Analytical Usability Evaluation:

Cognitive walkthrough

What is a Cognitive Walkthrough?

- Evaluators look at the system from the user's point of view
- They step through user tasks and predict where users will have problems
- They concentrate on learnability

“Cognitive”?

“of, relating to, being, or involving conscious intellectual activity (as thinking, reasoning, or remembering)” *Merriam-Webster Dictionary*

Evaluating a system based on a model of how the user thinks, reasons, etc.

Cognitive model of user: Exploratory learning

- Start with rough idea of task to be accomplished
- Explore interface and select most appropriate action on basis of similarity with goal
- Monitor interface reactions (has progress been made towards the goal?)
- Determine what action to take next

How do you do it? (1)

- Preparation:
  - Identify users
  - Identify representative tasks
  - Per task, describe the correct action sequence
  - Get a UI description
  - Get evaluators

How do you do it? (2)

- Evaluators walk through the correct action sequence
- For each action, they indicate whether it is a “success story” or a “failure story”
- They provide evidence for their decision

Questions to ask of each action

Will the user:

- Expect to have to take this action?
- Notice the control for the action?
- Recognize that the control produces the desired effect?

If the correct action is performed,

- Will progress be apparent?

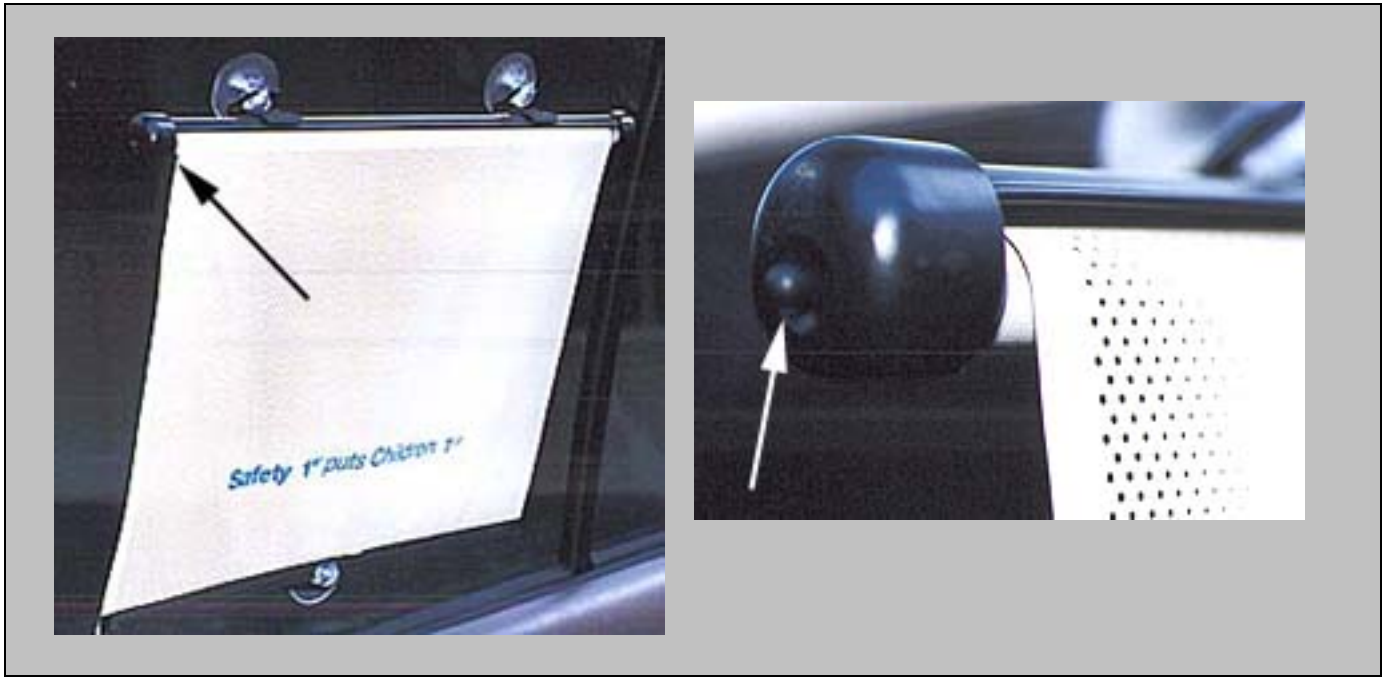
Expect to have to do this?

- In older versions of Windows, to shutdown the computer, press the Start button 

- On a mobile phone, after entering a phone number, press the Send button.

Notice the control? (1)

