN WRONG

Support efficient correction.

Make it easy to edit, refine, or recover when the AI system is wrong.

10 WHEN WRONG

Scope services when in doubt.

Engage in disambiguation or gracefully degrade the AI system's services when uncertain about a user's goals.

11 WHEN WRONG

Make clear why the system did what it did.

Enable the user to access an explanation of why the AI system behaved as it did.

WHEN WRONG

12 OVER TIME

Remember recent interactions.

Maintain short-term memory and allow the user to make efficient references to that memory.

13 OVER TIME

Learn from user behavior.

Personalize the user's experience by learning from their actions over time.

14 OVER TIME

Update and adapt cautiously.

Limit disruptive changes when updating and adapting the AI system's behaviors.

15 OVER TIME

Encourage granular feedback.

Enable the user to provide feedback indicating their preferences during regular interaction with the AI system.

16 OVER TIME

Convey the consequences of user actions.

Immediately update or convey how user actions will impact future behaviors of the AI system.

17 OVER TIME

Provide global controls.

Allow the user to globally customize what the AI system monitors and how it behaves.

18 OVER TIME

Notify users about changes.

Inform the user when the AI system adds or updates its capabilities.

OVER TIME

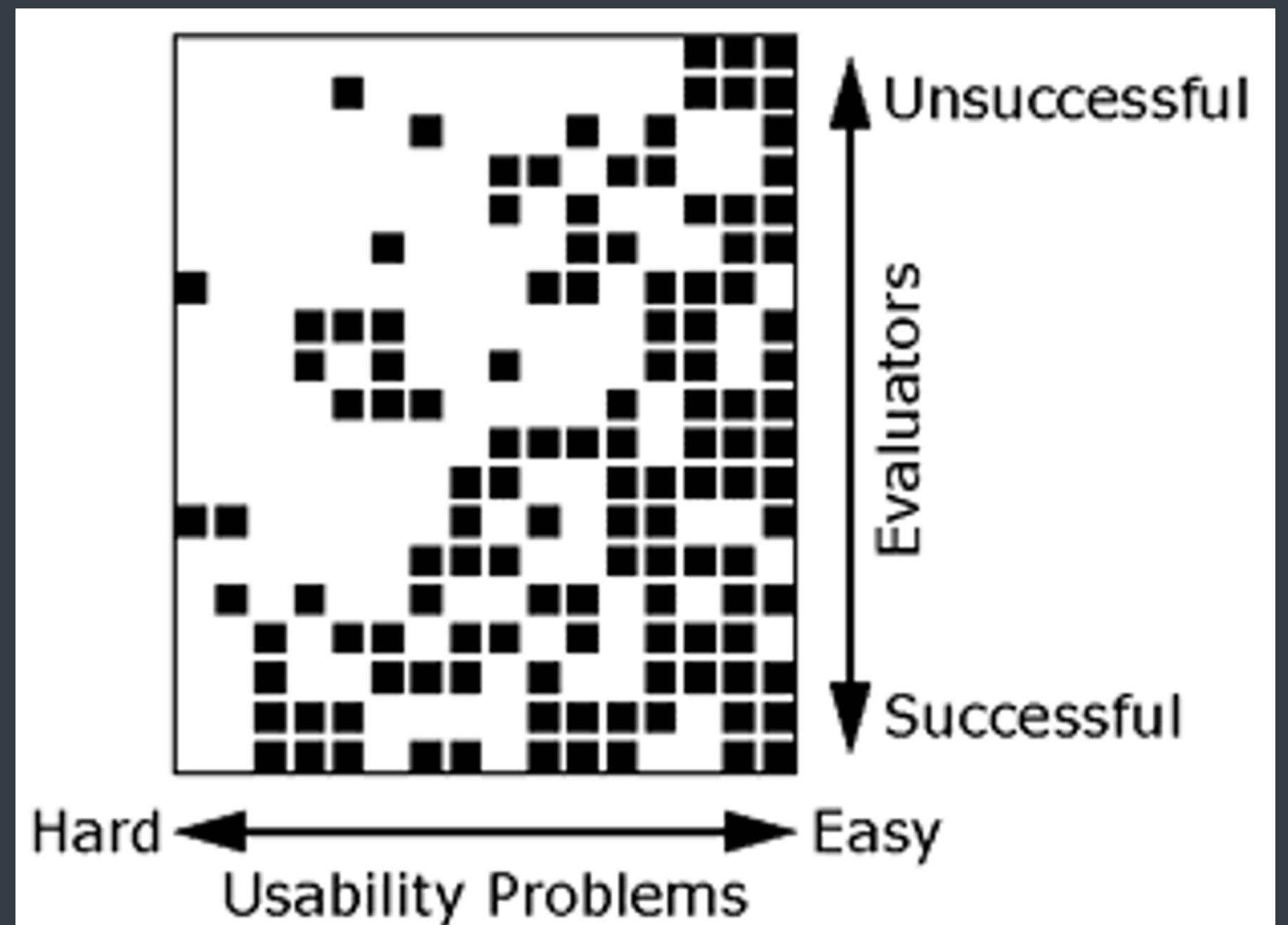
Heuristic Evaluation

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.



From Jakob Nielsen, 1992.

Heuristic Evaluation

Process.

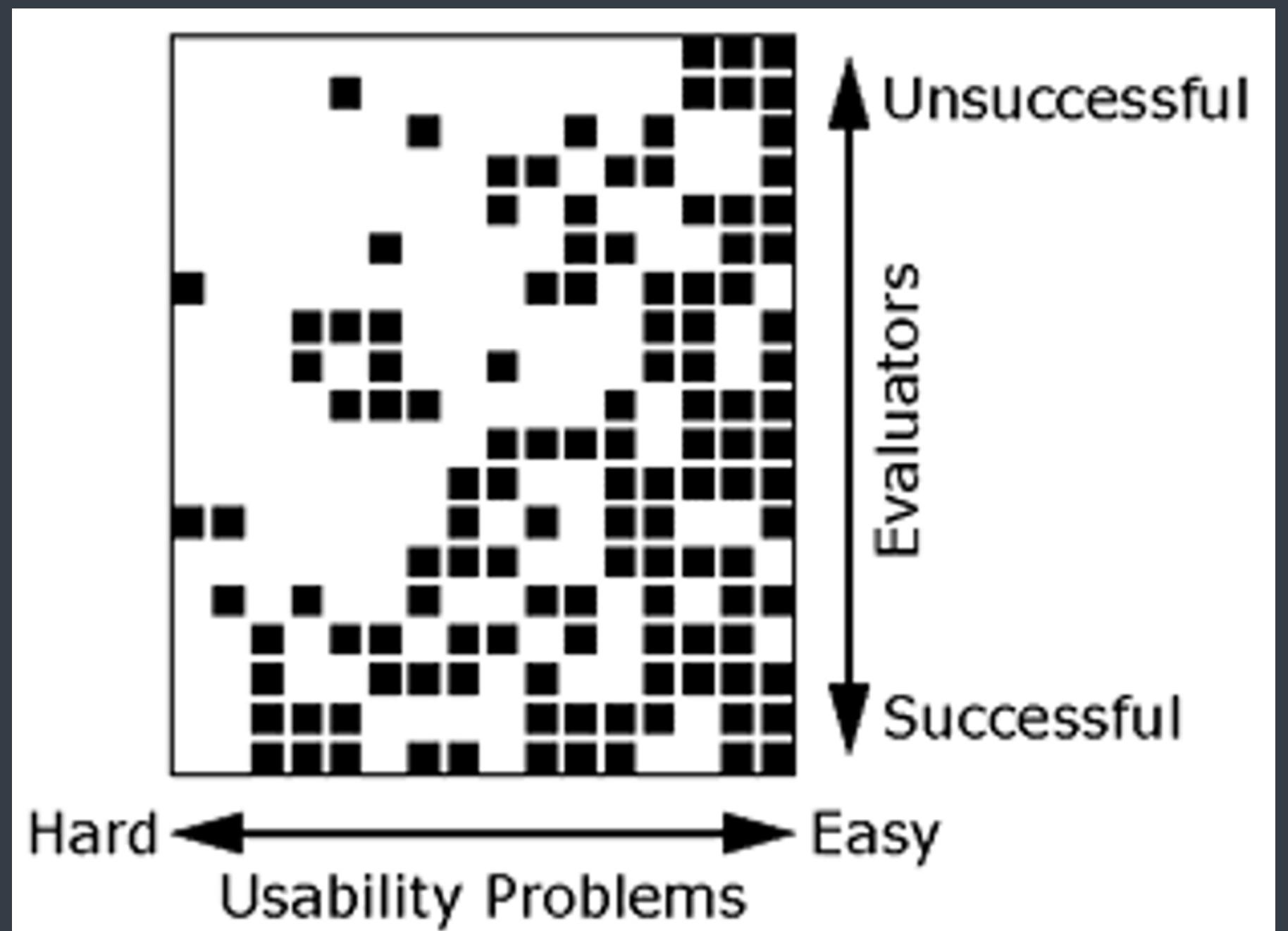
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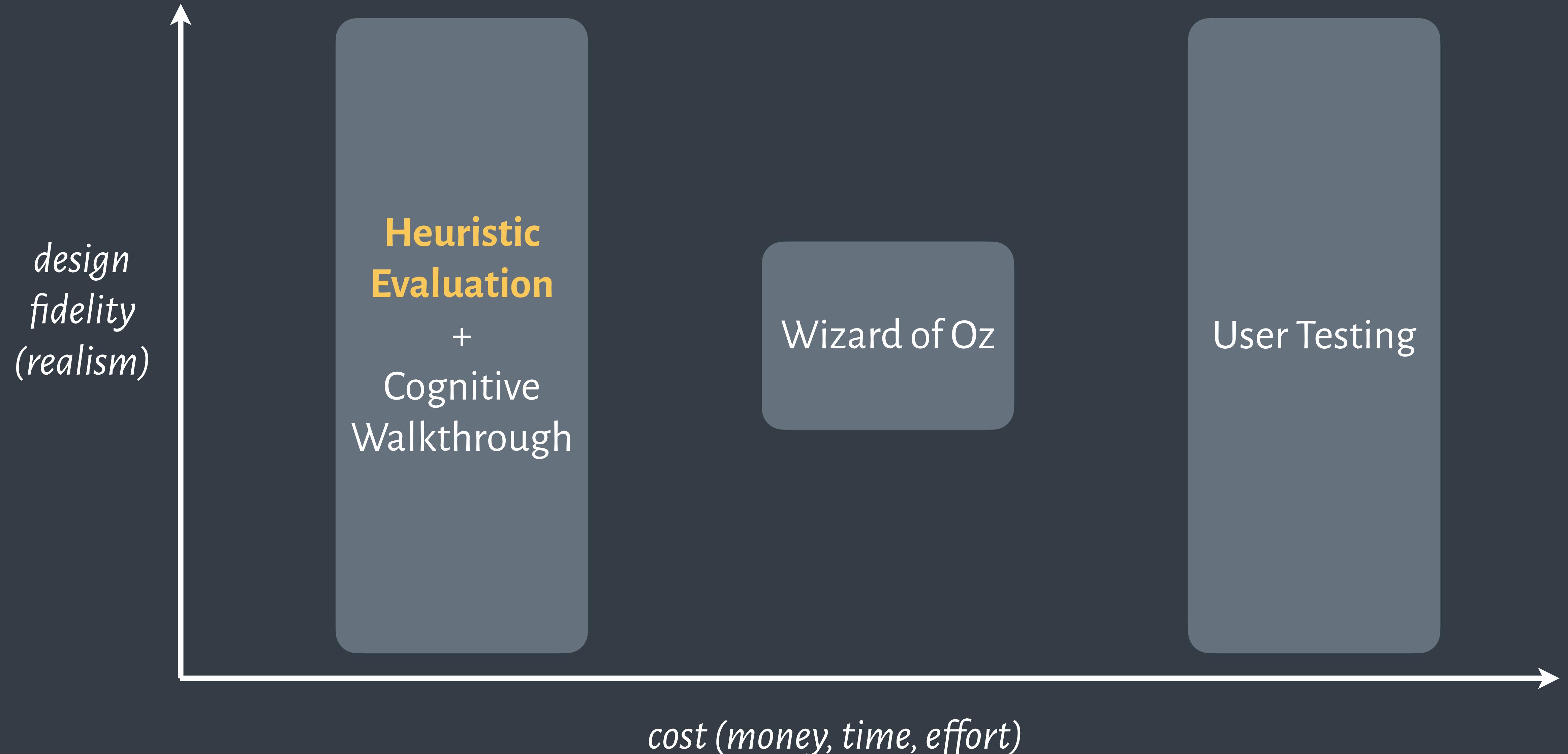
Only communicate at the end.

