COGNITIVE WALKTHROUGH

What Is a Cognitive Walkthrough?

- step by step execution (evaluation) of selected typical tasks with a system
- **keep an eye out for certain problems** that often arise, especially with beginning users
- Discover mismatches between **HOW the user thinks about a task**, and **HOW the UI designer thinks about the same task**

Cognitive Walkthrough

- Answer this question
- "How successfully does this design guide the unfamiliar user through the performance of the task?" [Newman & Lamming]
- **Principle of Learnability**

Cognitive Walkthrough

- Going through a scenario of interaction
- Checking for usability problems in each step
  - Try to empathize with the user
  - "What would the user see/do now?"
  - Evaluation informed by users' cognitive processes
- Collecting the usability problems
- Requires a detailed description of the UI prototype

Cognitive Walkthrough – When it is needed?

- Early phase of the design
  - Implementation is not needed
    - Paper prototypes are enough
  - "Invest some effort now. Save time/money later."
  - Allows rapid iteration of the design cycle

Cognitive Walkthrough – Procedure

- Input
  - Identify the users
    - Their level of experience
    - Their level of knowledge
  - Identify relevant tasks for the following examples
    - “Buy ticket” using a ticket machine
    - “Check the balance” using ATM
    - “Withdraw money” using an ATM;

Cognitive Walkthrough – Procedure

- Identify relevant task for
  - "Buy ticket" using a ticket machine
- Identify the sequence of actions needed for carrying out the task
  - "Choose the destination"
  - "Choose the fare type"
  - "Insert money"
  - "Take the ticket"
  - "Get the change back"
- Identify what could go wrong on users' side
  - E.g. "User may not have enough money"

Cognitive Walkthrough – Procedure

- Output
  - List of findings

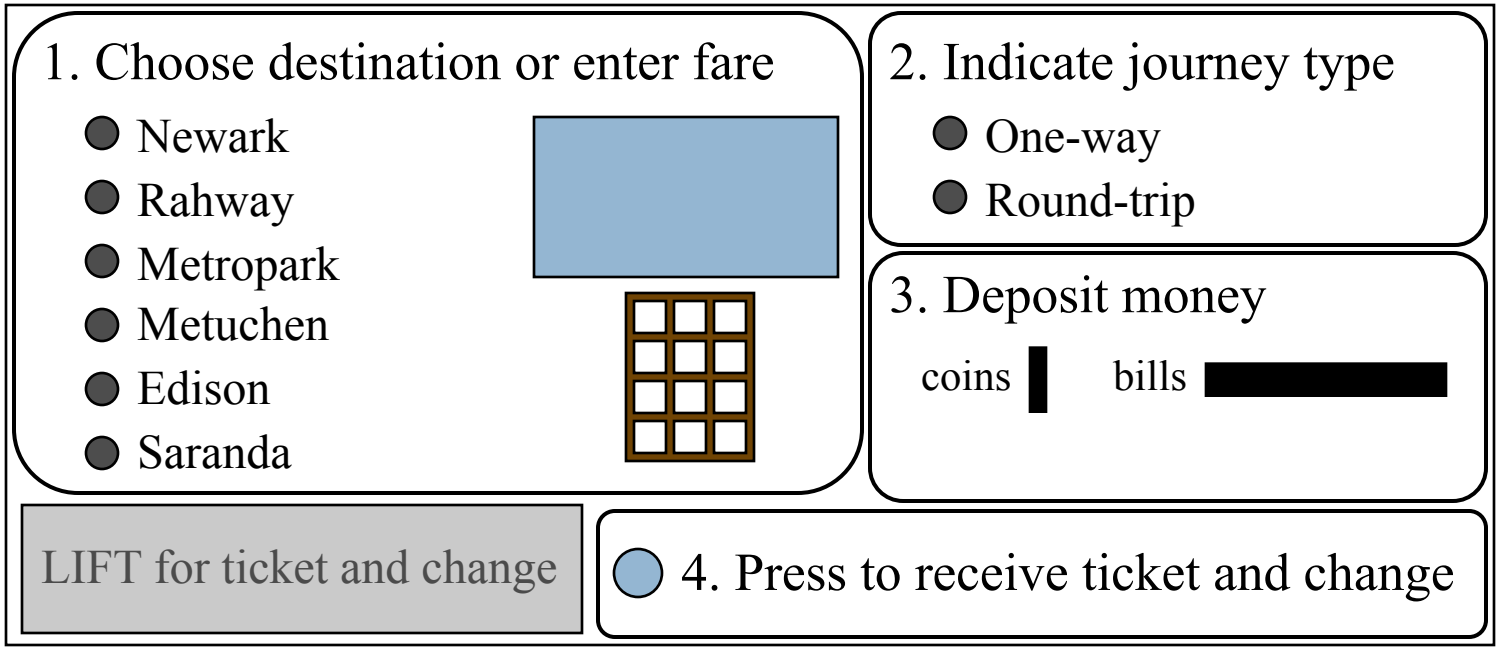
- Who do we do this for?
  - Decision on purchase
    - "Binary ruling": Good enough, not good enough
    - No need to bring up any suggestions
  - Designers
    - Suggest improvements to the design

Cognitive Walkthrough – Procedure

- Task-definition question:
  - Q0 = "What does the user want to achieve?"
  - At the beginning of the test
- Questions for each step:
  - Q1 = "Will the correct action(s) be evident to the users?"
    - *Will users know what to do?*
  - Q2 = "Will the users connect the label of an action with their goals?"
    - *Will users see how to do it?*
  - Q3 = "Will the user receive a sensible feedback?"
    - *Will users understand from the feedback whether their action are correct or not?*

Cognitive Walkthrough Example

- Train ticket vending machine from [Newman & Lamming 1995]



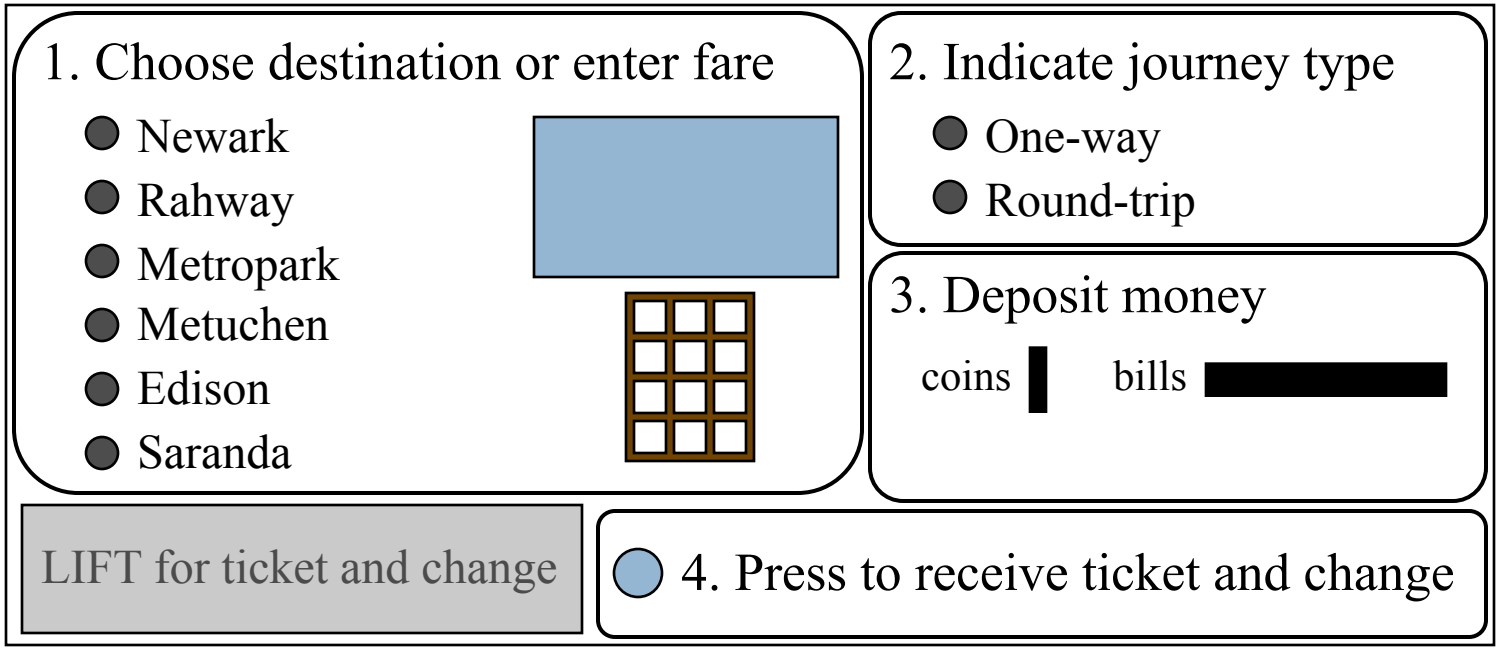
Cognitive Walkthrough Example

- Scenario
  - A user wants to buy a one-way ticket to Saranda. She has a $5 bill in her pocket + some change.

- Task-definition question Q0: “What does the user want to achieve?”
  - Answer: “Purchase a one-way ticket to Saranda.”