- Raising the window shade

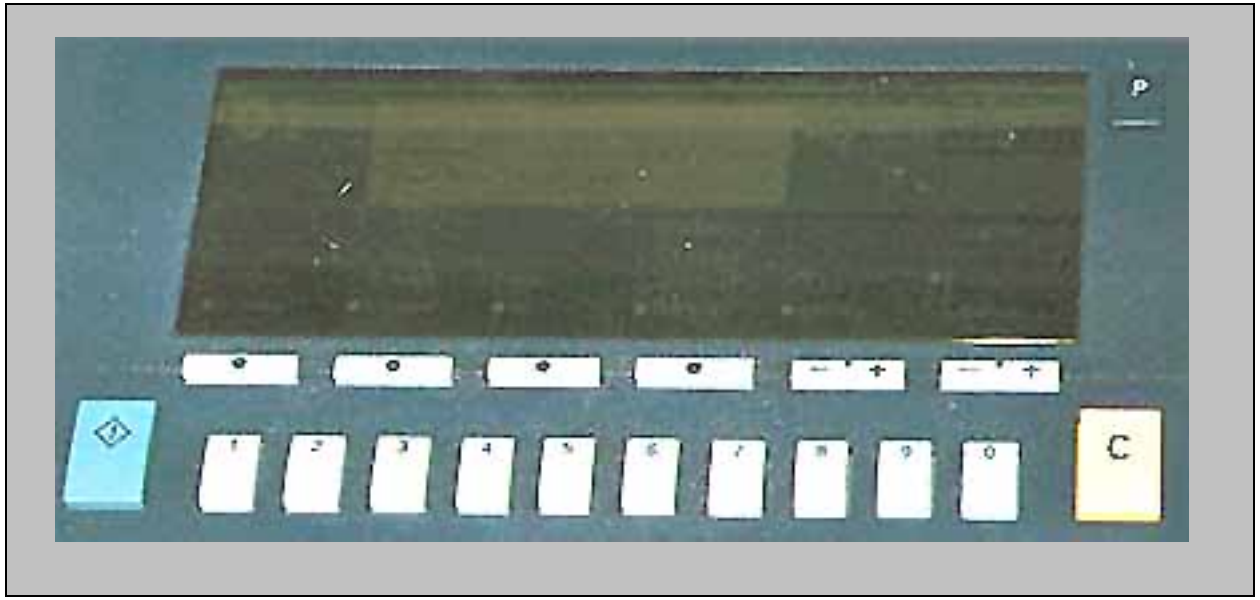


Notice the control? (2)

- Start up the gas pump

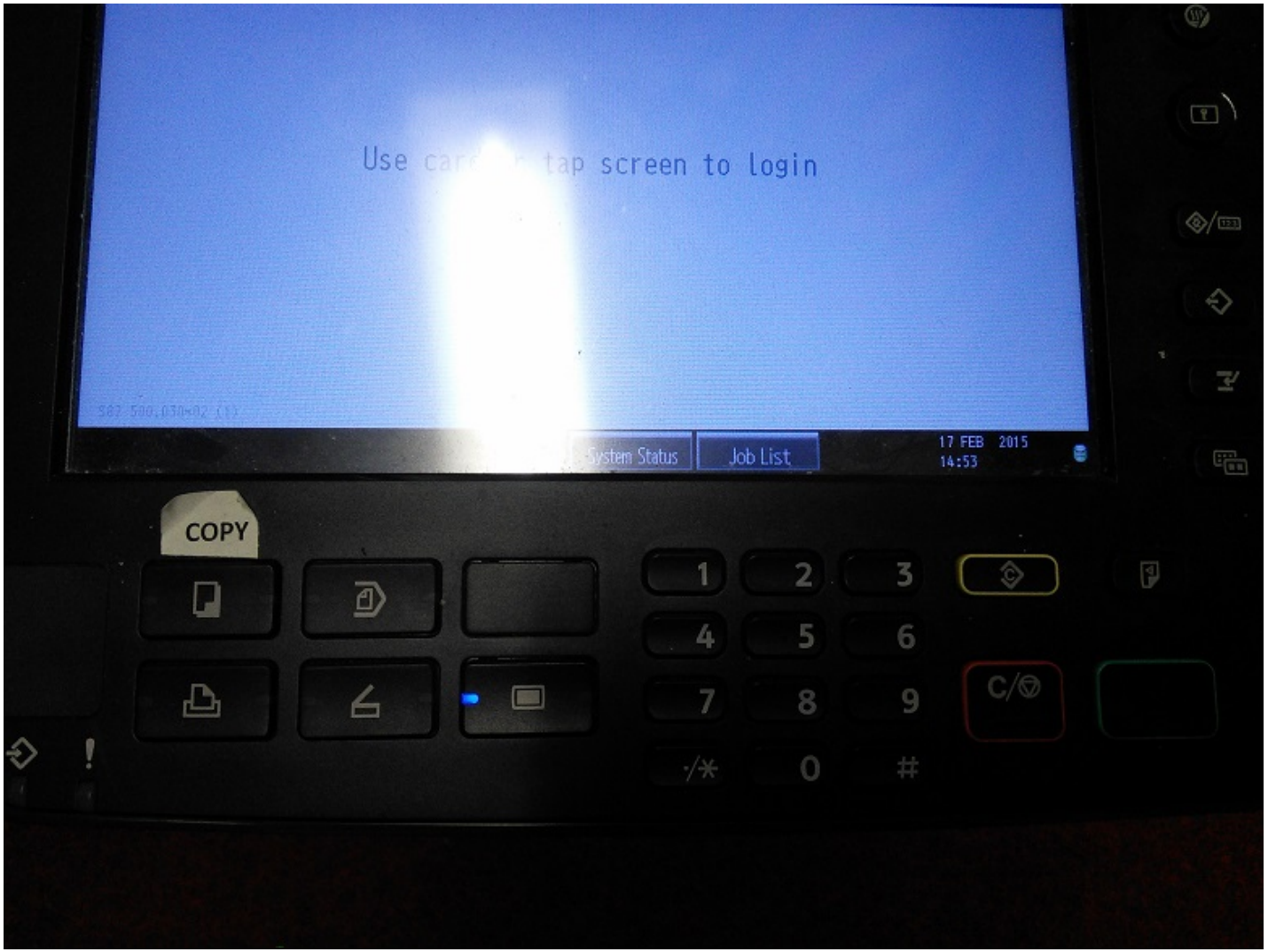
Recognize the control? (1)

- Making a photocopy



Recognize the control? (1)

In case you think that is just because it is a very old machine.. These are in uni now