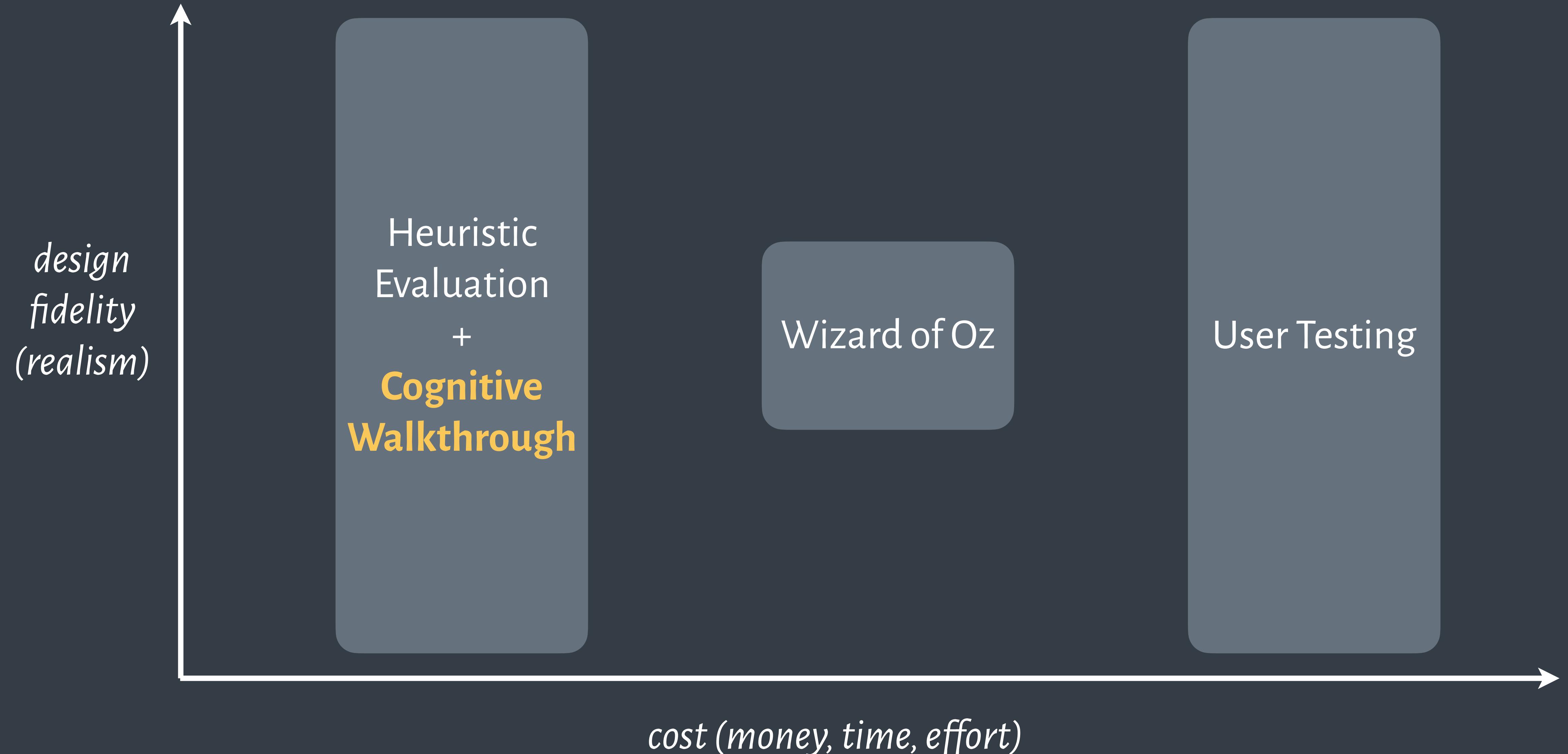
Pros and Cons.

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



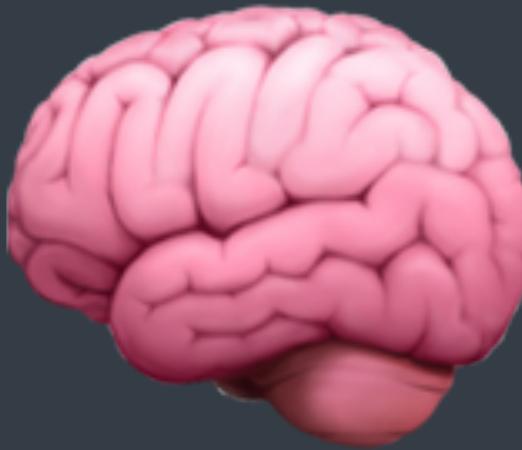
From Jakob Nielsen, 1992.





Gulf of Execution

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



Gulf of Execution

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



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?



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.

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

Cognitive Walkthrough

Questions.

How easily can a user...

1. know they need to do something?
2. notice the correct action is available, and associate it with what they're trying to do?
3. based on what occurs after the action is taken, know that it was the right thing to have done?
4. understand how they've made progress towards their larger goal?

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.

Cognitive Walkthrough



Process.

1. Brainstorm a set of tasks a user might wish to perform with your interface.
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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.

Tasks.

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

Cognitive Walkthrough



Process.

1. Brainstorm a set of tasks a user might wish to perform with your interface.
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3. For each action, answer the 4 questions.
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Tasks & Actions.

1. Withdraw \$40 from my checking account.
 - (i) Insert debit card
 - (ii) Enter PIN number
 - (iii) Tap \$40 on the screen
2. Deposit a check into my checking account.
3. Check the balance of my savings account.

Cognitive Walkthrough



Tasks & Actions.

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Cognitive Walkthrough



Tasks & Actions.

1. Withdraw \$40 from my checking account.
 - (i) Insert debit card
 - (1) No. Show a message on screen.
 - (ii) Enter PIN number
 - (iii) Tap \$40 on the screen
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3. Check the balance of my savings account.

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Cognitive Walkthrough



Tasks & Actions.

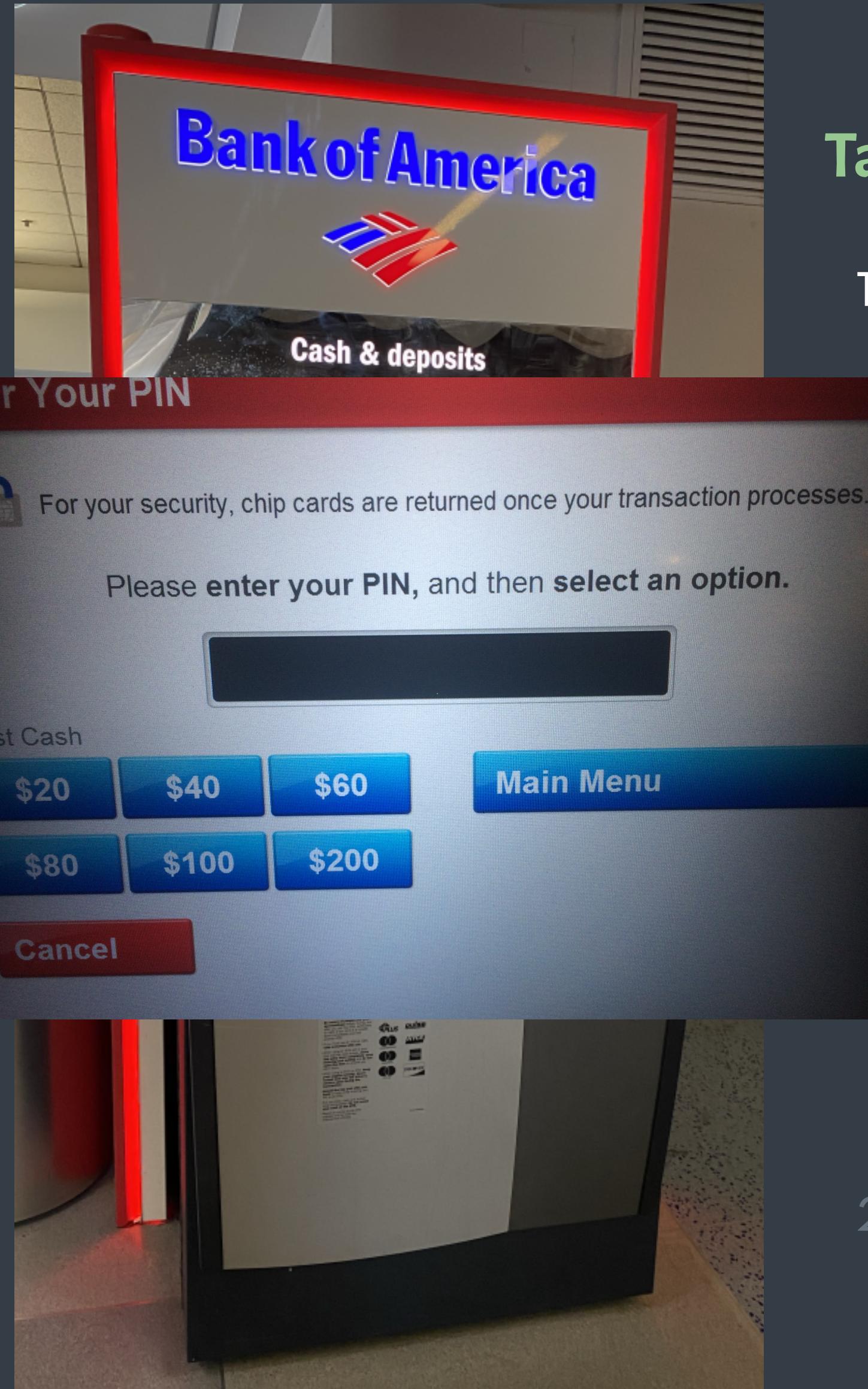
1. Withdraw \$40 from my checking account.
 - (i) Insert debit card
 - (1) No. Show a message on screen.
 - (2) No. Highlight debit card slot w/image.
 - (ii) Enter PIN number
 - (iii) Tap \$40 on the screen
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Cognitive Walkthrough