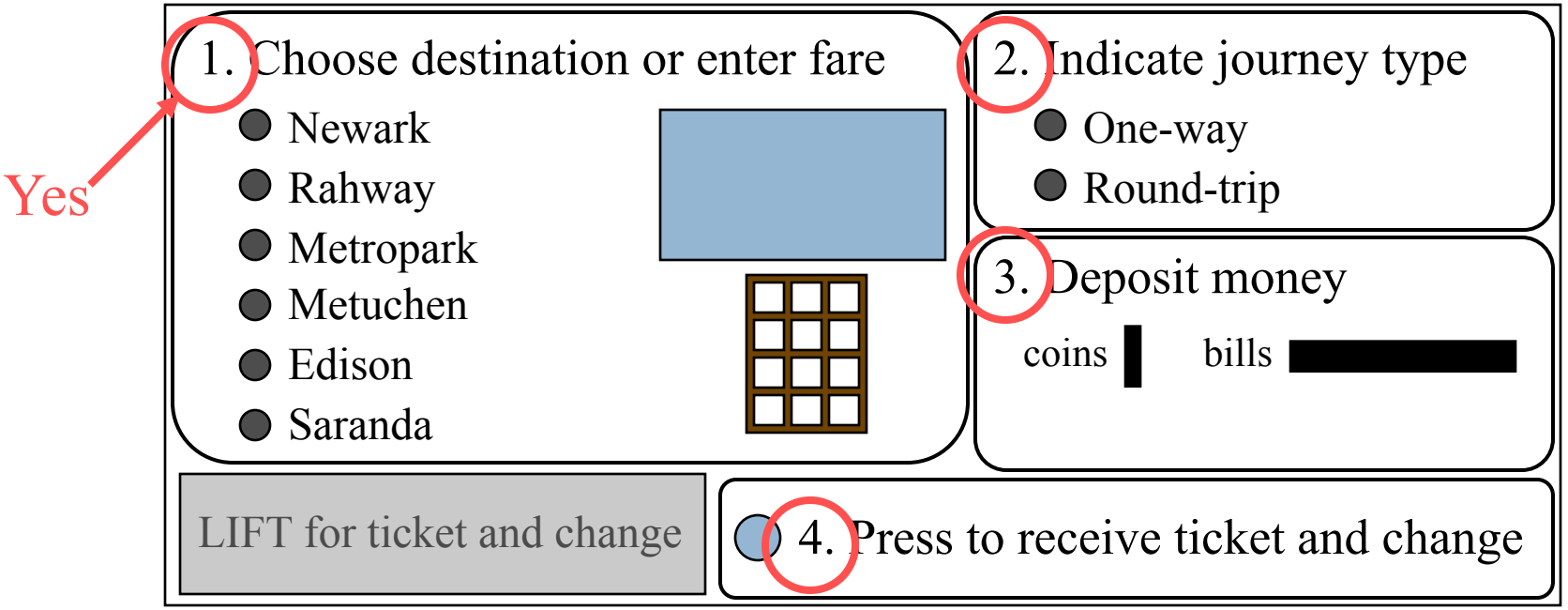
Cognitive Walkthrough Example

1. Will the correct action be evident to the user?



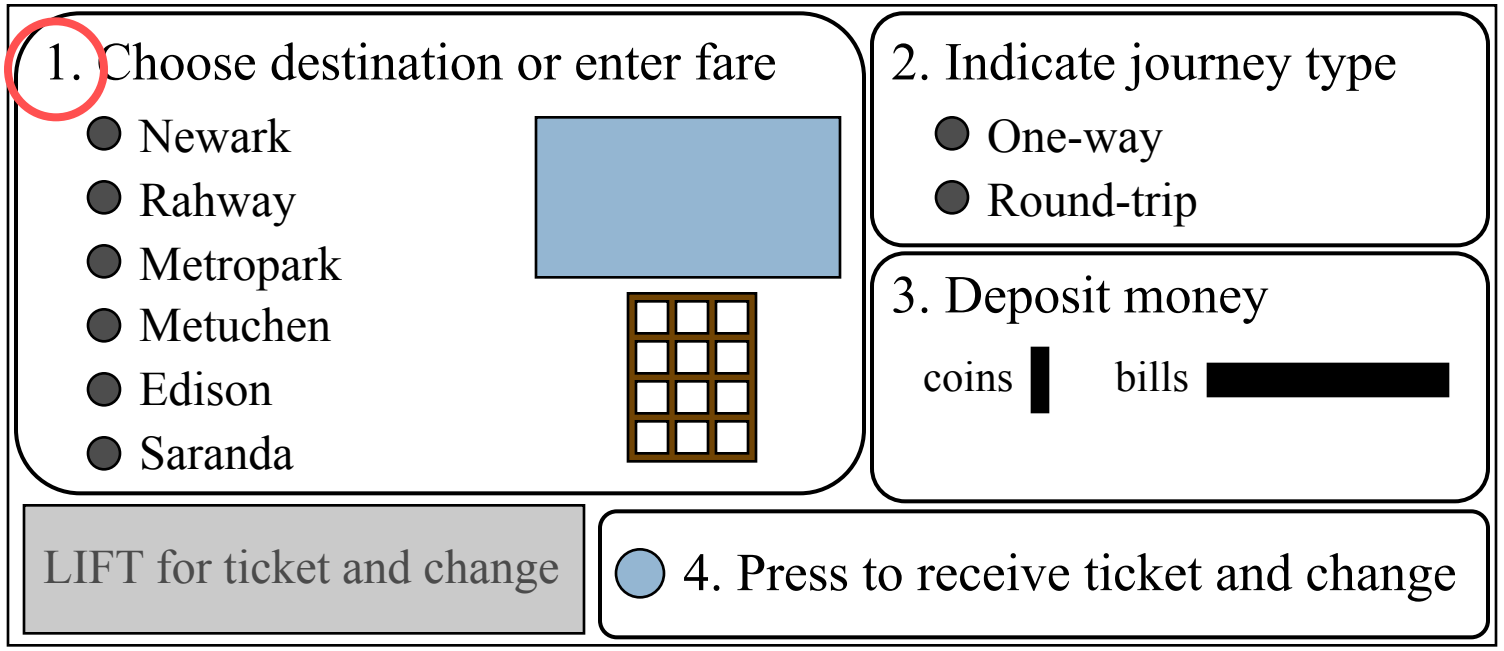
Cognitive Walkthrough Example

1. Will the correct action be evident to the user? (sub goals provided to user)



Cognitive Walkthrough Example

2. Will the user connect the correct action's description/label with his/her intent?



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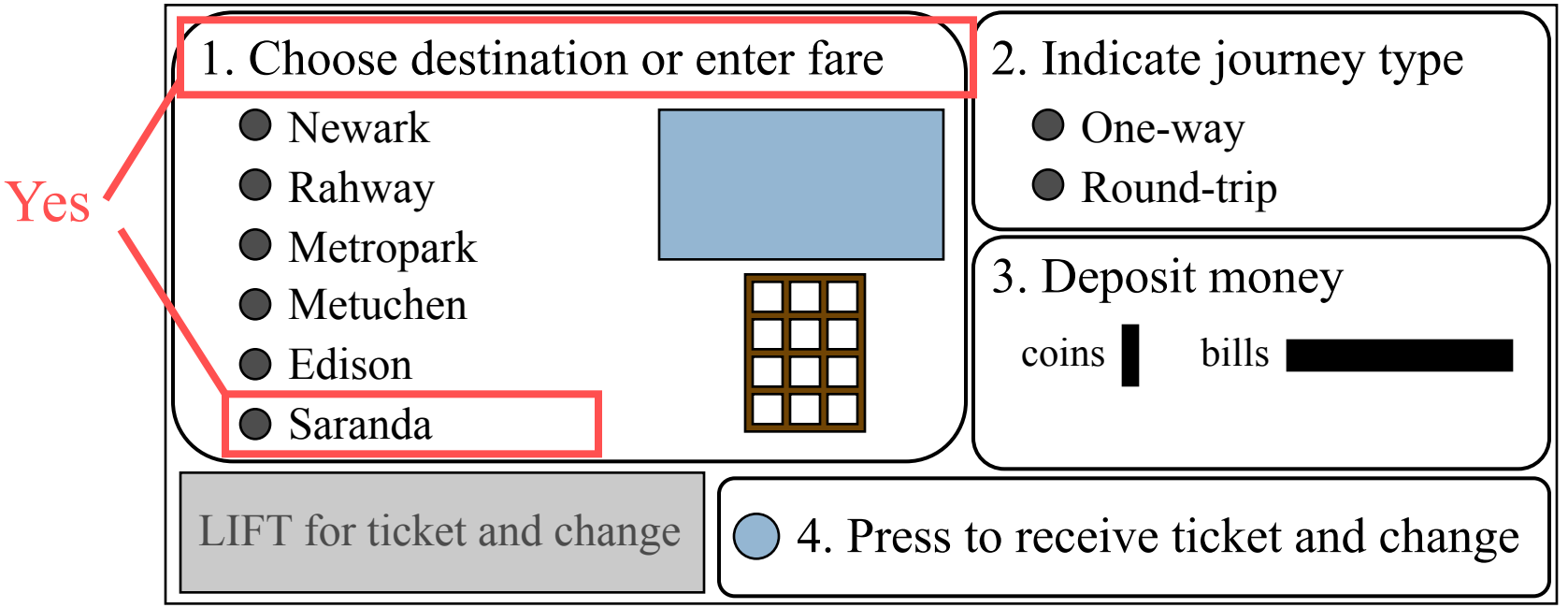
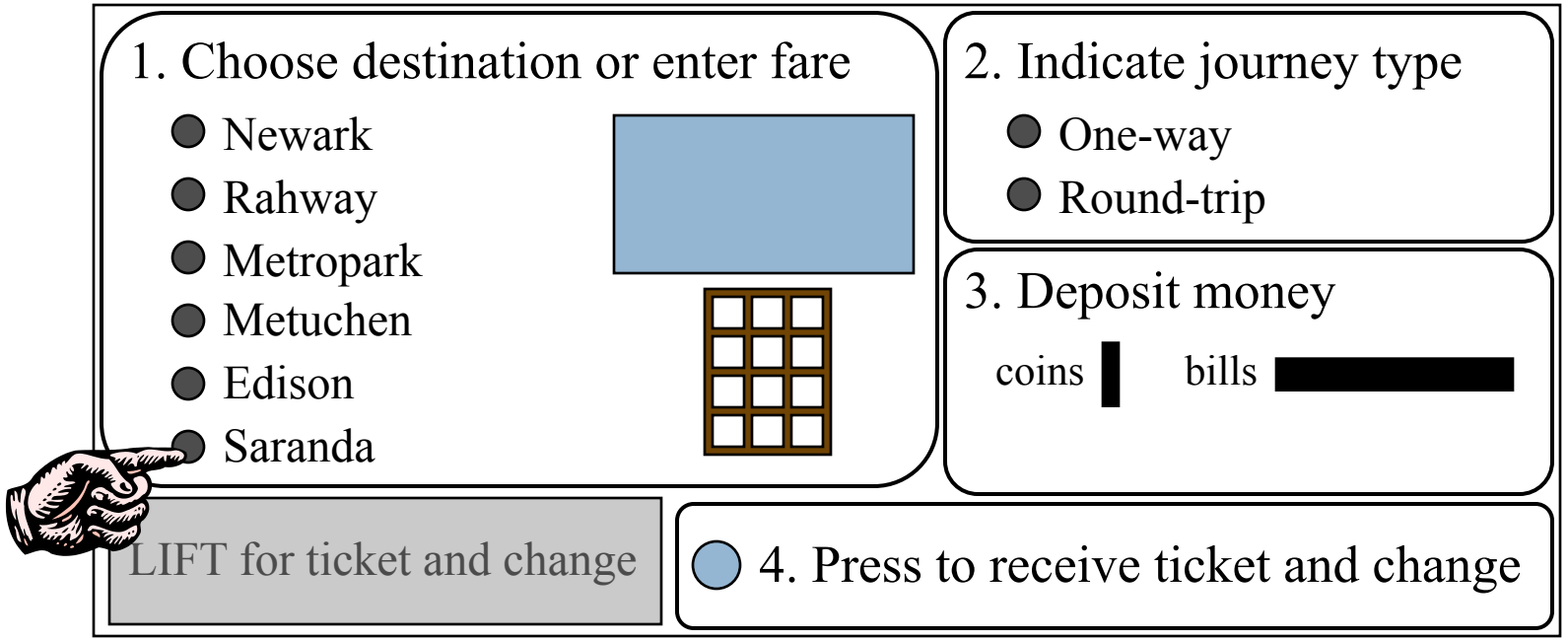