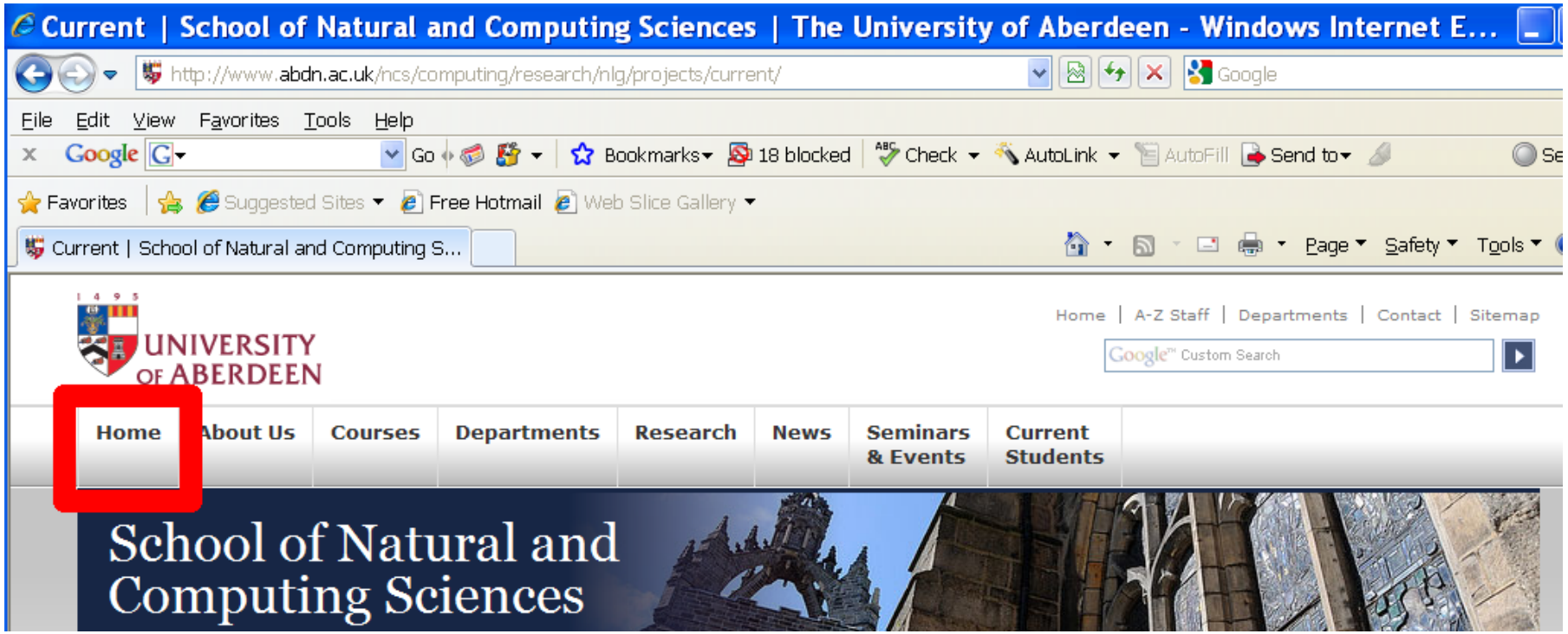


Recognize the control? (2)

- Turning the volume down

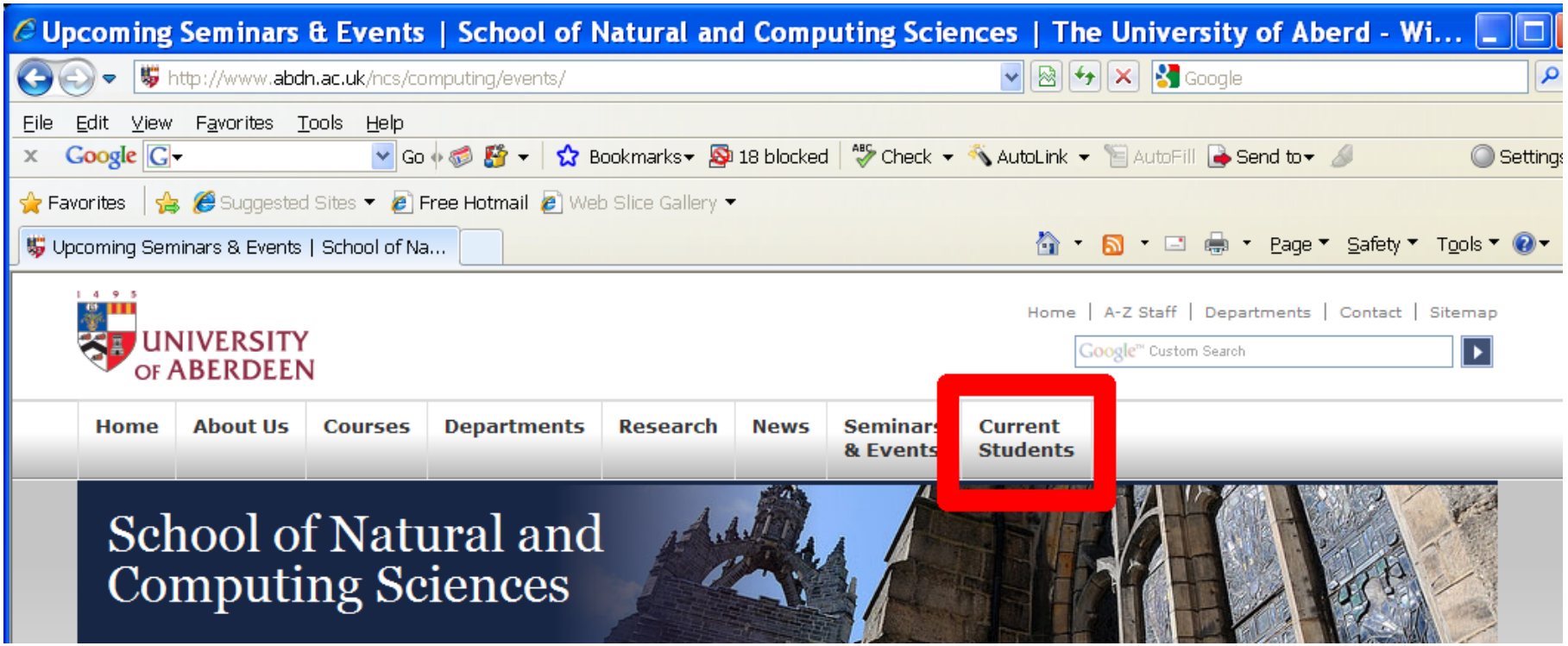
Recognise the control (3)