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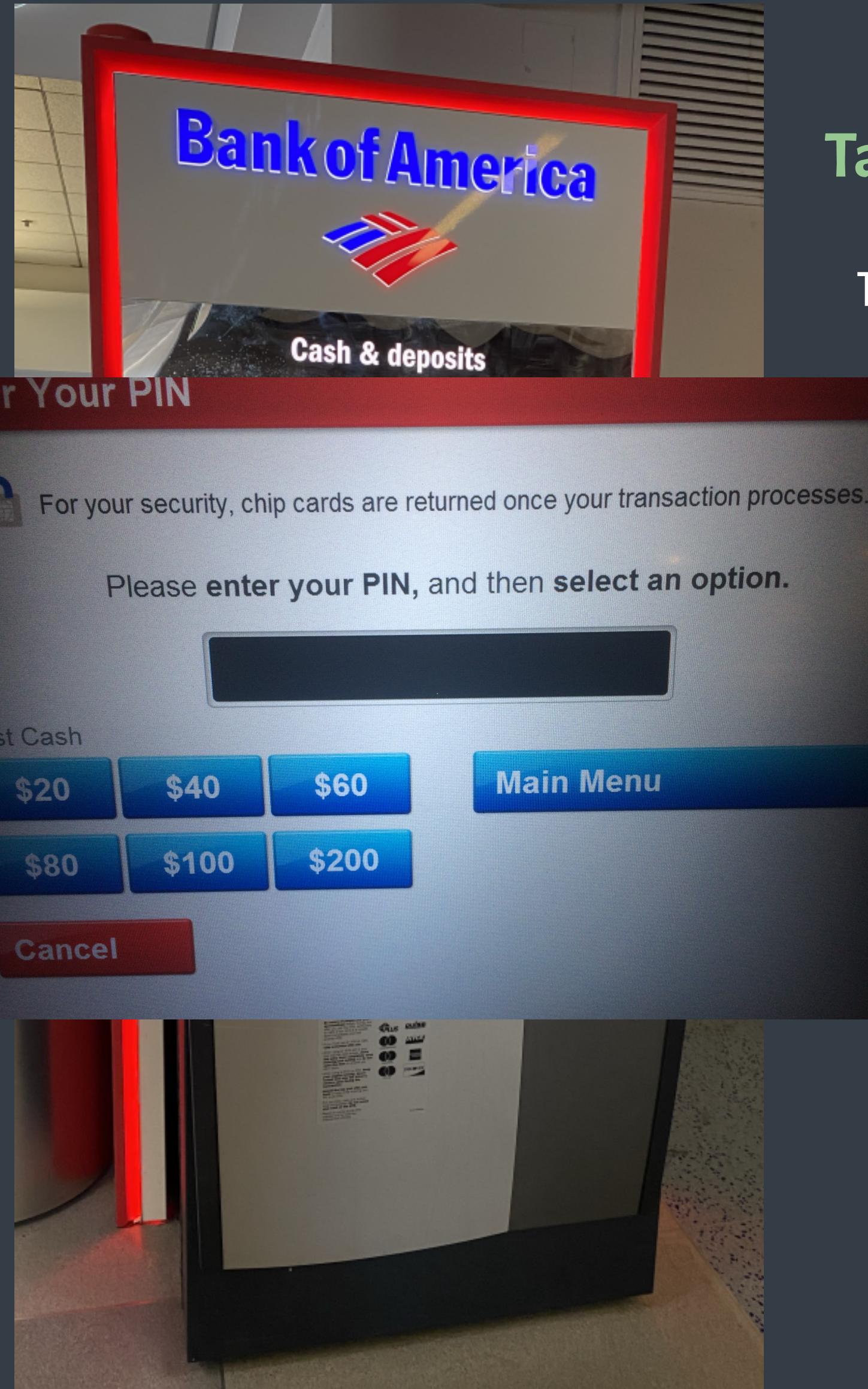
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- (4) Yes.

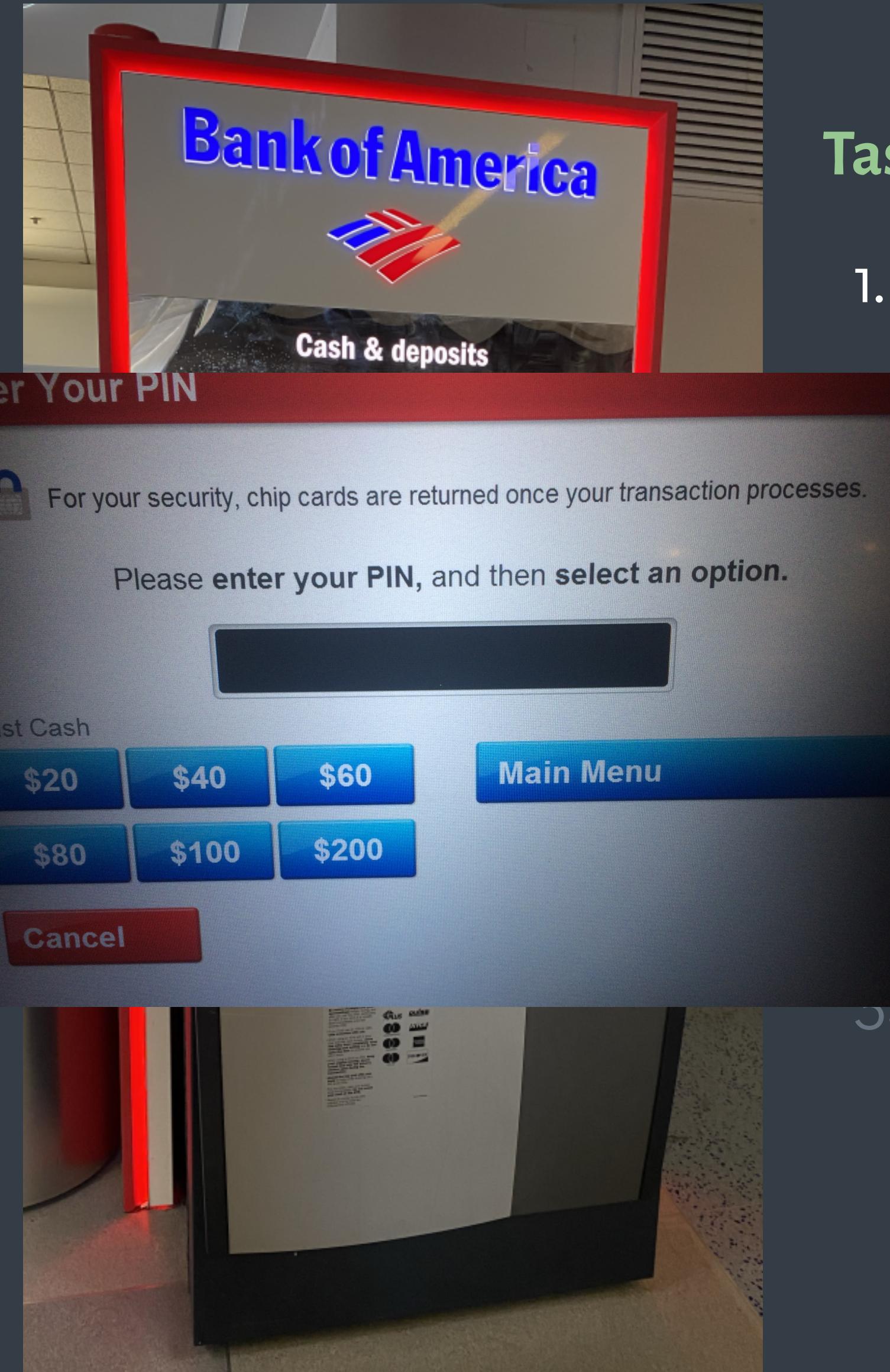
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Cognitive Walkthrough