Cognitive Walkthrough Example

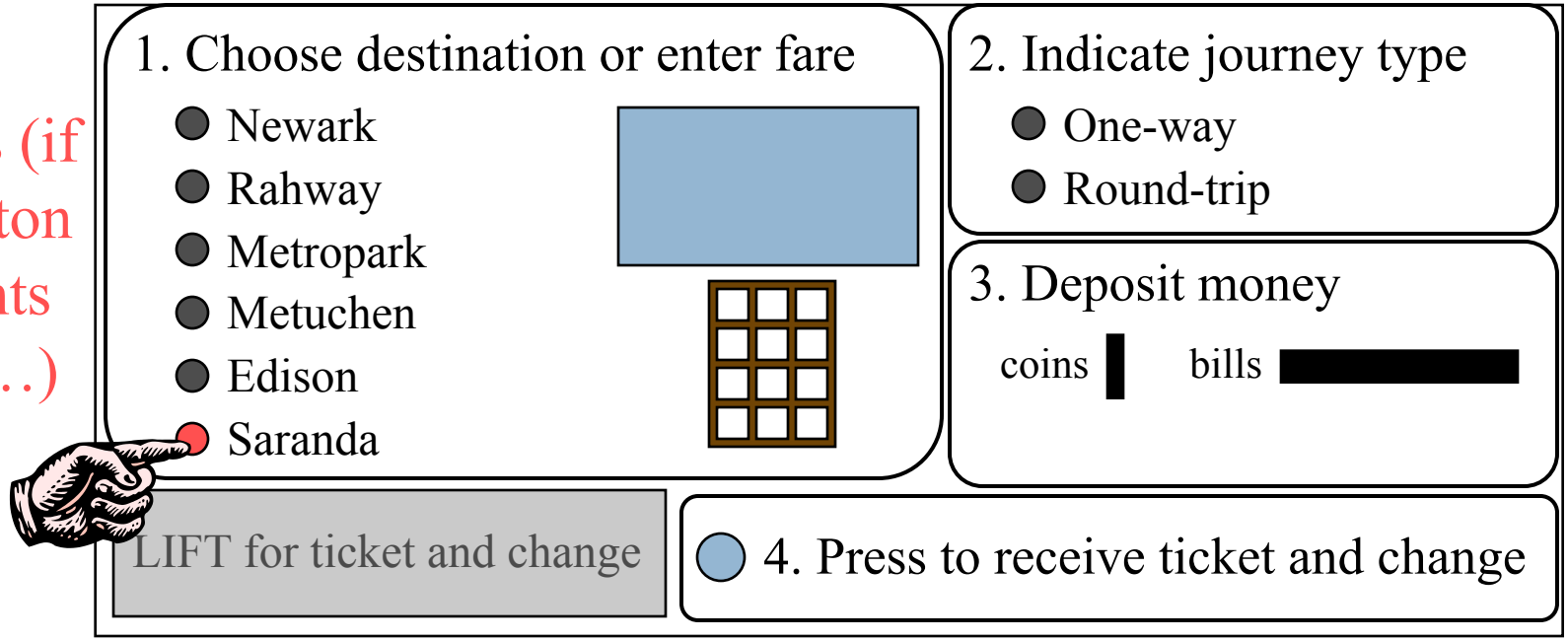
3. Will the user properly interpret the system's response? (know if chose right/wrong?)



Cognitive Walkthrough Example

3. Will the user properly interpret the system's response? (know if chose right/wrong?)

Yes (if button lights up…)



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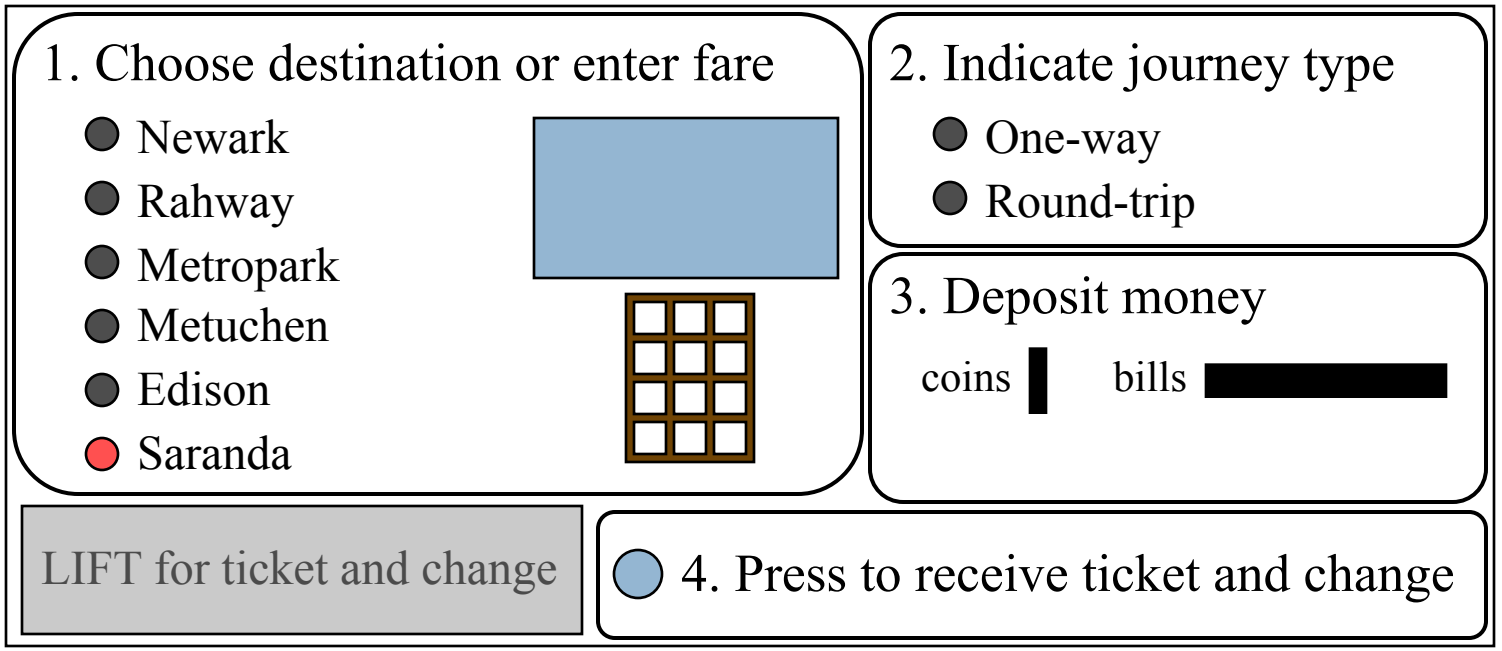

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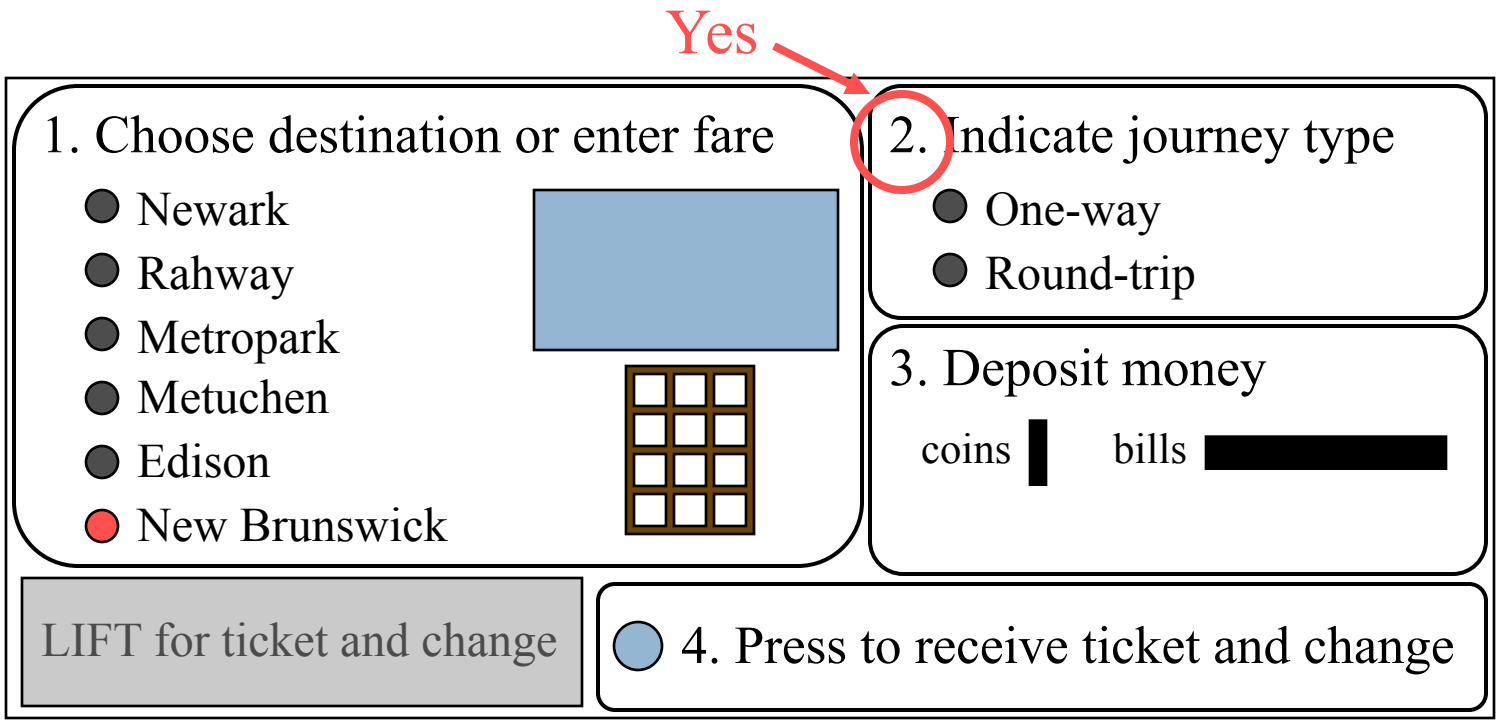