Going to the *school* home page



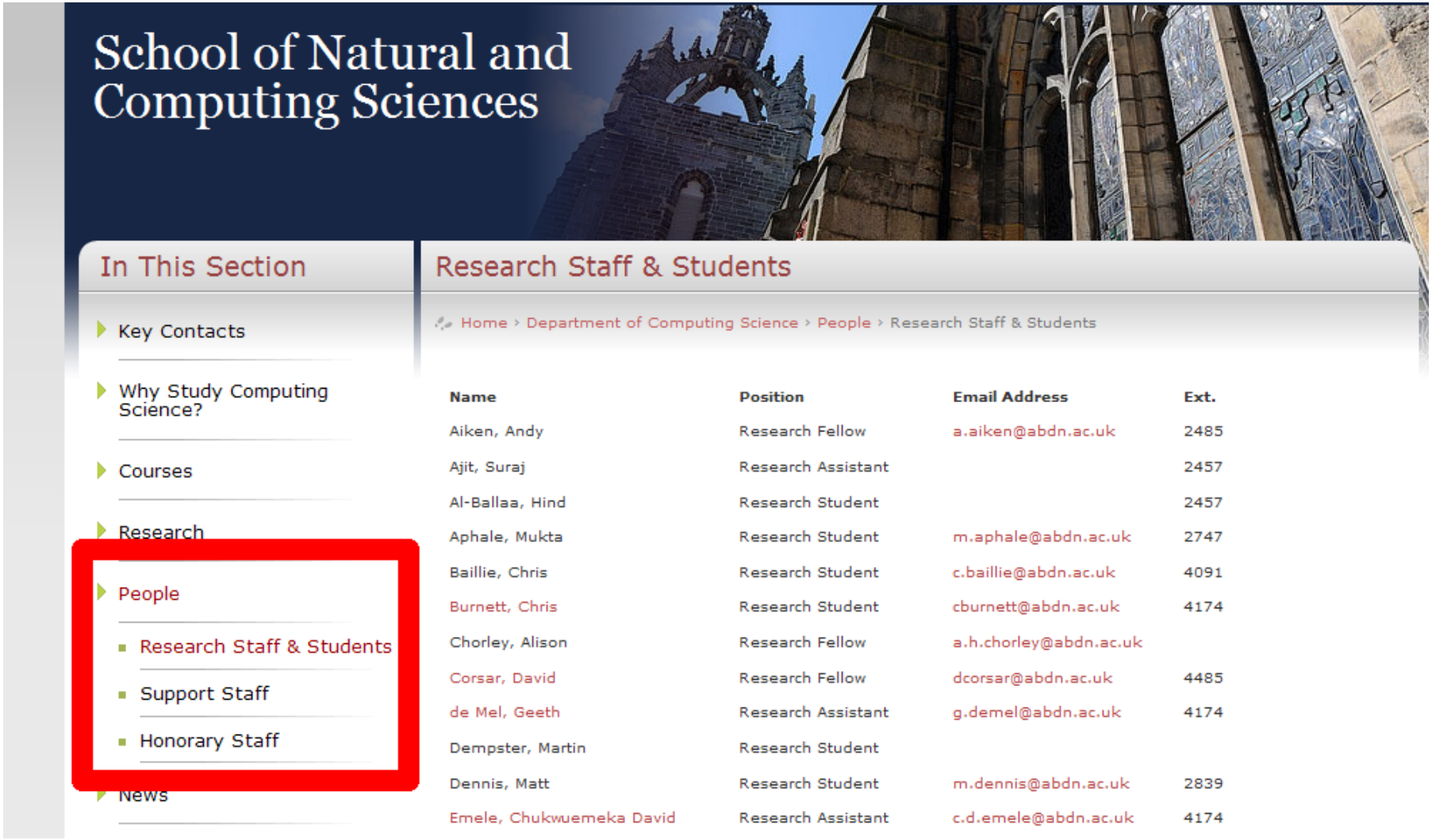
Recognise the control (4)