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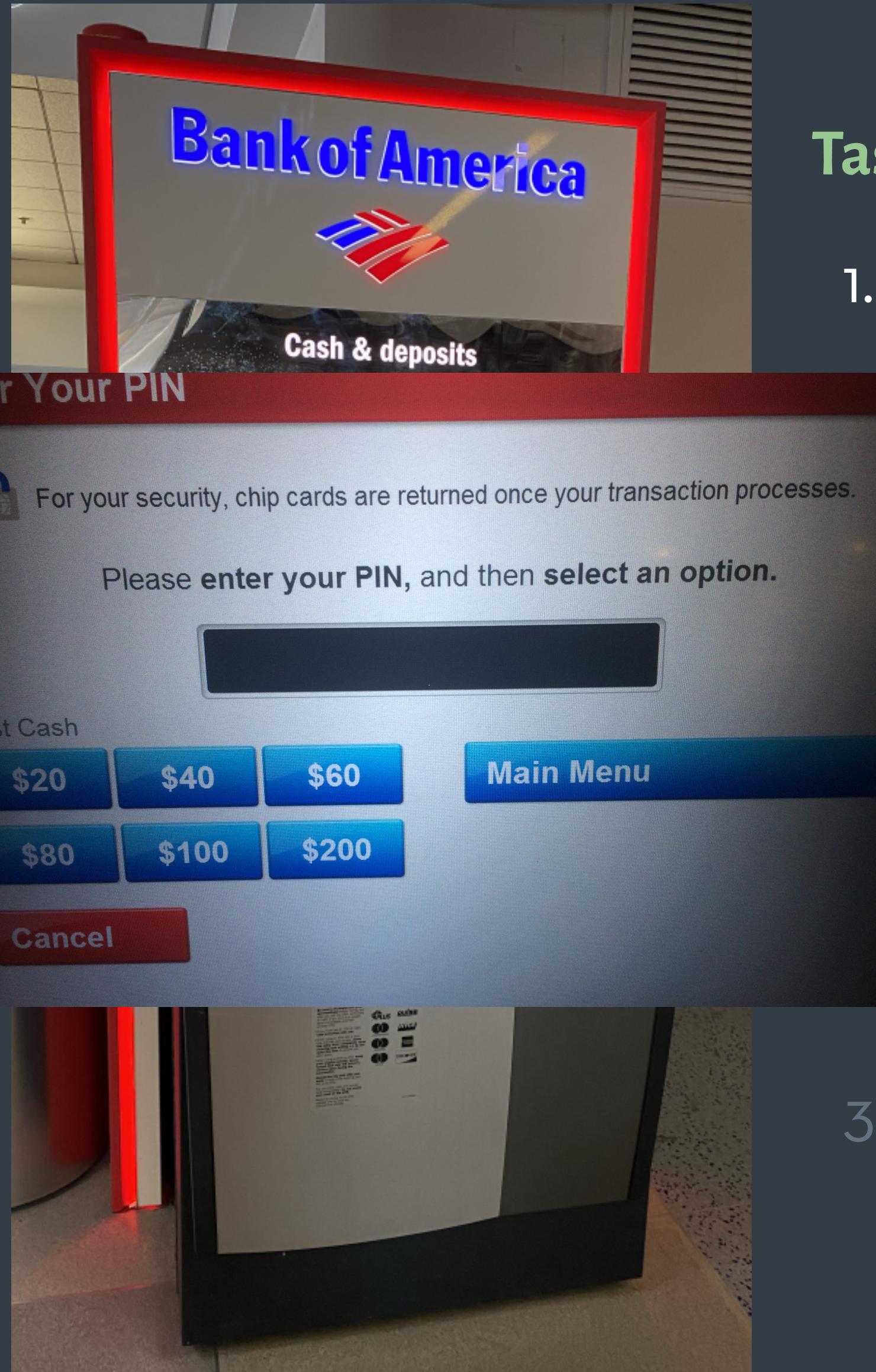
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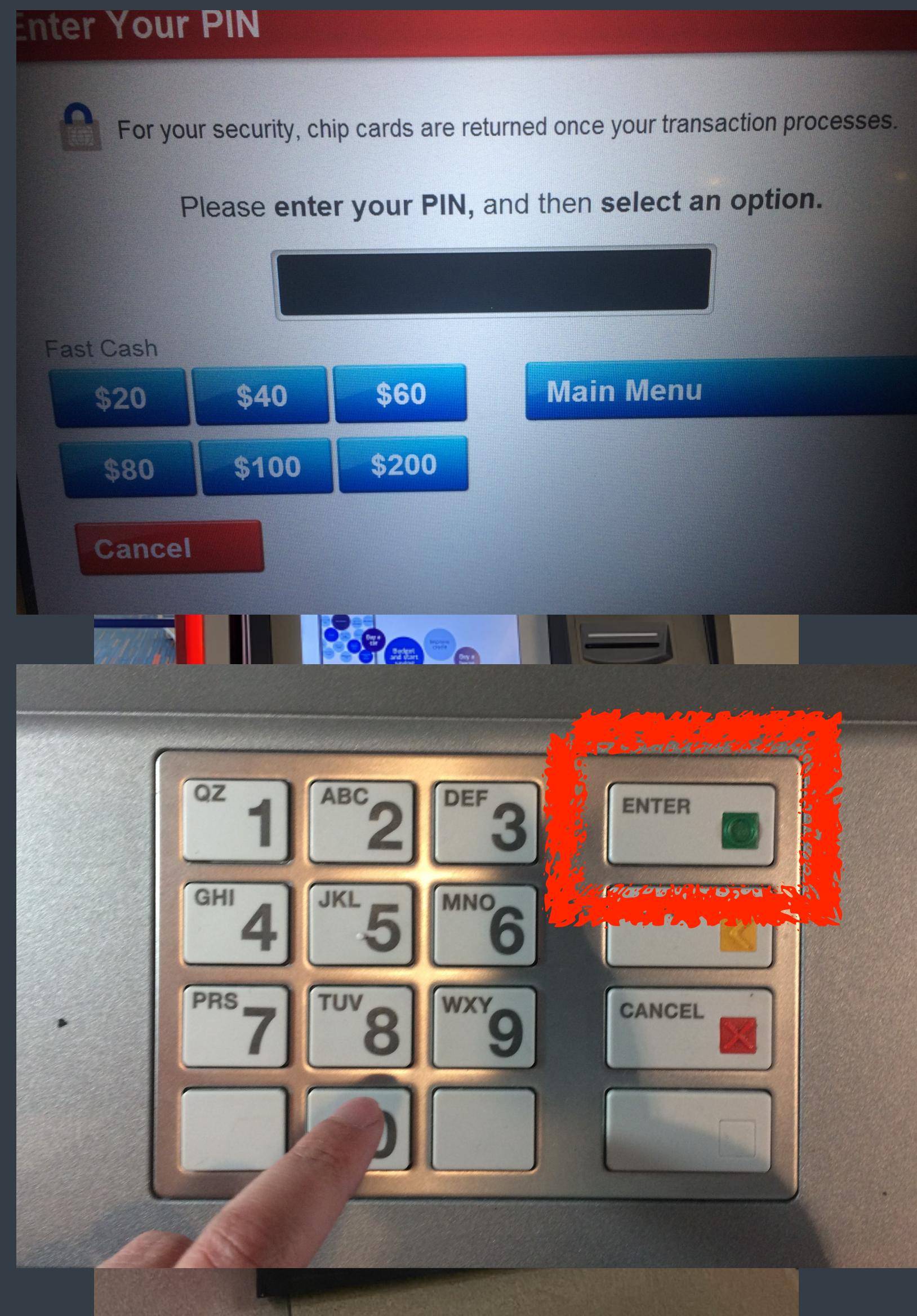
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- (3) Yes.
- (4) Yes.

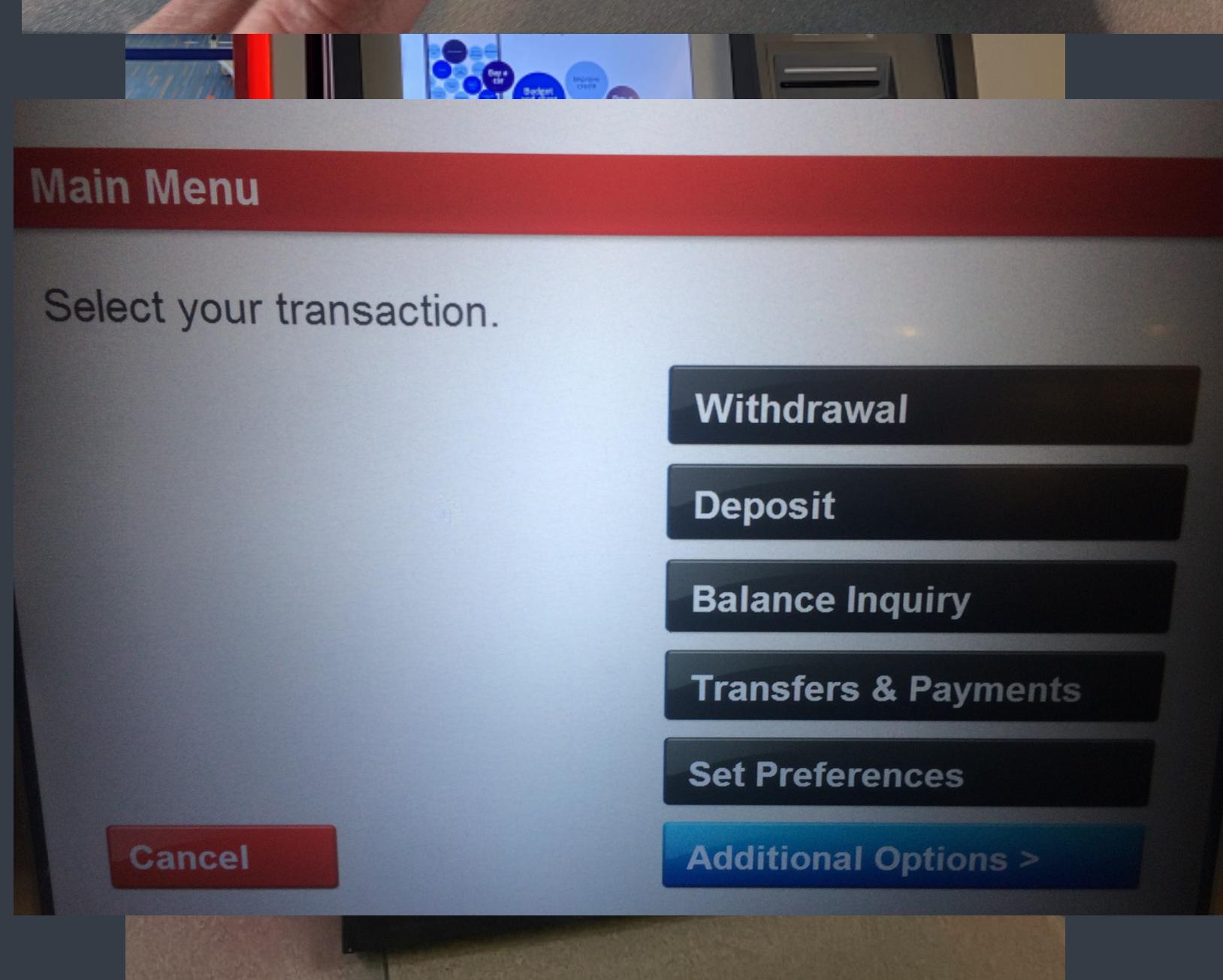
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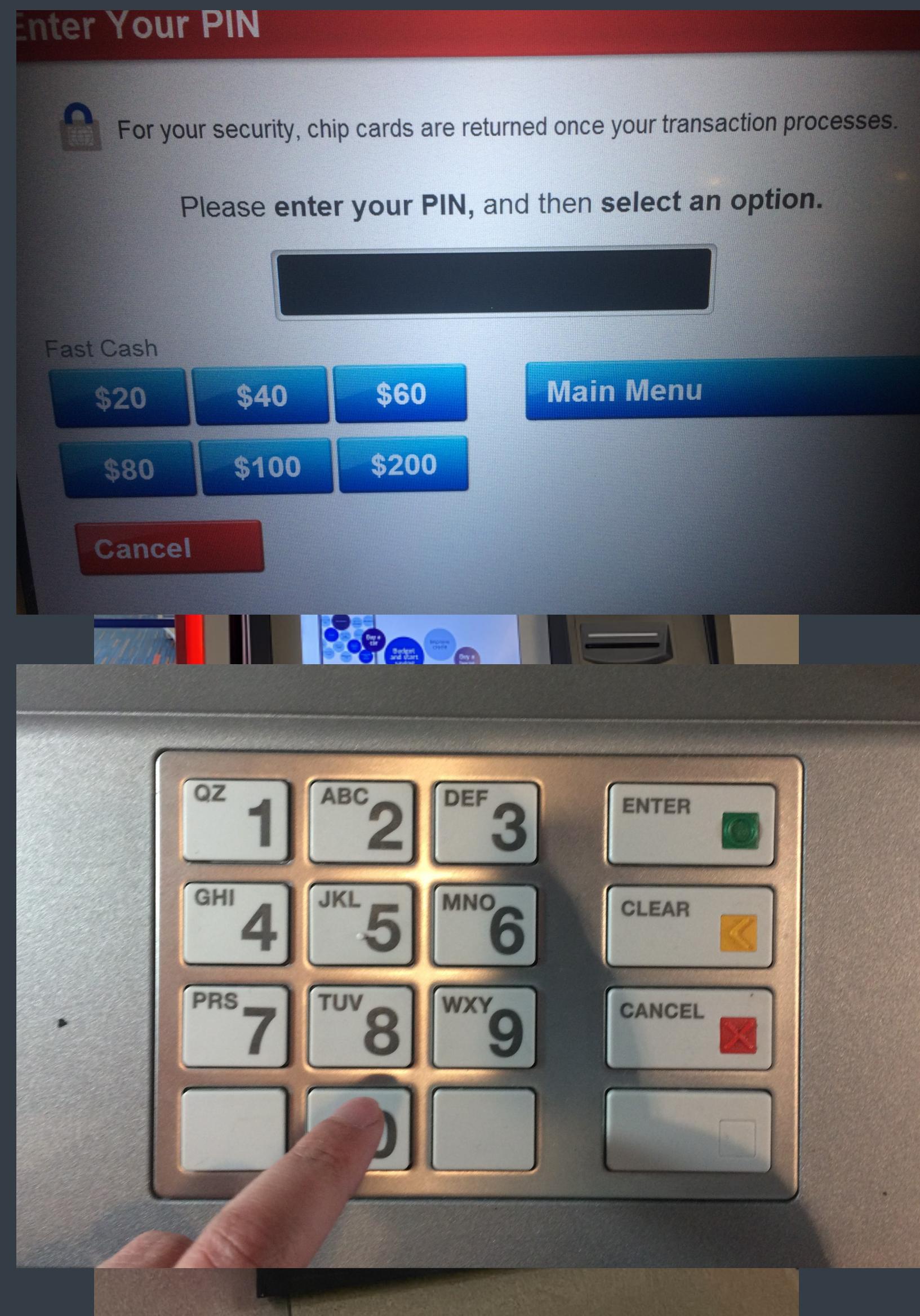
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Cognitive Walkthrough