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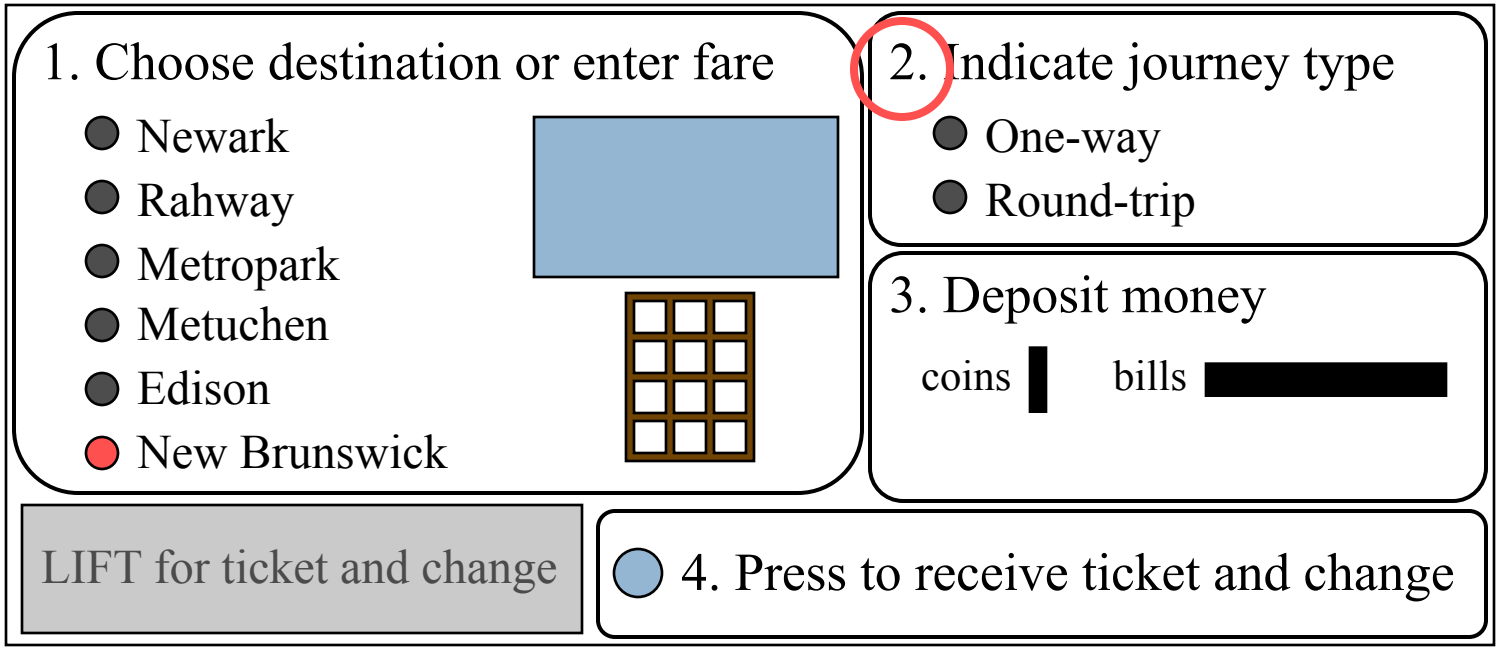

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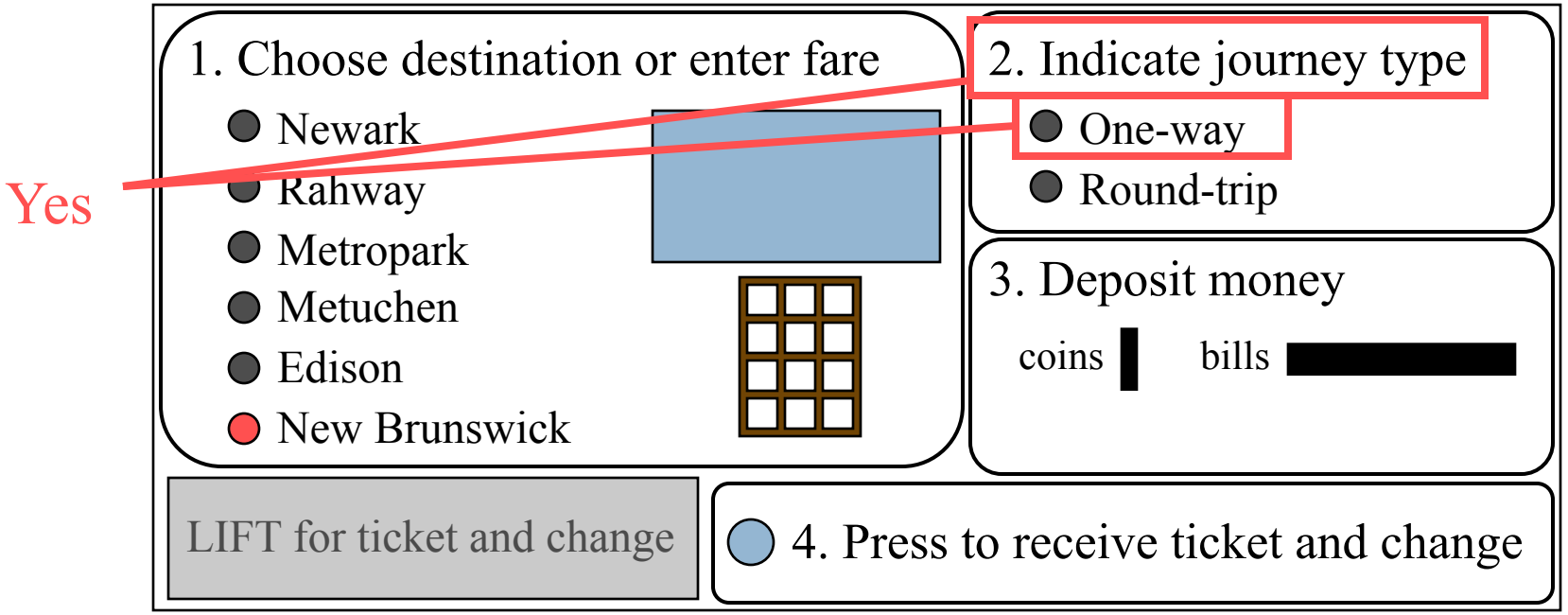

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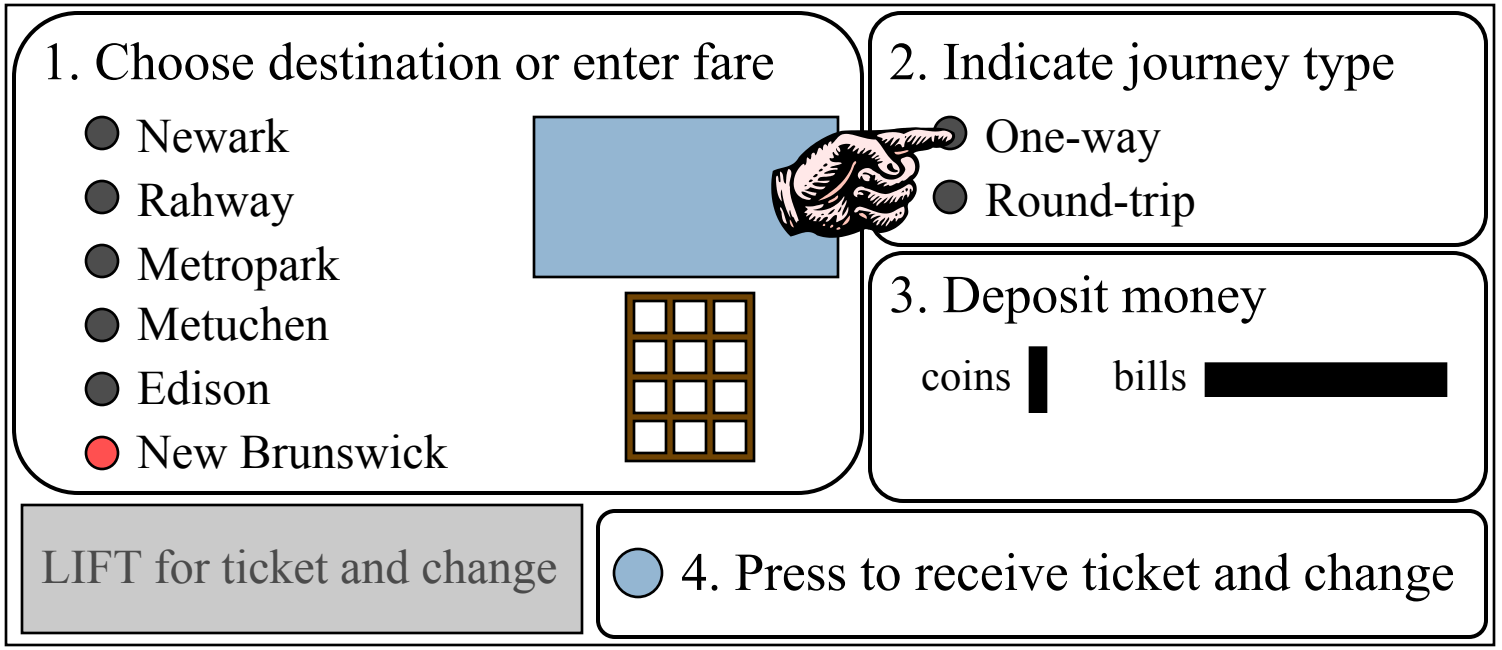