Getting information about your course, not information about current students



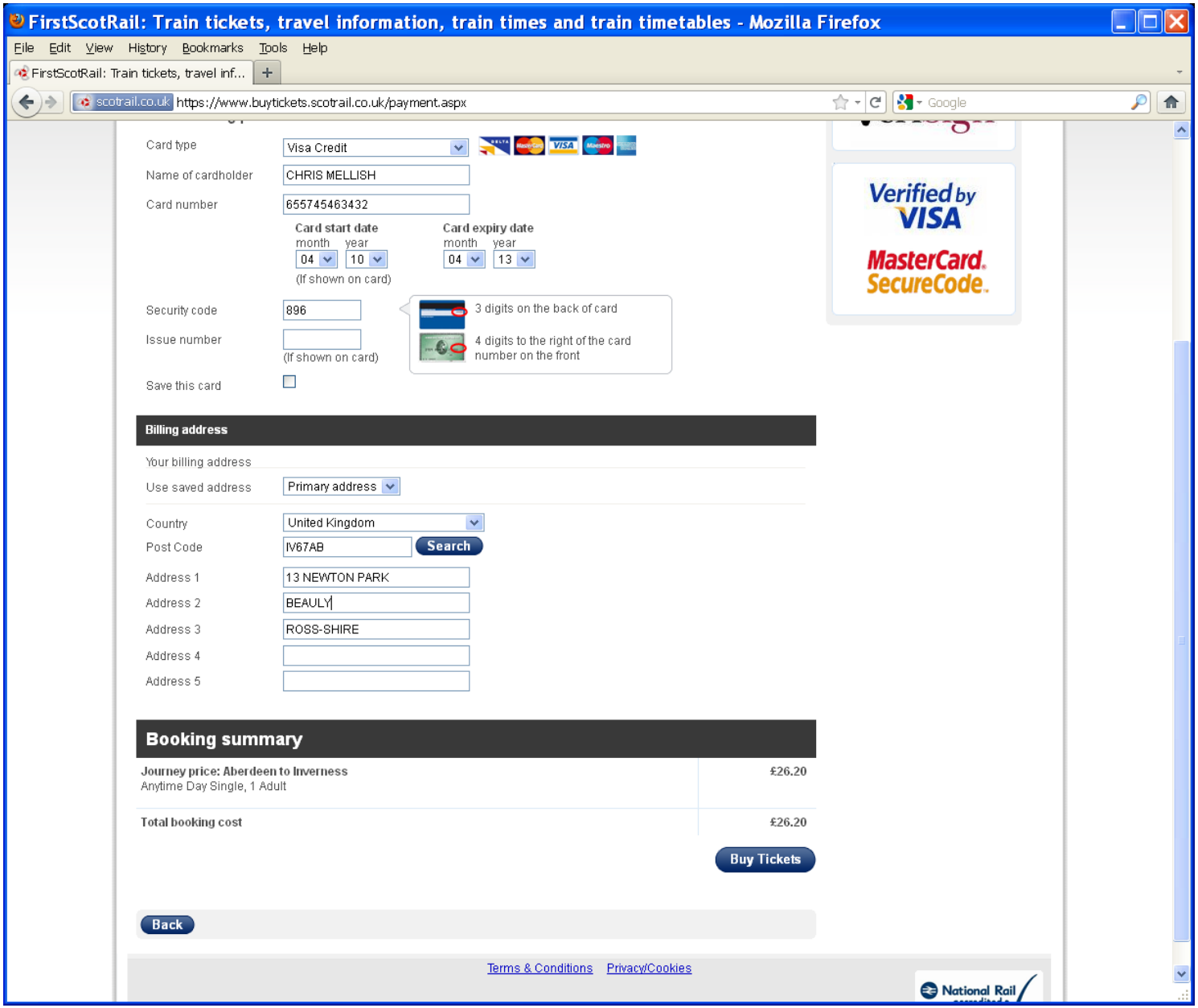
Recognise the control (5)

Find information about a lecturer



Will progress be apparent?

- Which train am I booked on? What date?
- How long do I wait after clicking “Buy Tickets”?


FirstScotRail: Train tickets, travel information, train times and train timetables - Mozilla Firefox
File Edit View History Bookmarks Tools Help
FirstScotRail: Train tickets, travel inf...
scotrail.co.uk https://www.buytickets.scotrail.co.uk/payment.aspx
Google
Card type
Visa Credit
Name of cardholder
CHRIS MELLISH
Card number
655745463432
Card start date
month year
04 10
(If shown on card)
Card expiry date
month year
04 13
Security code
896
3 digits on the back of card
Issue number
(If shown on card)
4 digits to the right of the card number on the front
Save this card
Verified by VISA
MasterCard SecureCode.
Billing address
Your billing address
Use saved address
Primary address
Country
United Kingdom
Post Code
IV67AB
Search
Address 1
13 NEWTON PARK
Address 2
BEAULY
Address 3
ROSS-SHIRE
Address 4
Address 5
Booking summary
Journey price: Aberdeen to Inverness
Anytime Day Single, 1 Adult
£26.20
Total booking cost
£26.20
Buy Tickets
Back
Terms & Conditions
Privacy/Cookies
National Rail

Cognitive Walkthrough Example 1

- Forwarding calls on campus telephone system (Wharton et al, 1994)
- User: new member of staff
- Task: forward phone calls to extension 1234
- Interface: Phone on desk. Overlay template includes: FWD *2

  CNCL #2

  SEND ALL *3

Example: Correct action sequence

1. Pick up the receiver [Phone: dial tone]
2. Press #2 (=cancel forward) [Phone: bip bip bip]
3. Hang up the receiver.
4. Pick up the receiver. [Phone: dial tone]
5. Press *2. {=forward calls} [Phone: dial tone]
6. Press 1234. [Phone: bip bip bip]
7. Hang up the receiver.

Example walkthrough steps (1)

1. Pick up the receiver. [Phone: dial tone]

   Success story: Seems ok based on prior experience with phones.

2. Press #2. [Phone: bip bip bip]

   Failure story:

   – Will the user expect to have to take this action? How does the user even know that forwarding is in effect?

Example walkthrough steps (2)

- Will the user notice the control for the action? Probably yes, if forwarding is active, one must be able to cancel it. CNCL is visible on the template.
- Will the user recognize that the control produces the desired effect? Might not recognize CNCL as the control to cancel forwarding. Might think that just pressing '2' is sufficient, instead of '#2'. Might try to press the buttons simultaneously, rather than sequentially.

Example walkthrough steps (3)

- If the correct action is performed, will progress be apparent? How do first-time users know they have succeeded? After some experience, they will recognize the bips as confirmation, but will they at first?