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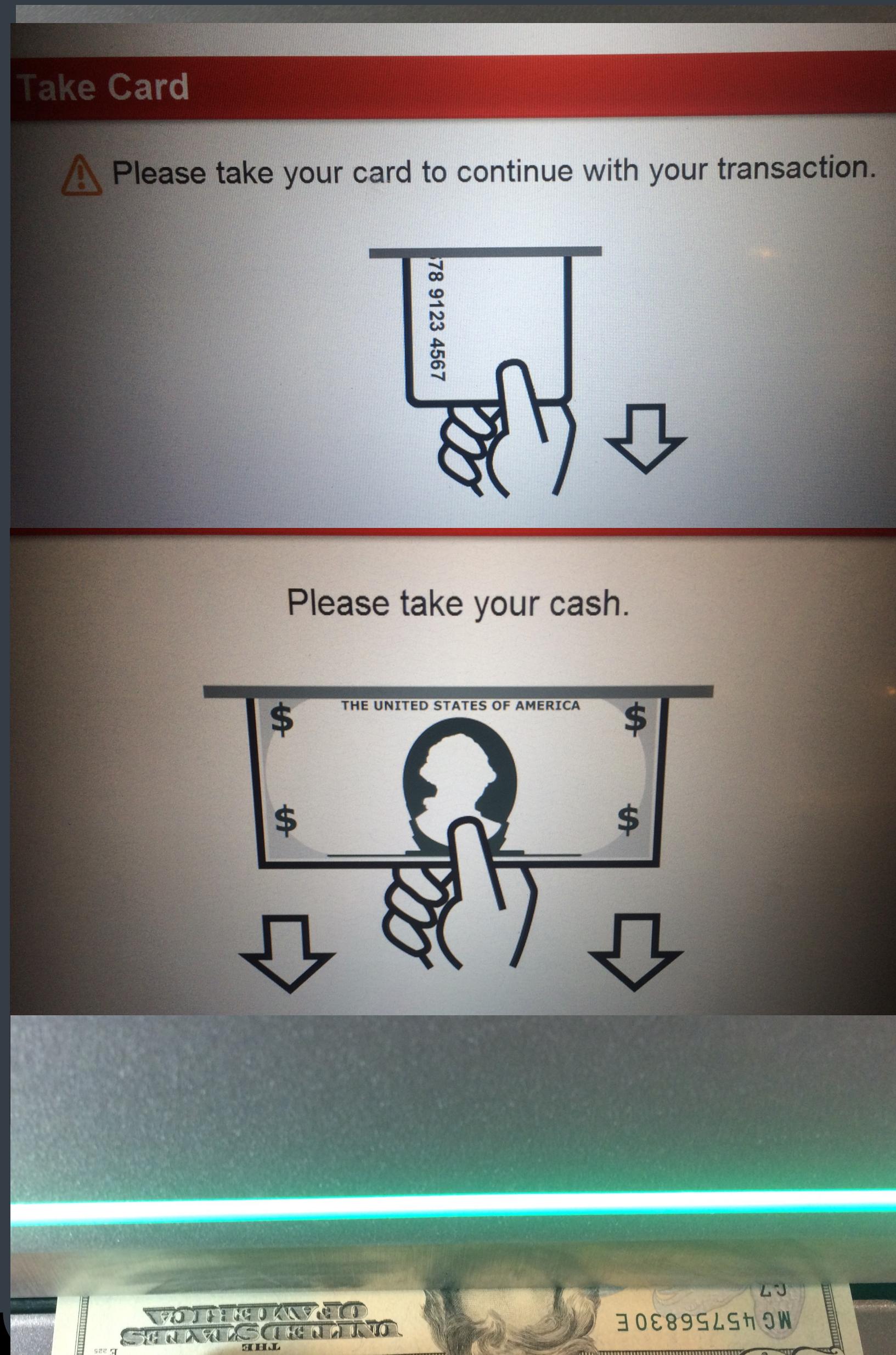
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Tasks & Actions.

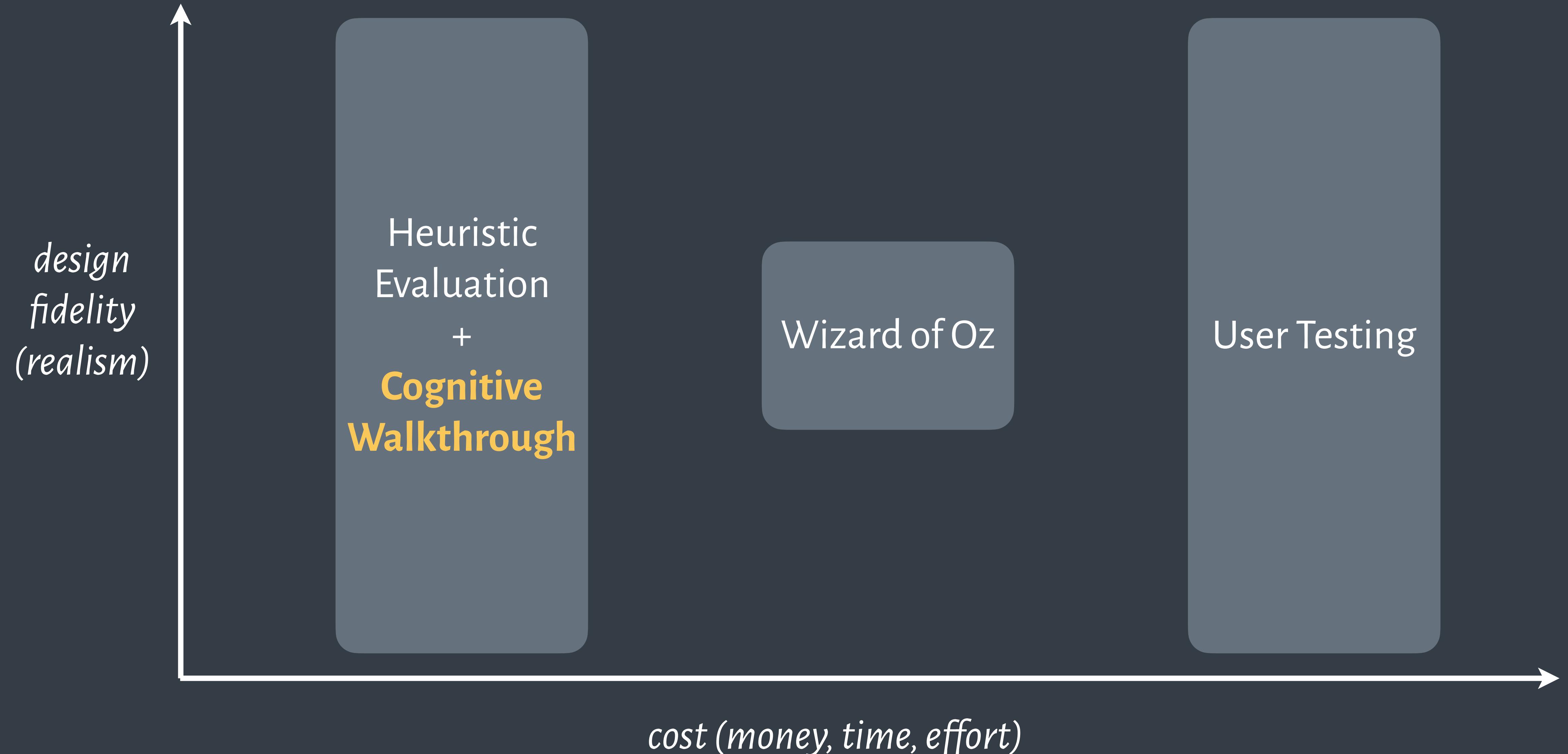
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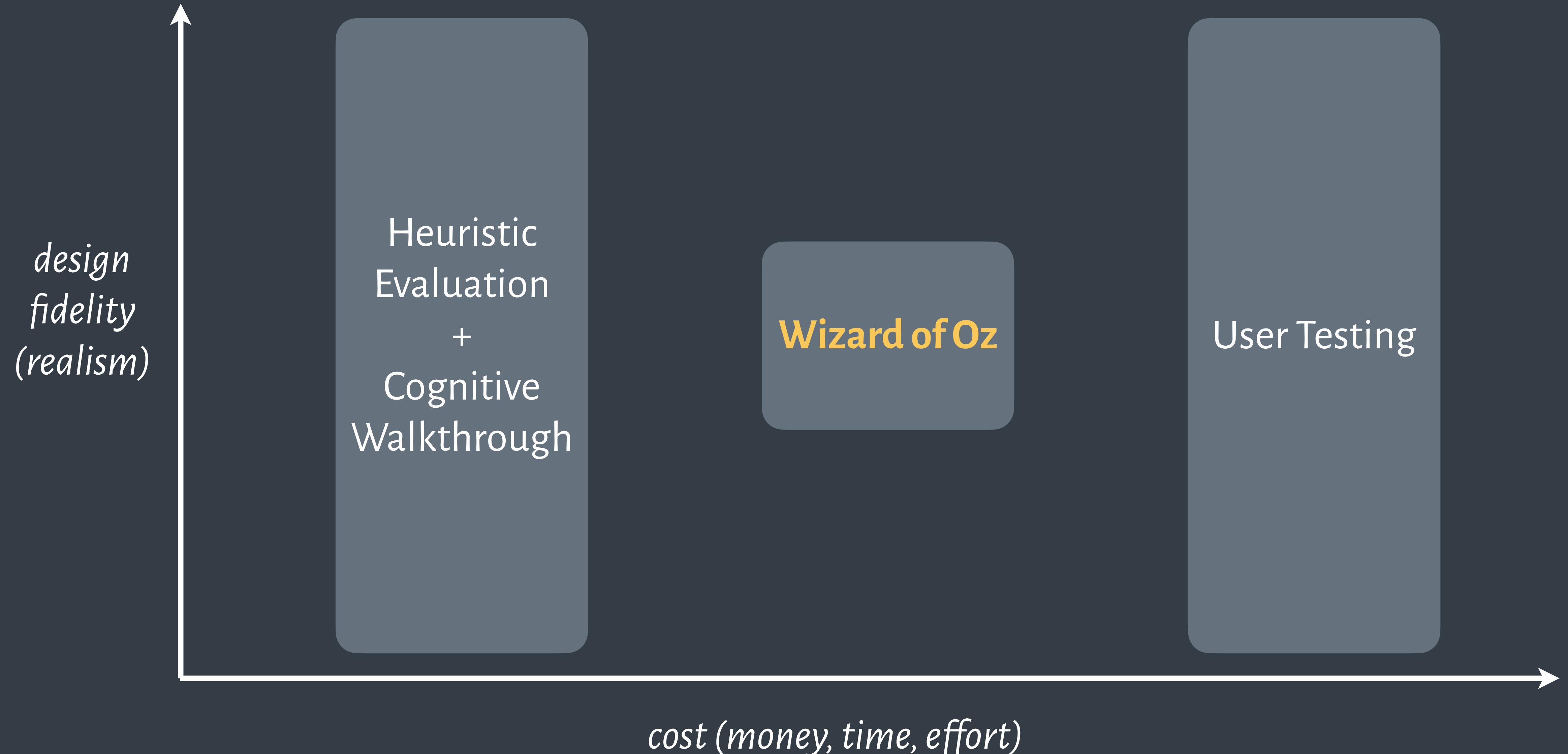
- (i) Insert debit card
- (ii) Enter PIN number
- (iii) Tap \$40 on the screen
 - (1) Yes.
 - (2) Yes.
 - (3) Yes. But message could be friendlier/clearer.
 - (4) Yes.