Cognitive Walkthrough Example

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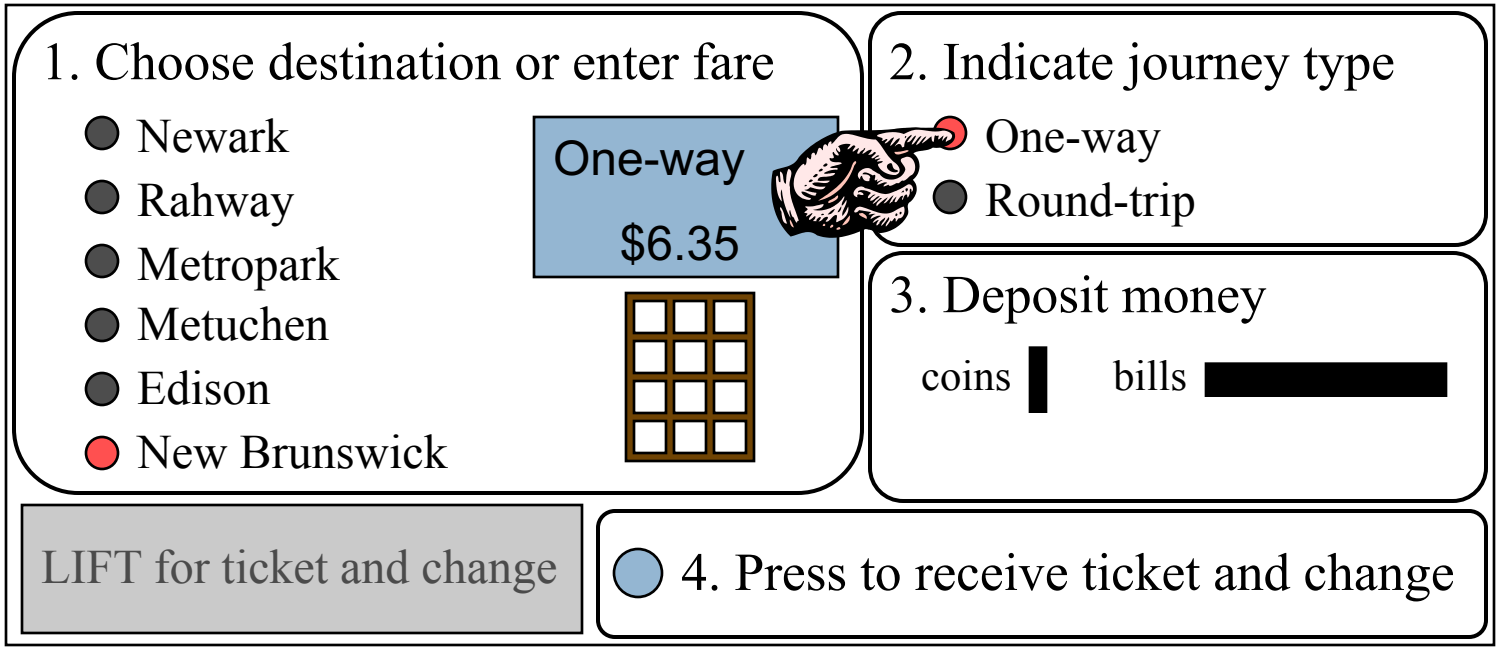
Yes …



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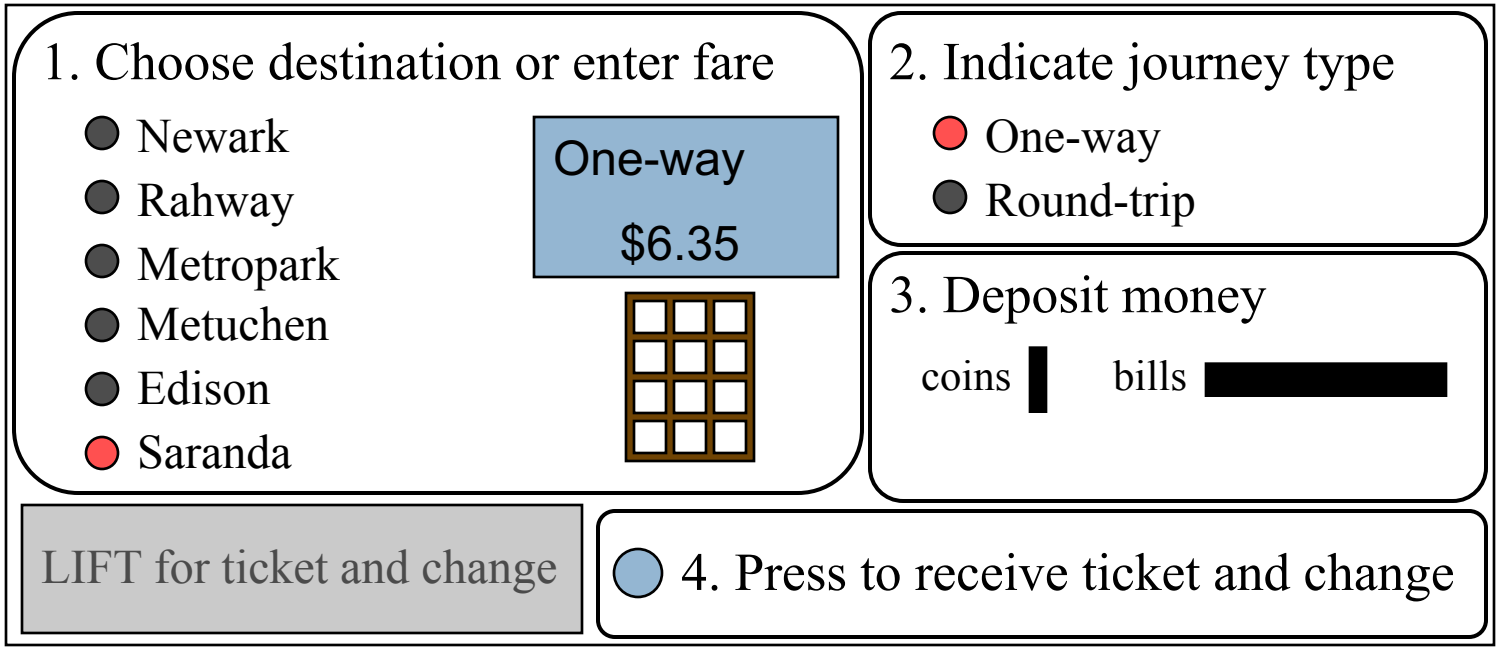

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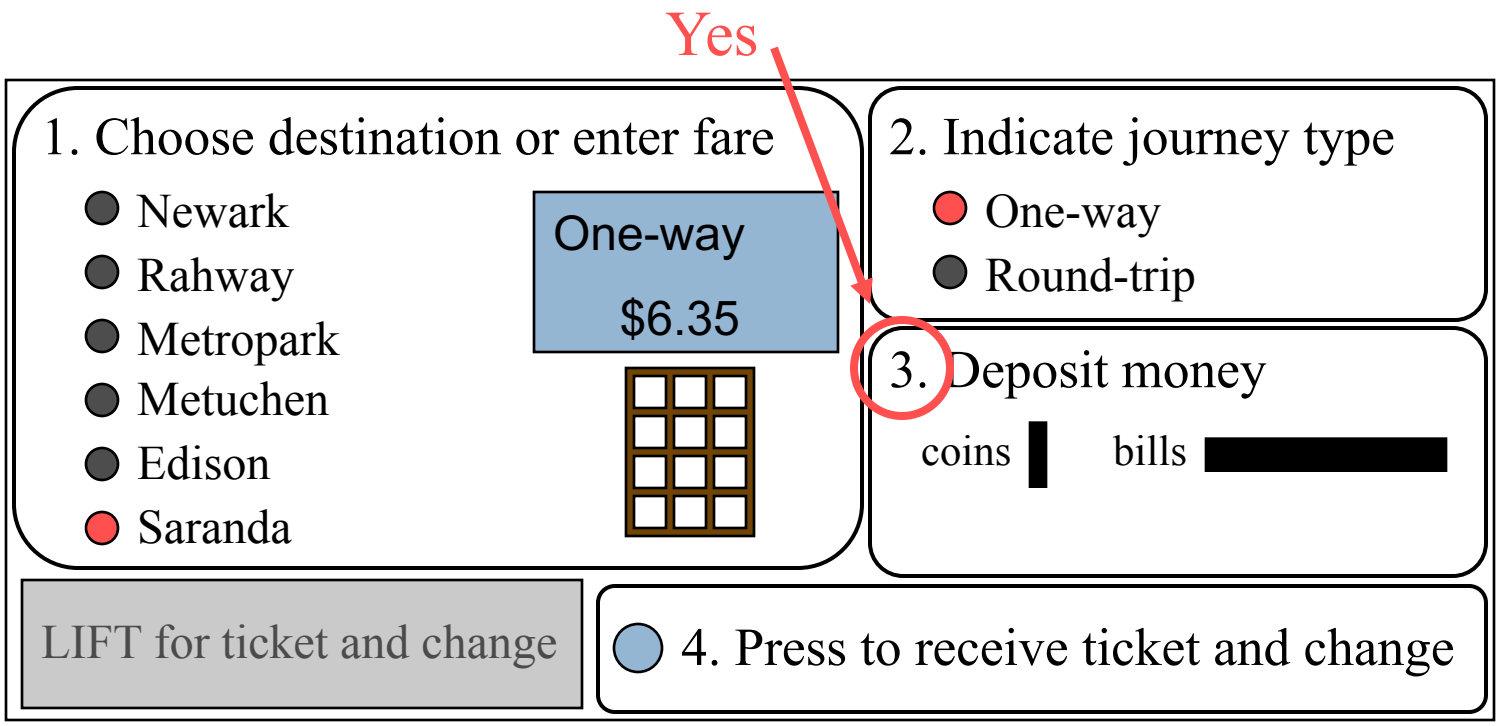