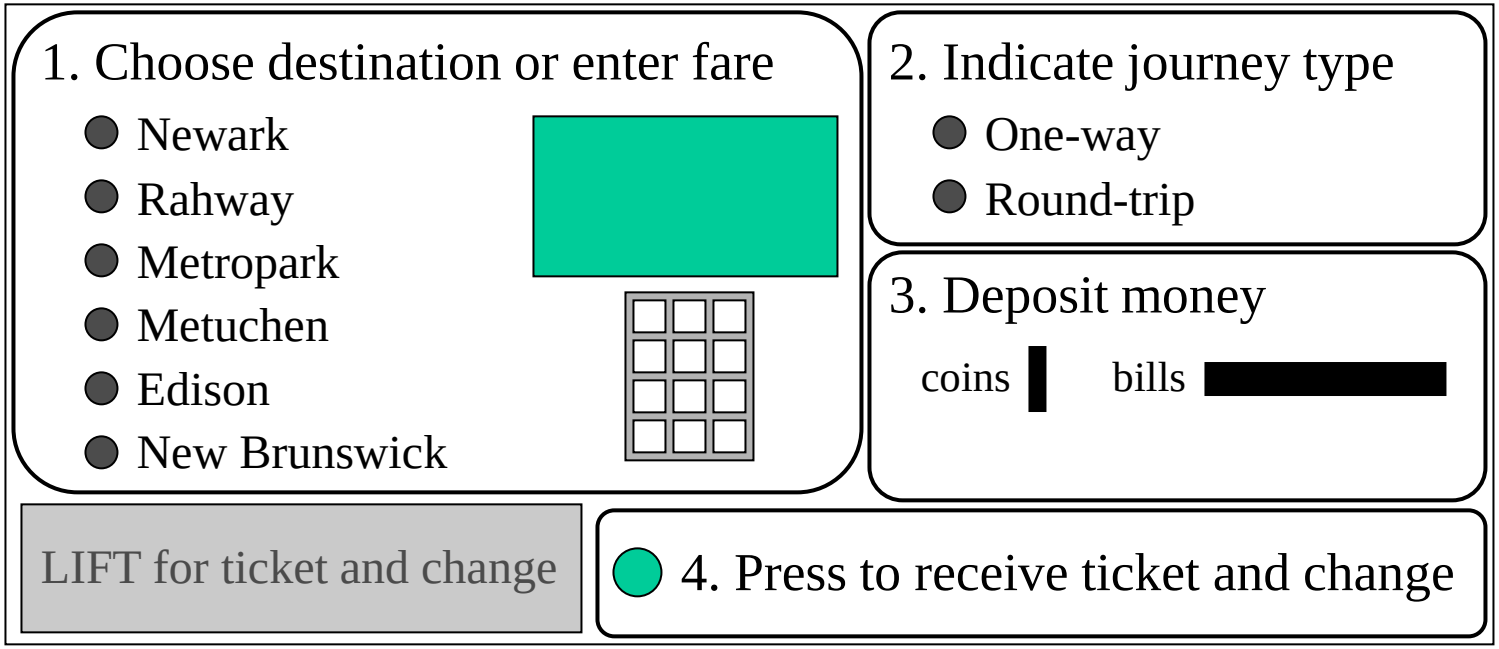
3. Hang up the receiver.

   Failure story:

   - Will the user expect having to take this action? Probably not. How do you know you have to hang up before reestablishing forwarding?

Cognitive Walkthrough Example 2

- Train ticket vending machine [Newman & Lamming 1995]

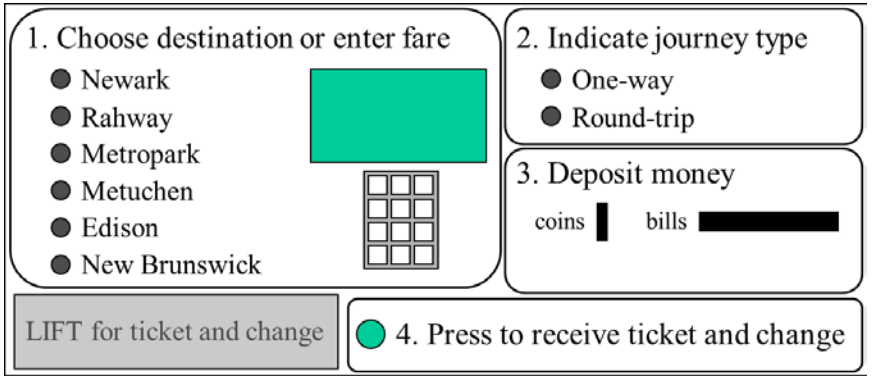


Cognitive Walkthrough Example

Scenario: Maria wants to buy a one-way ticket to New Brunswick. She has a $5 bill in her pocket + some change

Correct action sequence:

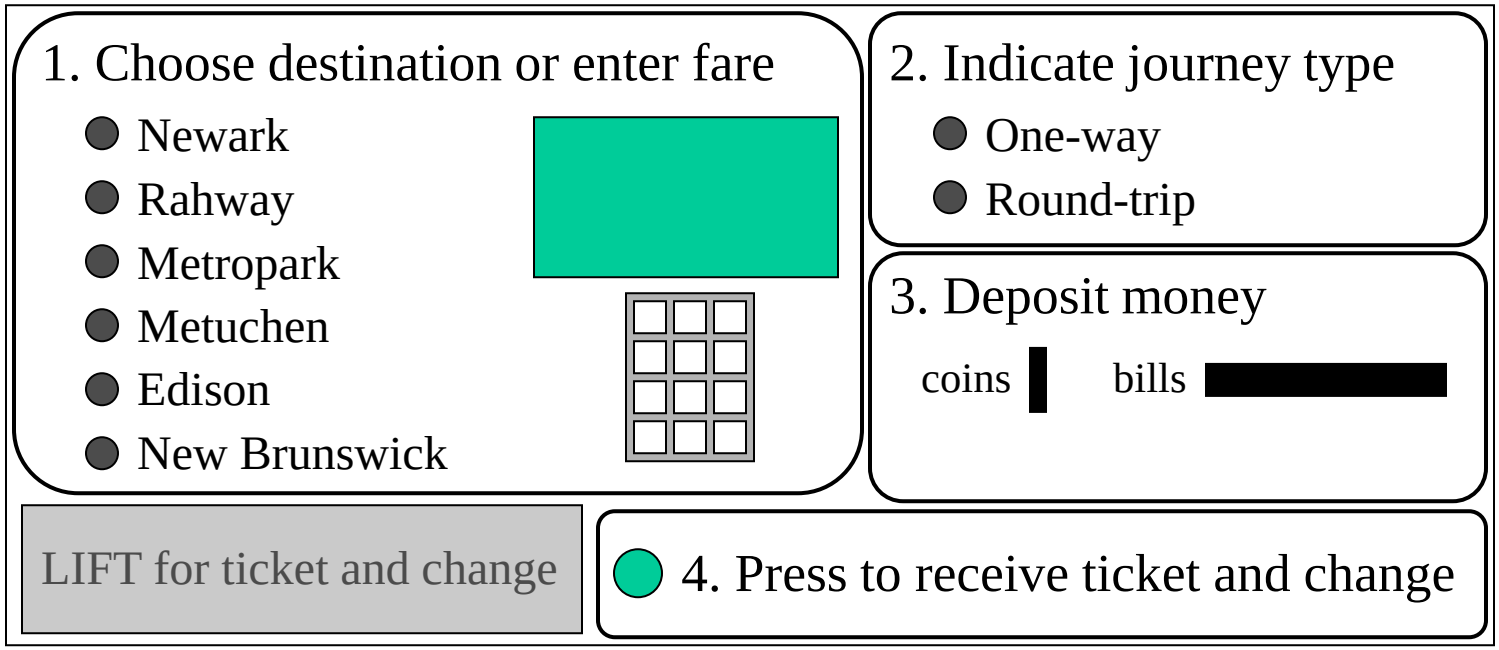
1. Press button in front of New Brunswick [Button lights up]
2. Press button in front of One-way [Button lights up, fare shown in green area]
3. Deposit money till fare reached
4. Press button in front of 4 [Ticket and change given]