Questions.

How easily can a user...

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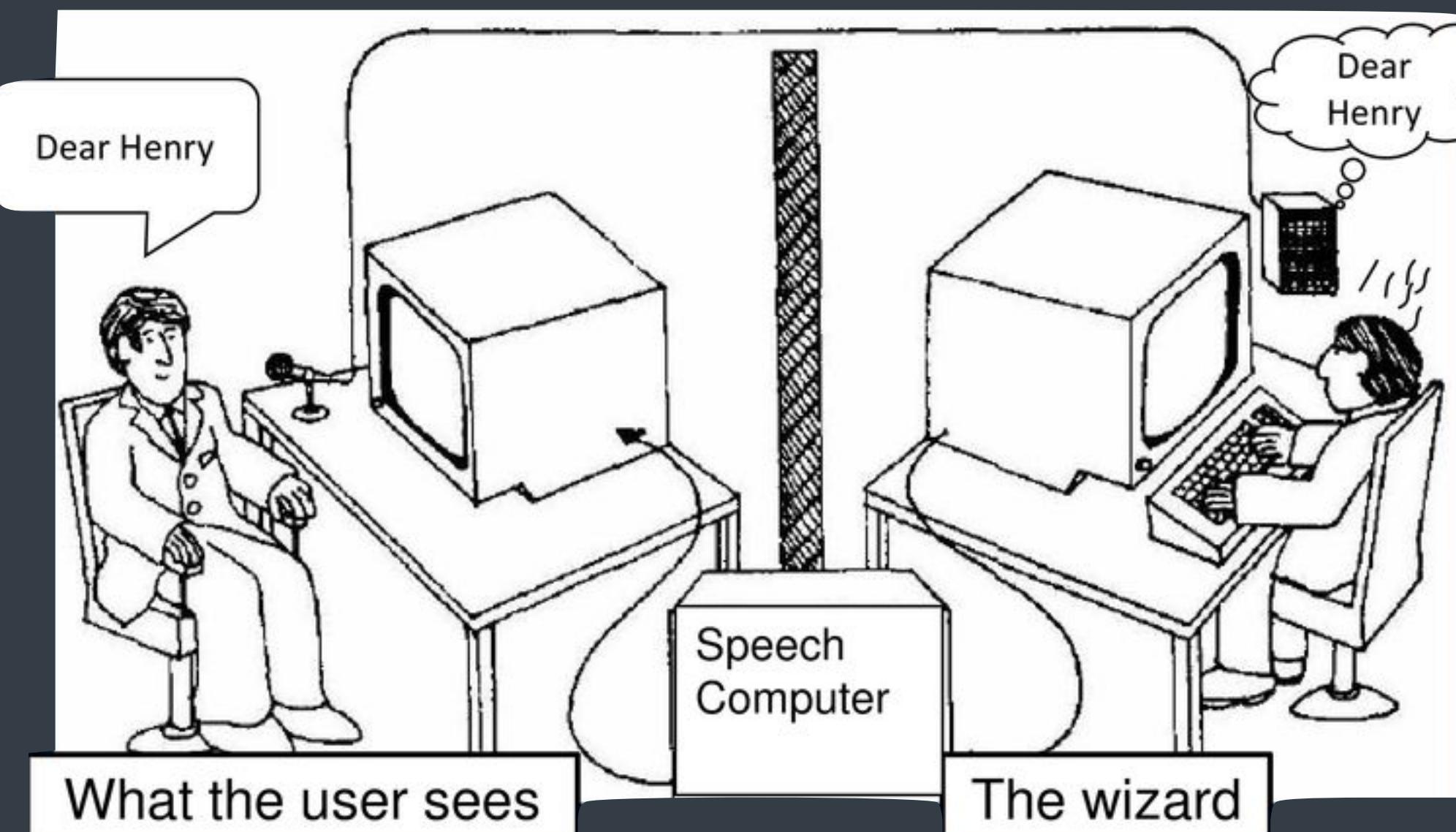
Wizard of Oz Technique

Make an interactive application without (much) code:

Front end interface (hard to fake this part).

(Remote) wizard controls the user interface.

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

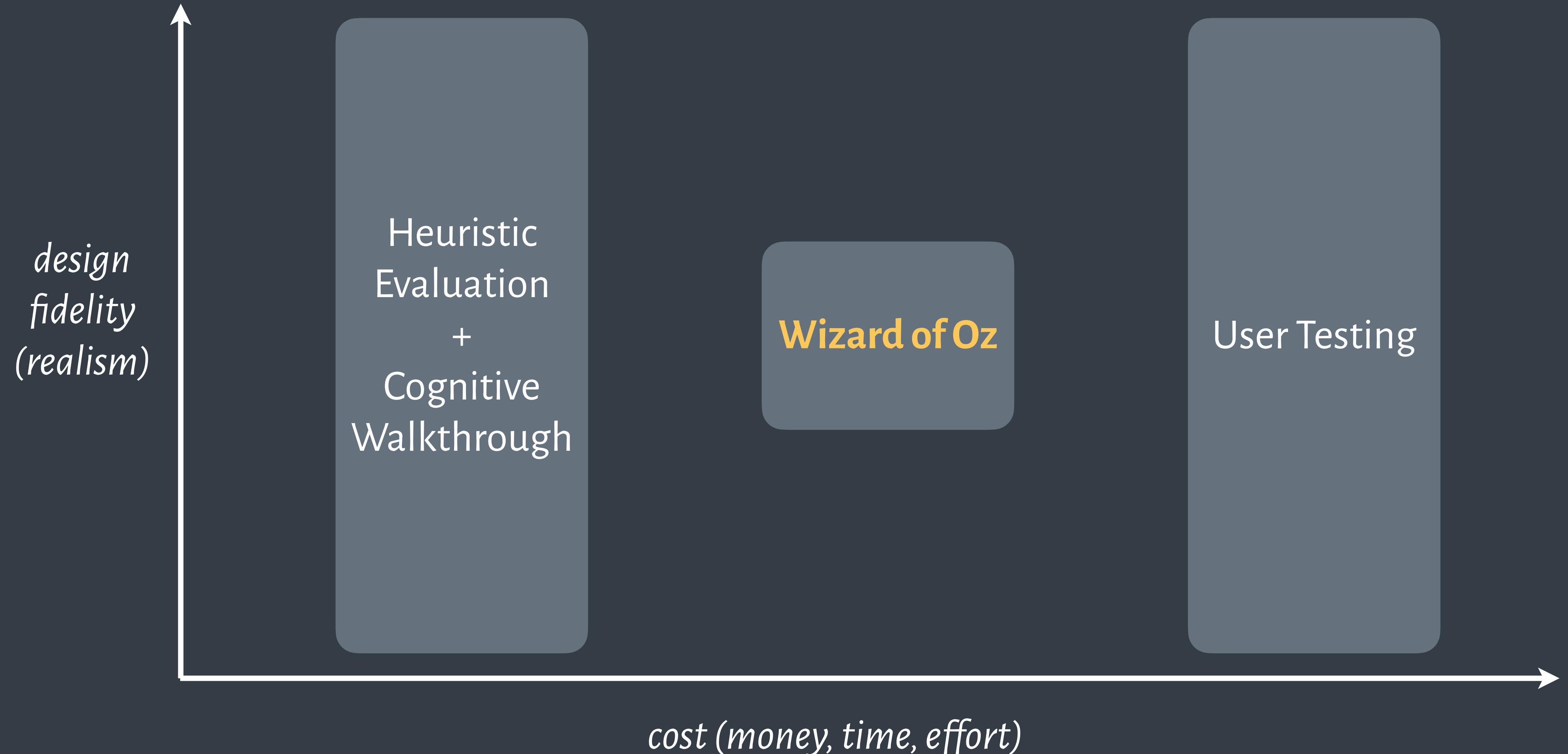
Where and how the wizard will provide input (e.g., selecting the next screen, entering text, entering a zone, recognizing speech, etc.)

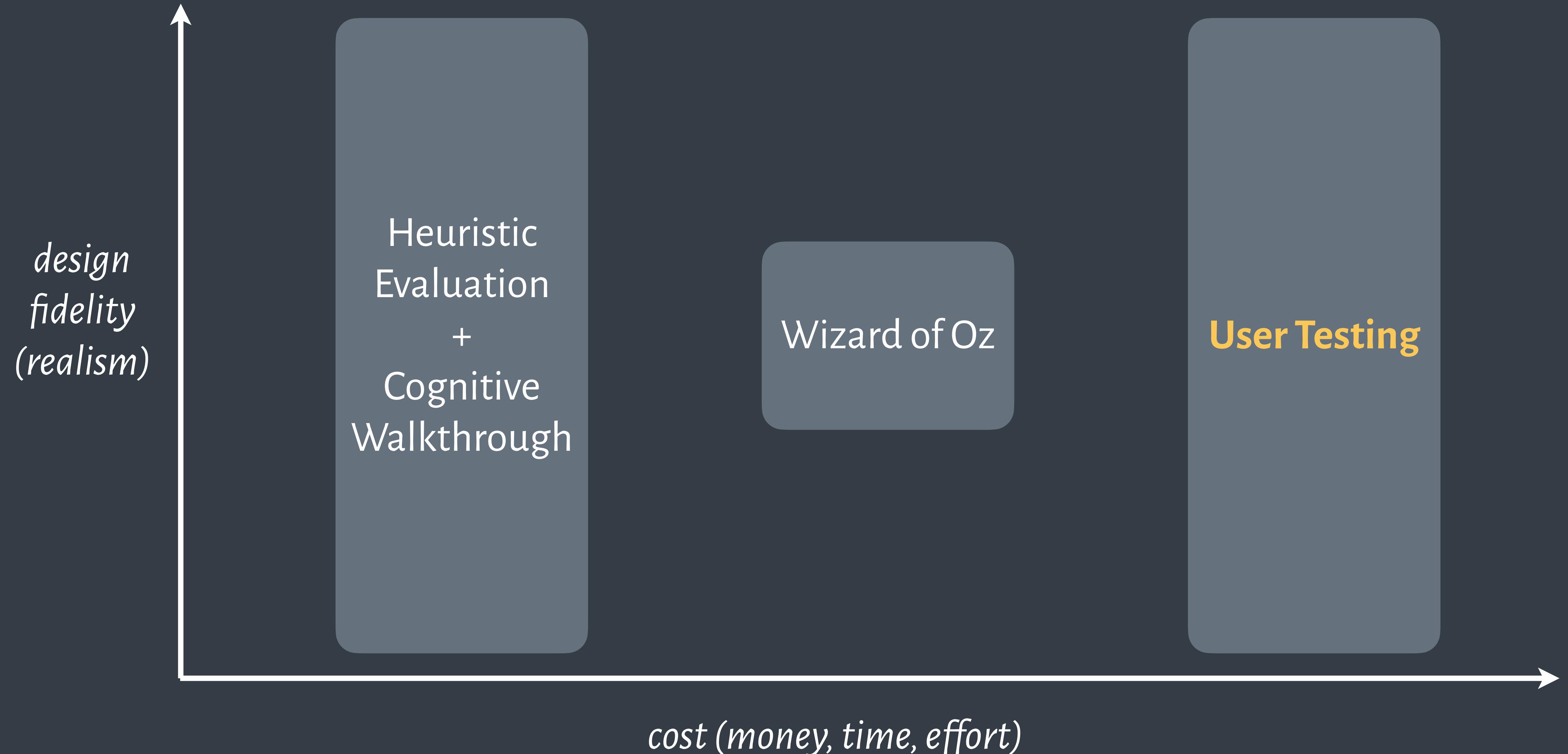
Must be possible to replace later with computer