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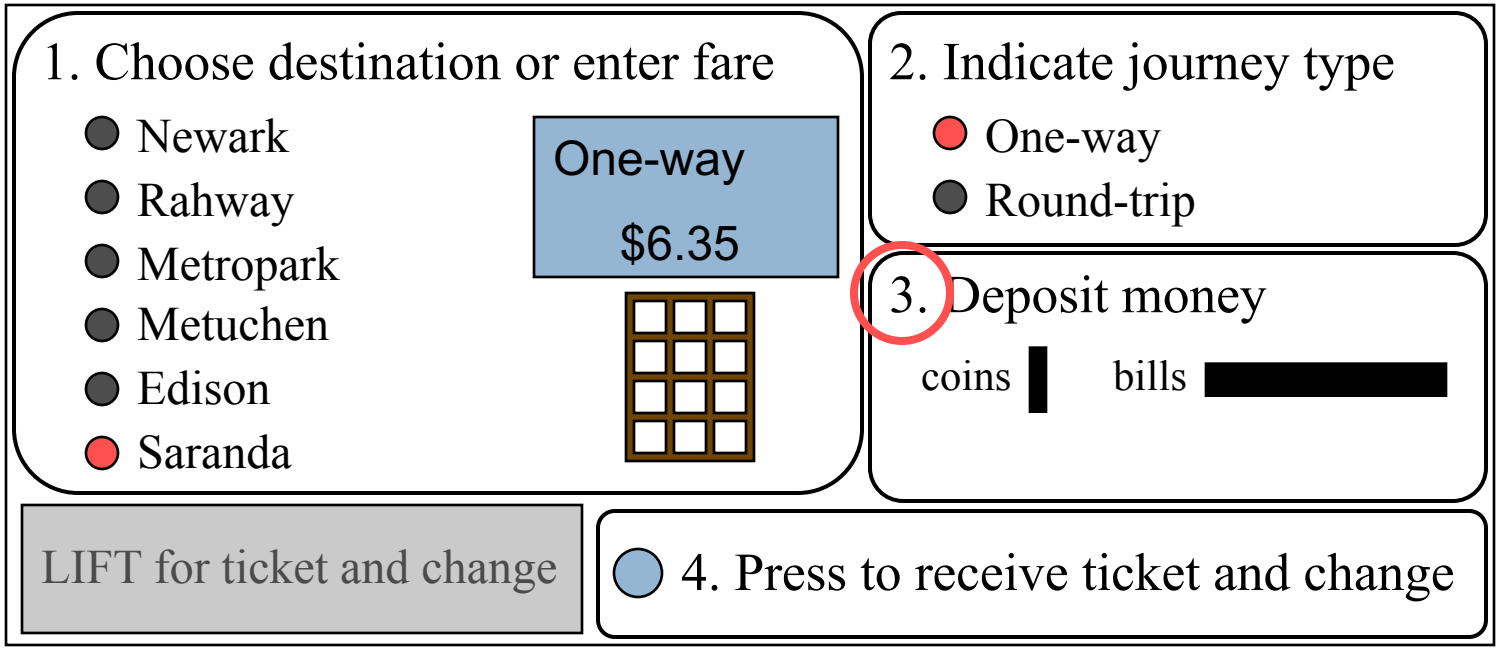

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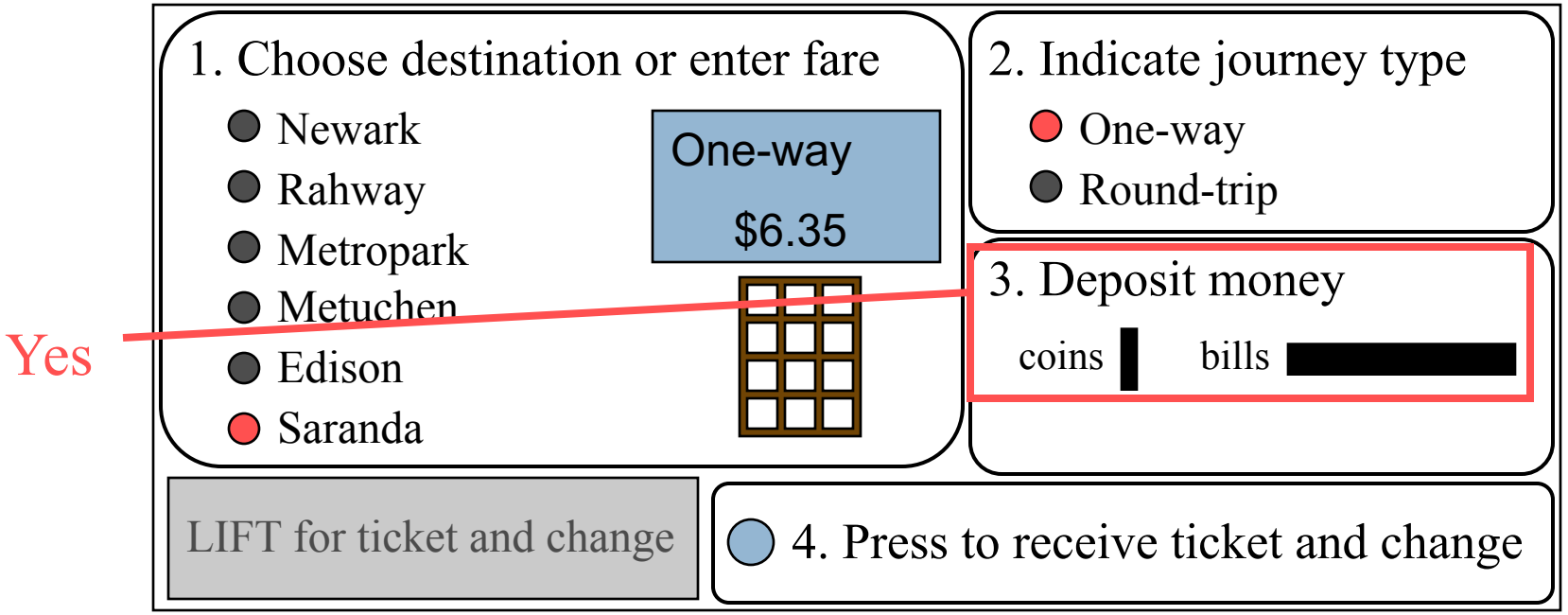

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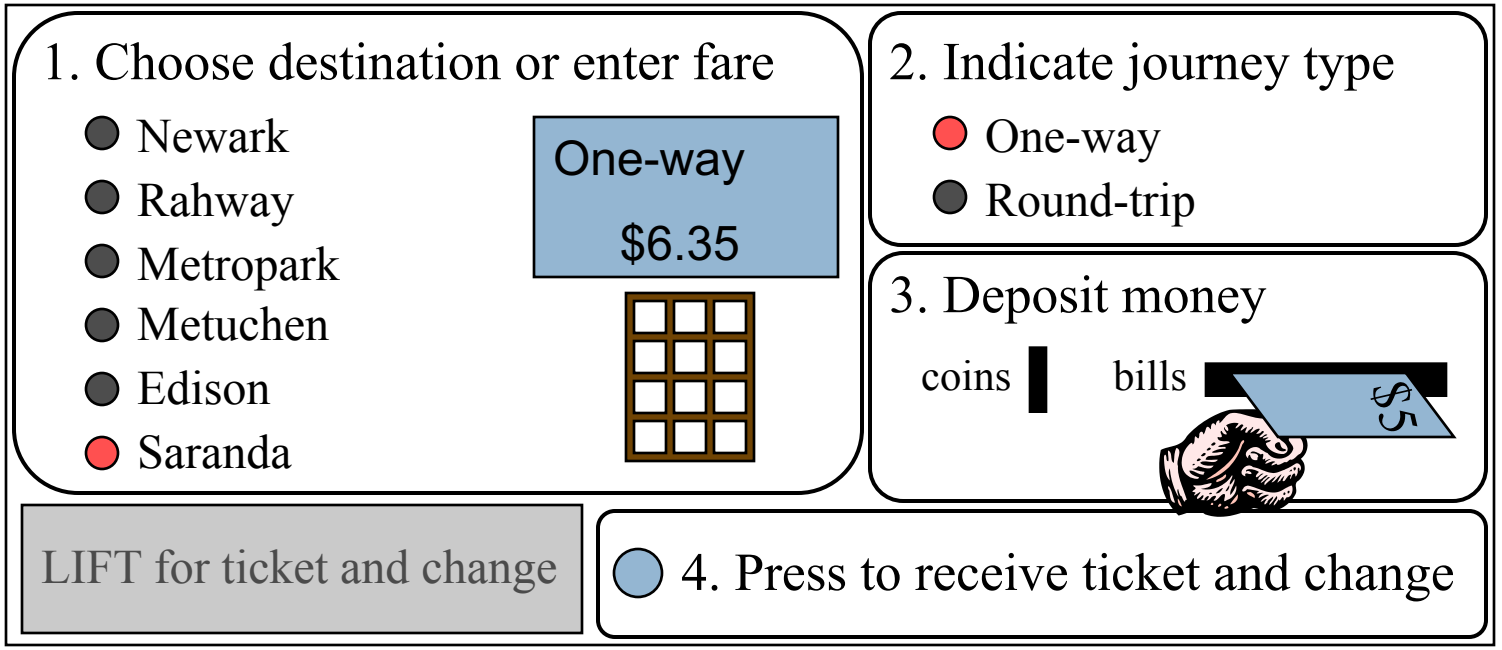