Cognitive Walkthrough Example:

Press button in front of New Brunswick [Button lights up]

1. Will the user expect to have to take this action?

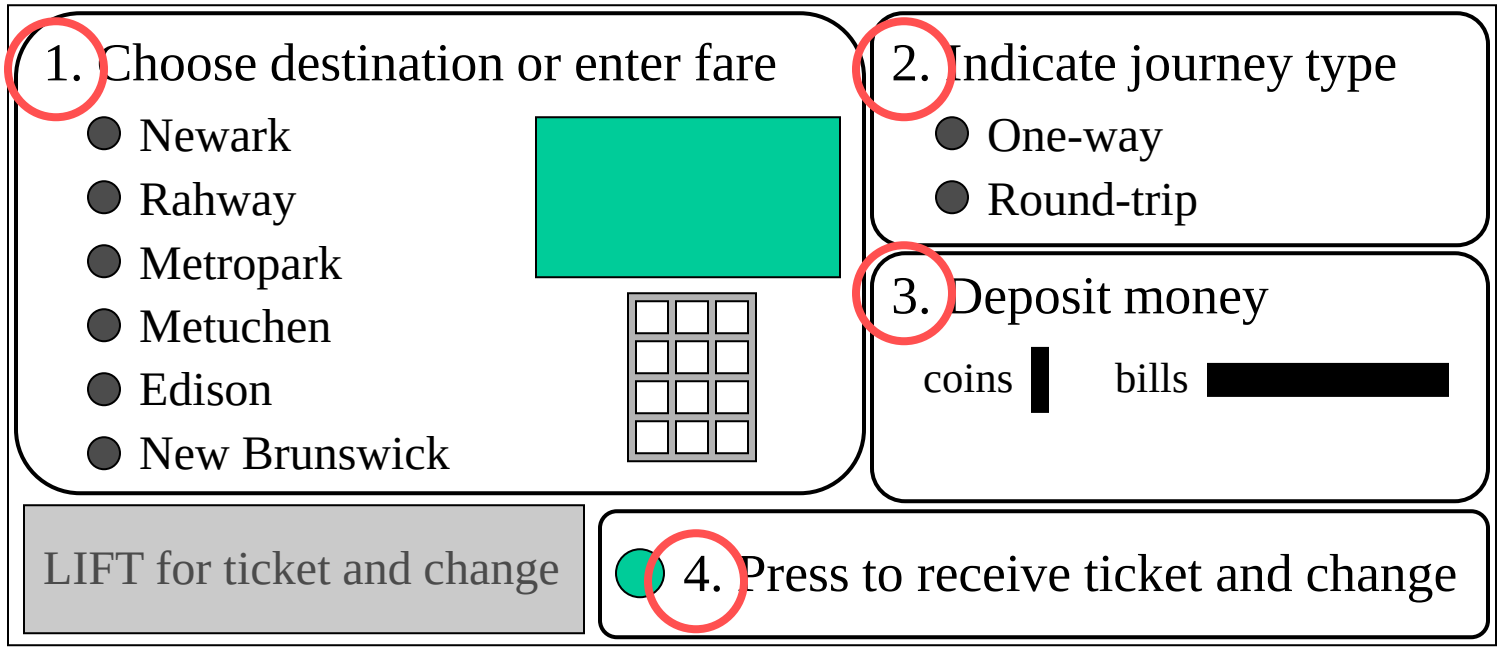


Cognitive Walkthrough Example:

Press button in front of New Brunswick [Button lights up]