Rehearse wizard role with a colleague.

up 9
nny, Camel
ana







Surveys

Bank of America® Advisory Panel

BANK OF AMERICA

12%

How often do you use Bank of America's website for online banking?
(Select one)

- More than once per day
- Once a week
- Every other week
- Once a month
- Every other month
- A few times a year
- I don't use online banking

Twitter Surveys @TwitterSurveys
We've selected a group of users for a brief survey. Please answer a few quick questions! analytics.twitter.com/research/

How often do you use emojis?

- Always
- Often
- Sometimes
- Rarely
- Never

What type of media do you Tweet with on Twitter?

- GIFs
- Photos
- Videos
- Vines
- Other / None of the above

Why do you use emojis? [select all that apply]

- To express my feelings
- To tell something that words wouldn't easily express
- To show what I'm doing at a given point in time
- They are easier to type than words
- Other / None of the above

1 of 5 questions 3 of 5 questions

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.

Surveys

Measuring user preferences.

✓ Relatively cheap to construct (e.g., can be purely textual, or

The screenshot shows a Twitter interface with two tweets. The first tweet is from Jonathan Haynes (@JonathanHaynes) dated Mar 4. It reads: "There are a wide range of topics and behaviors that appear on Face ideal world where y policies, how would private message in year old girl for sex". The second tweet is from Guy Rosen (@guyro) replying to Jonathan Haynes. It reads: "When thinking about the rules for deciding I mean, this is not the kind of topic you should be determining policy on by surveying your readers. Facebook so out of touch with the real world." Below the tweets, a large block of text from Guy Rosen continues: "We run surveys to understand how the community thinks about how we set policies. But this kind of activity is and will always be completely unacceptable on FB. We regularly work with authorities if identified. It shouldn't have been part of this survey. That was a mistake." The timestamp at the bottom is 11:36 AM - 4 Mar 2018.

shots/mockups).

large number of responses relatively quickly.

to compensate participants.

that participants say they're going to do lo.

✗ Designing surveys can be difficult.

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.

A

The screenshot shows the Highrise website's "Plans & Pricing" page. At the top, there is a navigation bar with links: Tour, Why Highrise?, Extras & Add-ons, iPhone, Help/Support, Plans & Pricing, and Sign in. Below the navigation, a large heading says "Start a Highrise Account". A sub-headline below it reads "Pay as you go. 30-day free trial on all accounts. No hidden fees." Two plan options are displayed: "Premium" and "Plus". The "Premium" plan is \$99/month and is described as "FOR POWER USERS". It includes "Up to 40 users", "30 GB storage", "Unlimited deals", "30,000 contacts", and "Enhanced security". A green "Choose Plan" button is present. The "Plus" plan is \$49/month and is described as "MOST POPULAR PLAN". It includes "Up to 15 users", "15 GB storage", "Unlimited deals", "20,000 contacts", and "Enhanced security". A green "Choose Plan" button is also present. Both plans mention a "30-day free trial on all accounts". At the bottom of the page, a blue banner states: "Everything in your Highrise account is safe, secure, and password-protected."

"Highrise does nearly everything a personal secretary might do except go out for coffee and pick up our dry cleaning."

washingtonpost.com

B

The screenshot shows the same "Plans & Pricing" page as the first one, but with a prominent red box highlighting a promotional offer. The red box contains the text "30-day Free Trial on All Accounts" and "Pick a plan & sign up in 60 seconds. Upgrade, downgrade, cancel at any time." Below this, a large red callout box features a white arrow pointing up and the text "30% more signups!". The rest of the page content is identical to the first screenshot, including the "Premium" and "Plus" plan details and the "Everything in your Highrise account is safe, secure, and password-protected" banner at the bottom.

"Highrise does nearly everything a personal secretary might do except go out for coffee and pick up our dry cleaning."

washingtonpost.com

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.



A/B Testing

Know Your Contacts & Leads by Heart

Over 100,000 businesses use Highrise to manage 20 million contacts & customer relationships.

Who followed up on that new client sales lead?
Where are the notes from Monday's conference call?
What's the lawyer's mobile number? When did we last speak with her?

Highrise

See Plans and Pricing

Import recent contacts from Outlook, Excel, vCard, ACT!
Sync with calendar as you never forget to follow up.
Be clutter-free. Import Facebook or Twitter contacts to Highrise.

Highrise is the perfect fit.
Attorney at law
Workforce management services
Apple Partners software development
Cinco De Mayo international design firm

Highrise makes it easier.
Meet some more Highrise customers

Review past calls, emails, texts, and conversations.
Jordan Chang from Third Investment Company, March 1, 2010
Regarding Marketing Director Search Client
Email recipient: N/A
Subject: Marketing Director job listing

If you are reading this, expand your lead.

Stephanie Lake: Log
Emails = 17,750 Email Log
From accounts, leads,

ORIGINAL DESIGN

Highrise Highrise is an easy-to-use app for small businesses that keeps track of your contacts, clients, leads, deals, and tasks.

How to keep the upper hand in your business relationships.

The one who remembers always has an edge. Whether you're resolving a dispute or reaching out to clients, it pays to be prepared.

Here's how to get that edge by using Highrise:

- Impress with preparation. Highrise keeps a log of notes so you can recall details from past conversations. Have the whole back story when you walk into a meeting. Highrise is like an always available cheat-sheet.
- Track promises from vendors, partners and clients before a problem ever occurs. When disputes happen, you'll be ahead of the game with a dated record of the whole issue.
- Never forget to follow-up. Instead of going to your agenda, let Highrise tell you to follow up. Highrise will send you a text message or email so you never forget to make the call.
- Always know where to find everything. Stop fumbling with papers and filing cabinets. Highrise lets you attach notes and documents right on a page for the person they are about. You'll have one place to find the info you need.
- Sleep well at night. Life is easier when you have a system remembering things for you. Information goes into Highrise so you can get it out of your mind and off your shoulders.
- Declutter your email inbox. Forward emails to Highrise and they will be automatically filed under the correct contact for easy reference.
- Share with your team. It's embarrassing when your right hand doesn't know what the left is doing. Highrise gives your team one place to see the latest status. Find out who talked to a person last, what they said, and who is

On this page

- How to get an edge with Highrise
- Top ways Highrise powers you in business
- Why small business loves it
- A year. Notes. Contacts. Tasks and Deals
- Everything you need is at the upper hand in your business relationships

LONG FORM DESIGN

37.5%

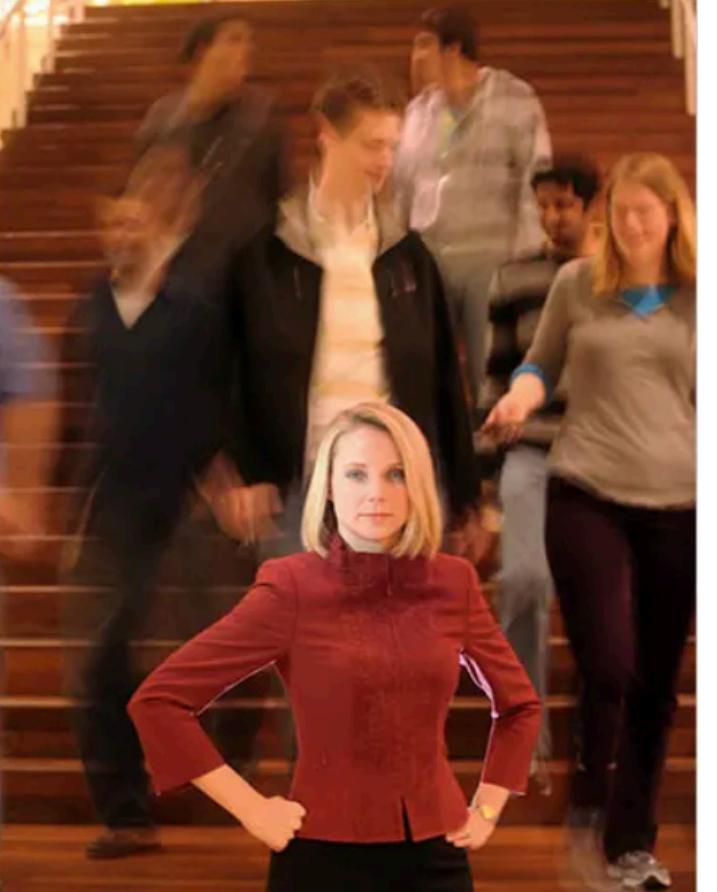
A/B Testing

The New York Times

Putting a Bolder Face on Google

Give this article Share Save

By Laura M. Holson
Feb. 28, 2009



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.

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.

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.



Lab 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.