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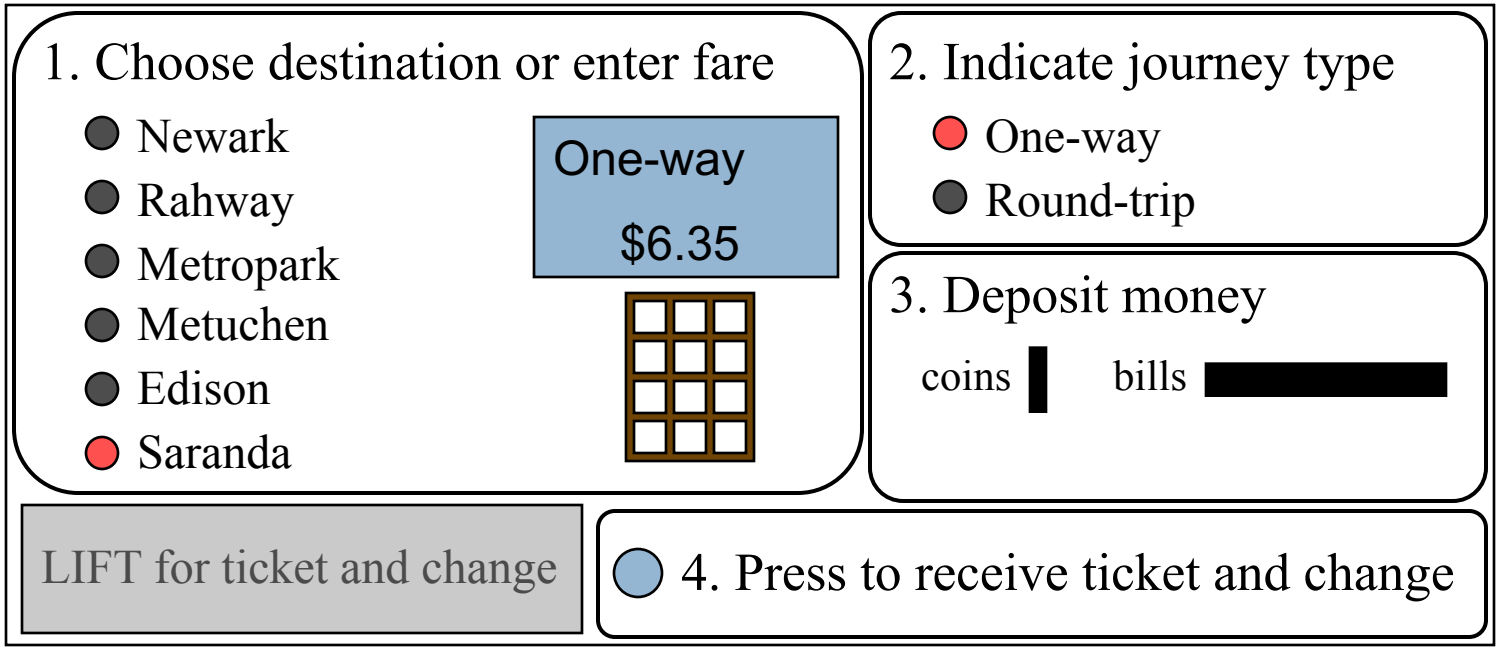

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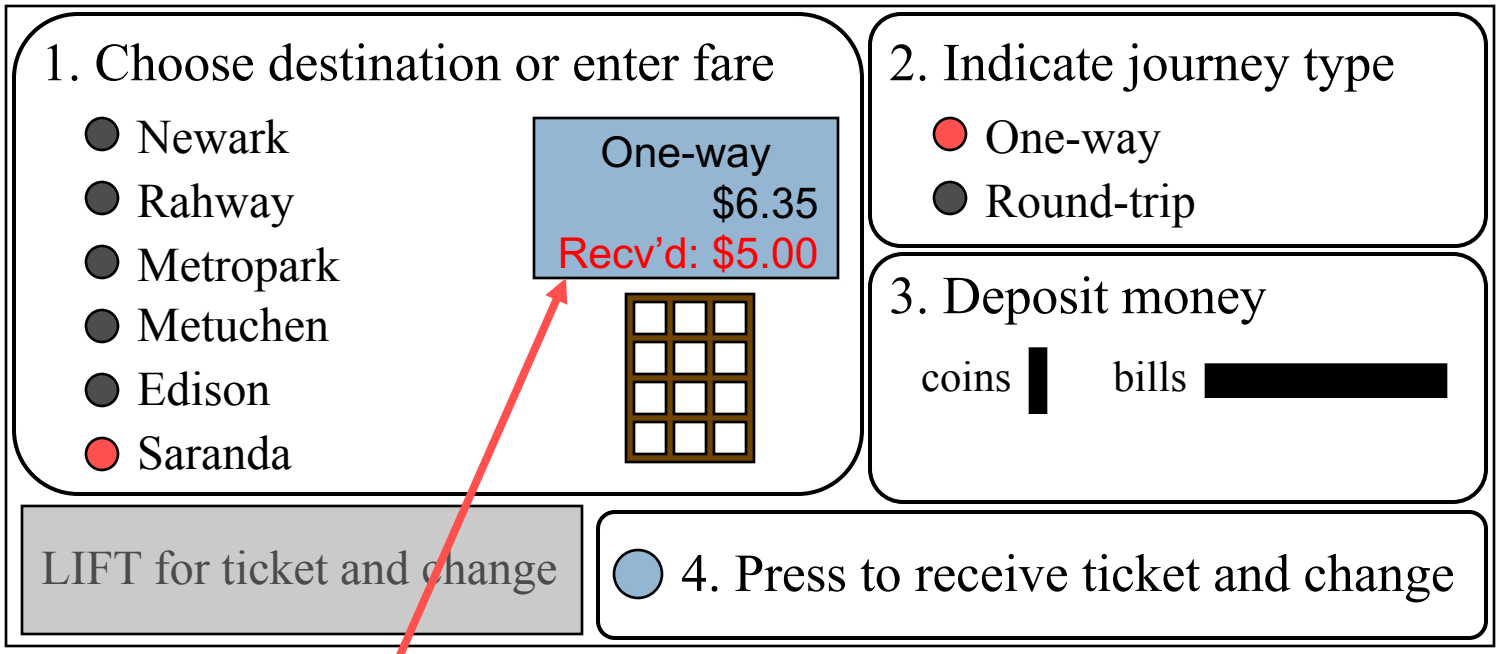


No, need feedback!

→ Add received amount display

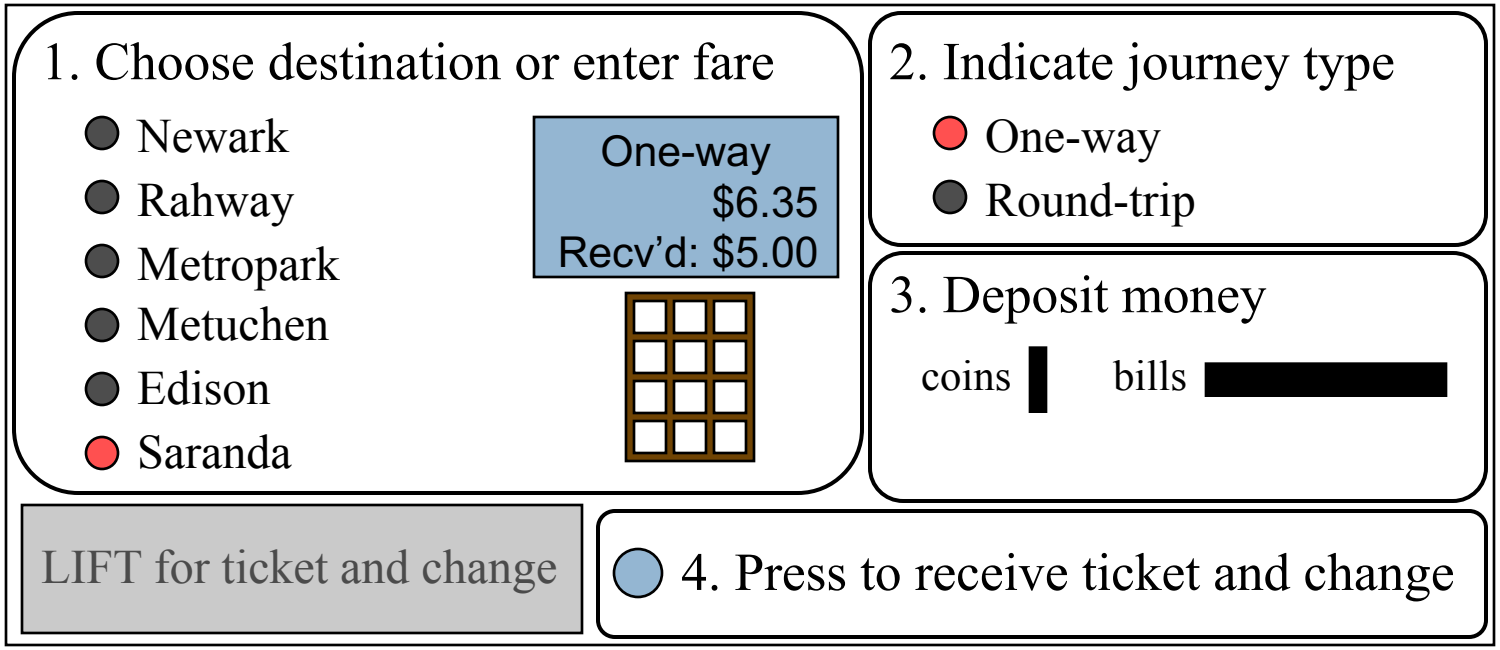
Cognitive Walkthrough Example

- We also need to handle common error-prone situations
  - "What if the user does not have enough money but she already put some bills in?"
  - The task gets redefined ➔ "Want cancel and get money back!"

Cognitive Walkthrough Example

Not enough $…

1. Will the correct action be evident?



Cognitive Walkthrough Example

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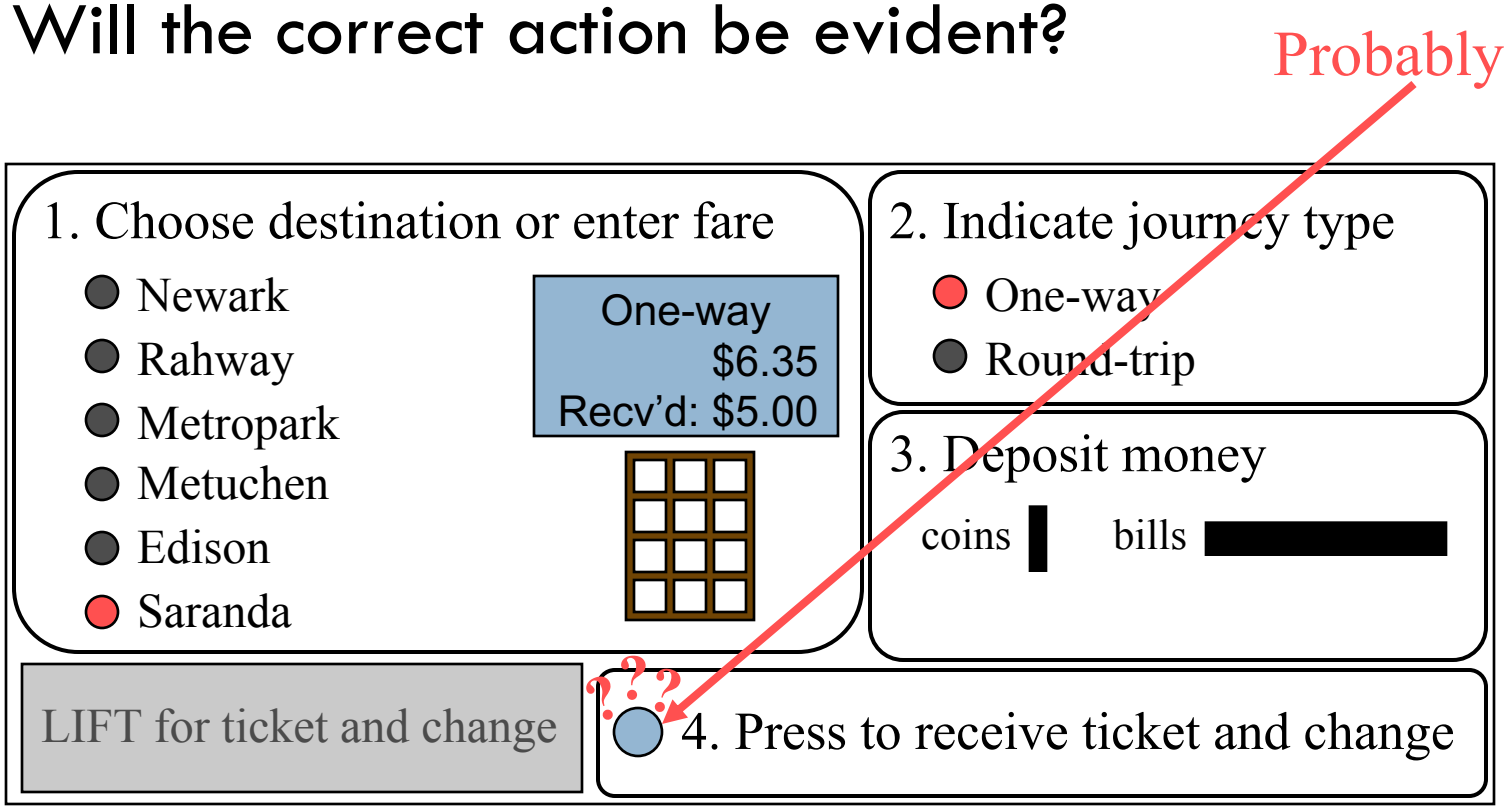
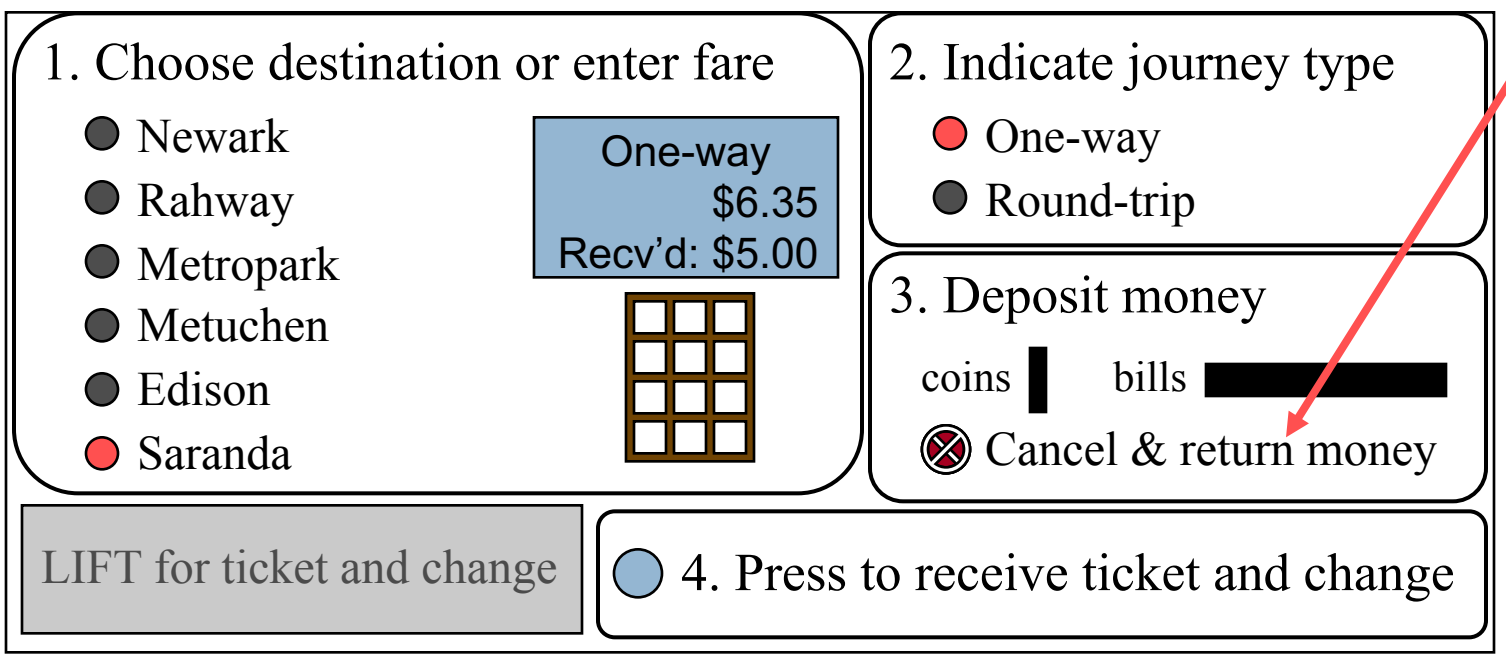


Cognitive Walkthrough Example

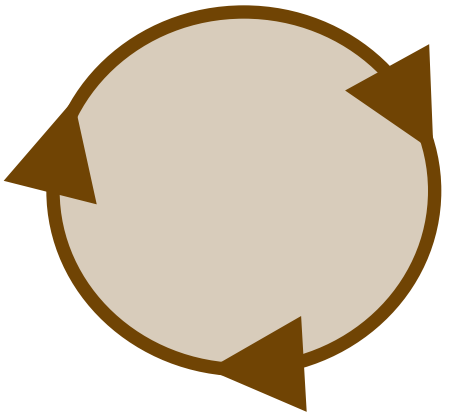
Not enough $…

Probably not!
→ Add a new UI element to make it clear!



Cognitive Walkthrough – Reporting

- Content of the document:
  - Scenario
    - Application of the questions
    - Answers to the questions
  - Interleave with critical phases
    - Suggest the solution of the problems



- … then start a new round the design cycle

Cognitive Walkthrough – Reporting

- Step 3: Deposit money
  - Q3: Will the User properly interpret the system response?
  - Answer: No. The system does not indicate any amount deposited.
  - Suggestion: Need feedback on the amount of money deposited.
- Step 4b: Cancel the operation
  - Q1: Will the correct action be evident?
  - Answer: No.
  - Suggestion: Add the Cancel button under the coin slot.

Cognitive Walkthrough – Limitations

- Only diagnostics of the usability problems
- No estimate of time
- Not a quantitative method

Cognitive Walkthrough-Example-2

- Identify relevant tasks for the following examples
  - "Check the balance" using ATM
  - "Withdraw money" using an ATM;
- Identify the sequence of actions needed for carrying out the task

Over view of the actual Walkthrough Processes

Pre-preparation:

Cognitive Walkthrough-Example-2

1. Define Users : Who are the users. Identify them.
(Catagorise them as Novices, Intermittent & Experts)

2. Identify the tasks for the evaluation

Ex: Evaluation for "Checking out Balance on an ATM"
Prepare notes on what the user must know prior to performing the task and what the user should be learning while performing the task.

3. Prepare action sequences for completing the Tasks

Make a " AND THEN " list of Goals & sub glass.
Ex: Overall Goal: Find out balance from the ATM
Subgoal1 : Activate ATM [Physical action Insert Card]
Subgoal2: Identify self [Input pin code]
Sub goal 3 : Get balance [press action button with label]
Sub goal 4: Get a print out [if required]
Sub gaol 5: Log out from ATM .

4. Conduct the Walk Through Session

Cognitive Walkthrough-Example-2

- Identify what could go wrong on users' side
  - E.g. "User may not have enough money in an account"

Comparison

- Cognitive Walkthrough
  - Informed by cognitive psychology
  - Done by one person (the researcher)
  - More formal
  - Better for highly structured tasks
- Heuristic Evaluation
  - Informed by design practices
  - Done by appointed experts
  - Less formal
  - Better for less structured tasks
  - Good for testing an artifact in extreme[~ish] conditions

PHYSIOLOGICAL METHODS

Eye tracking

Physiological measurement

Eye tracking

- Head or desk mounted equipment tracks the position of the eye
- Eye movement reflects the amount of cognitive processing a display requires
- Measurements include
  - Fixations:
    - Eye maintains stable position
    - Number and duration indicate level of difficulty with display
  - Saccades: Rapid eye movement from one point of interest to another
  - Scan paths: Moving straight to a target with a short fixation at the target is optimal

Physiological measurements

- Emotional response linked to physical changes
- These may help determine a user's reaction to an interface
- Measurements include:
  - Heart activity, including blood pressure, volume and pulse.
  - Activity of sweat glands: Galvanic Skin Response (GSR)
  - Electrical activity in muscle: electromyogram (EMG)
  - Electrical activity in brain: electroencephalogram (EEG)
- Some difficulty in interpreting these physiological responses
  - More research needed

Choosing an evaluation method

When in process	:	Design vs. implementation
Style of evaluation	:	Laboratory vs. field
How objective	:	Subjective vs. objective
Type of measures	:	Qualitative vs. quantitative
Level of information	:	High level vs. low level
Level of interference	:	Obtrusive vs. unobtrusive
Resources available	:	Time, subjects, equipment, expertise

THE END