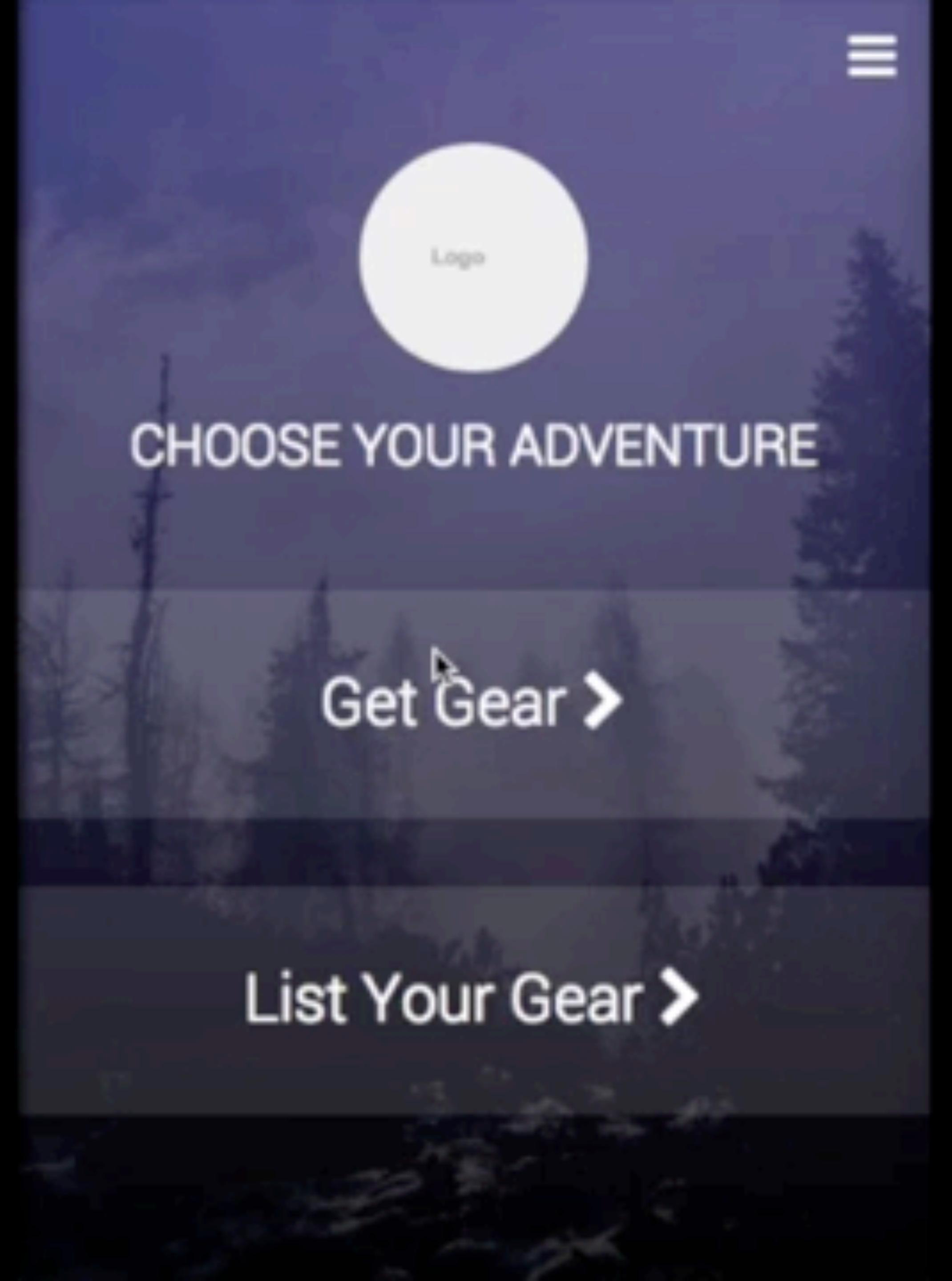
Observe your participant's **process**.

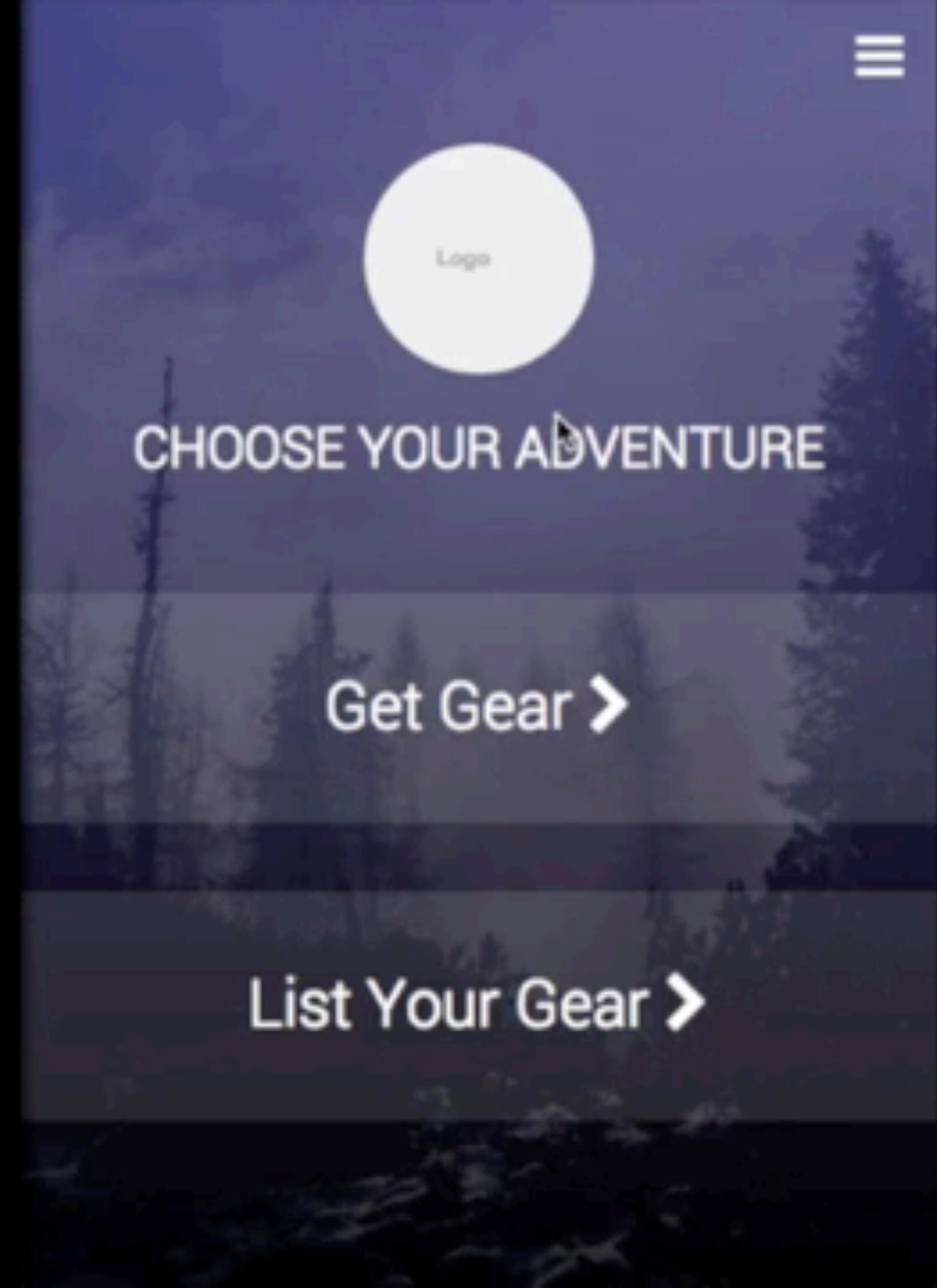
Ask them to talk out loud while performing tasks (**think aloud**)

- 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

Thinking out loud feels very strange to participants, so they will often fall silent. **Prompt them** to keep talking.

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





Lab Study

Human Resources Management - Laws and Regulations - Microsoft Internet Explorer

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HUMAN RESOURCES MANAGEMENT

◆ Home ◆ Compensation/Benefits ◆ Laws and Regulations

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 these laws and regulations.

Provincially regulated

- 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





REQUEST SENT!



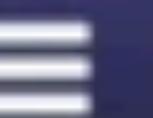
Expect to hear back from
the owner in 24 hours.

[Go Back](#) [Home](#)





5 steps to list



Write Title

Give your listing a descriptive headline



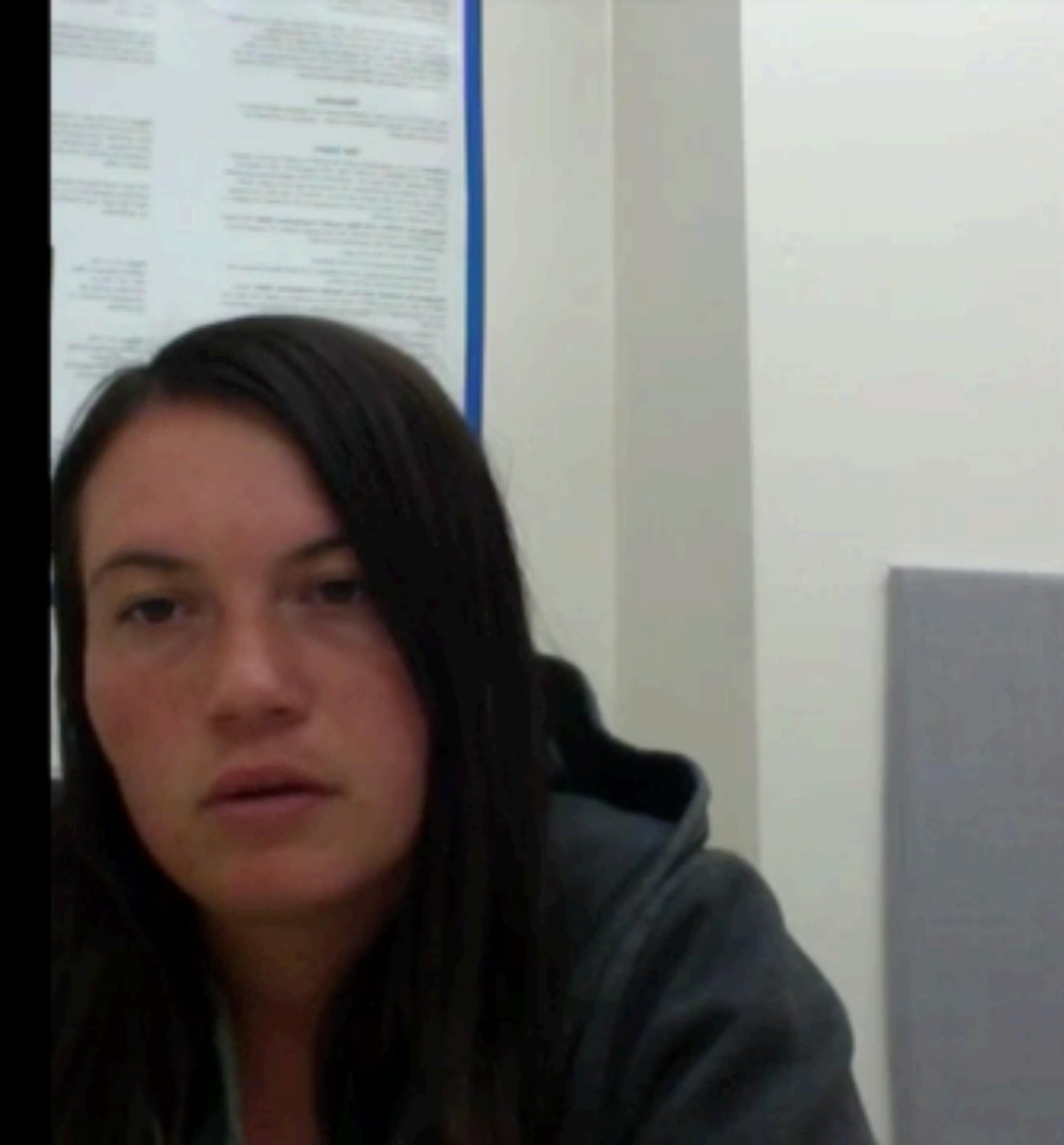
Write Description

Describe your listing's characteristics



Set Price

It's time to make money off that thing!



Lab Study: Ethical Considerations

Lab 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.

Fill Out Your MUD Cards

<http://tiny.cc/61040-fa22-mud>

Give us Feedback

<http://tiny.cc/61040-fa22-feedback>

RSVP to Reading Group

<http://tiny.cc/61040-fa22-pizza>