1. Will the user expect to have to take this action?

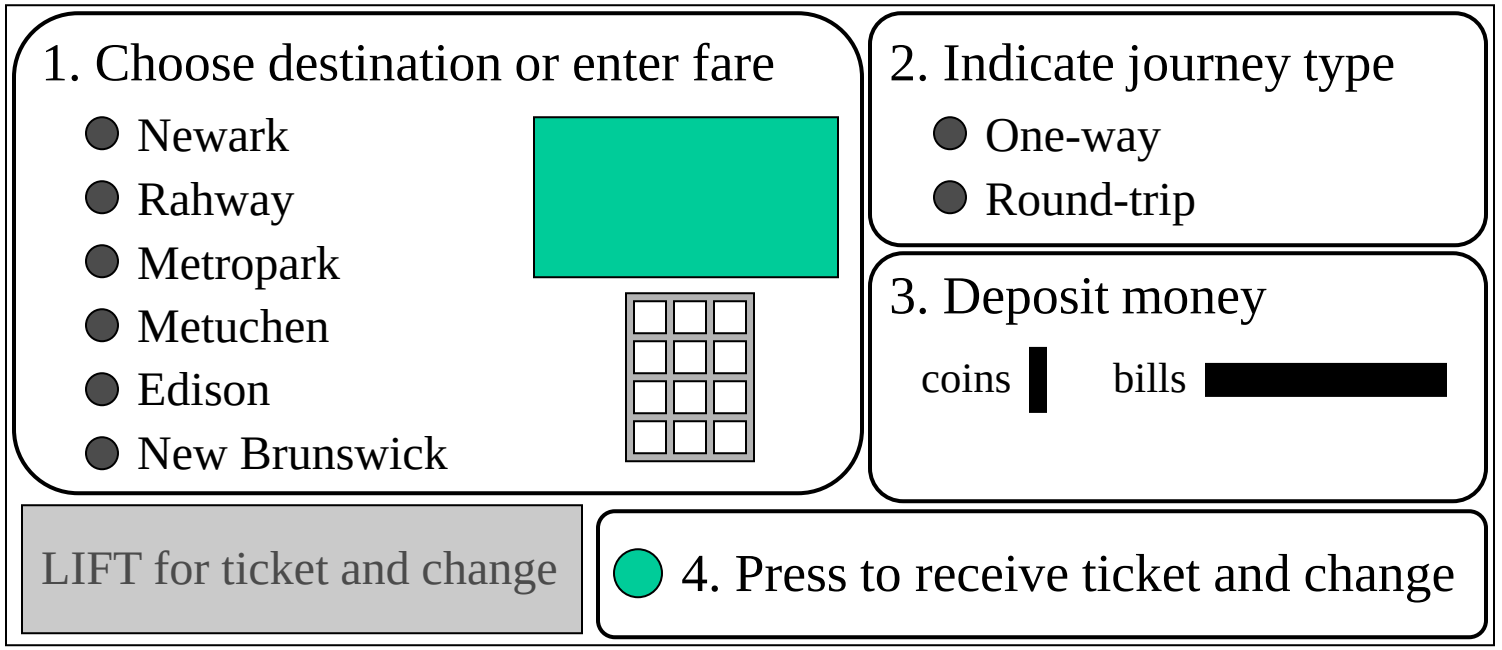
Yes, will expect to have to provide destination, and sub goals provided, so will expect to do this first



Cognitive Walkthrough Example:

Press button in front of New Brunswick [Button lights up]

2. Will the user notice the control?

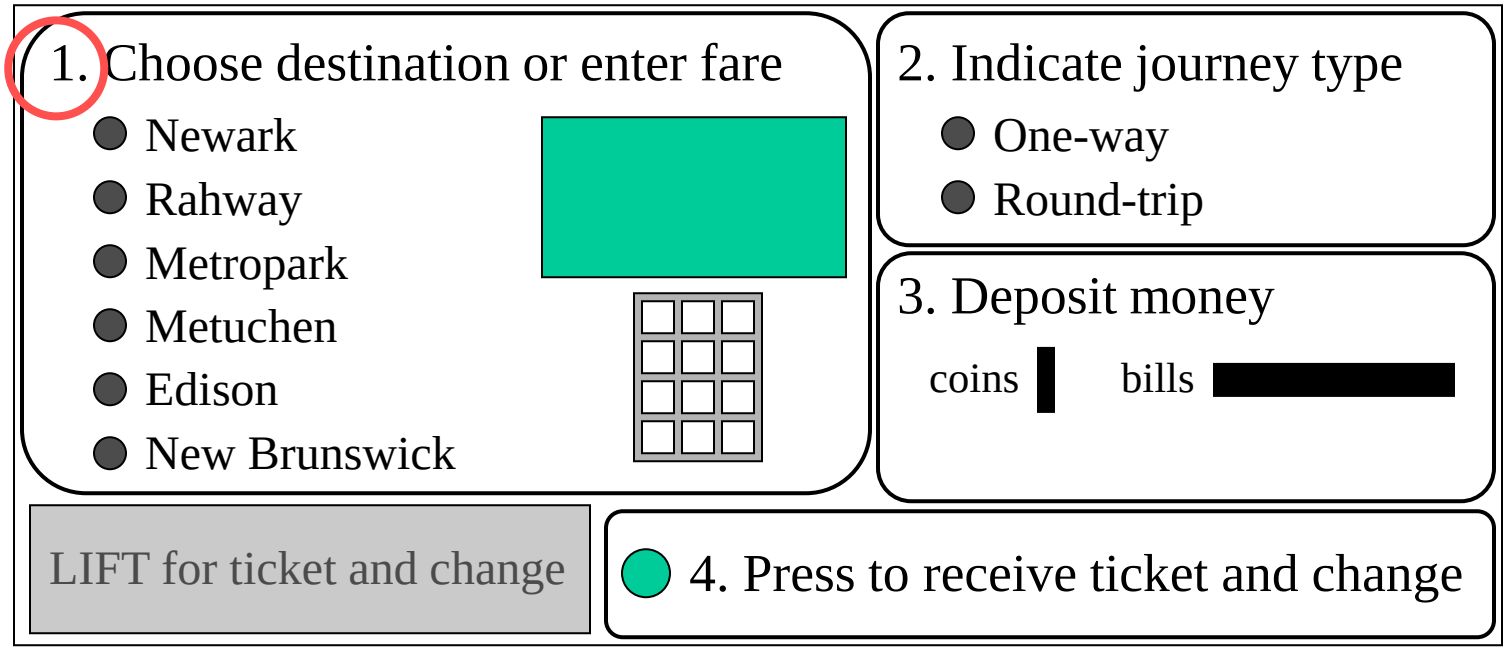


Cognitive Walkthrough Example:

Press button in front of New Brunswick [Button lights up]

2. Will the user notice the control?

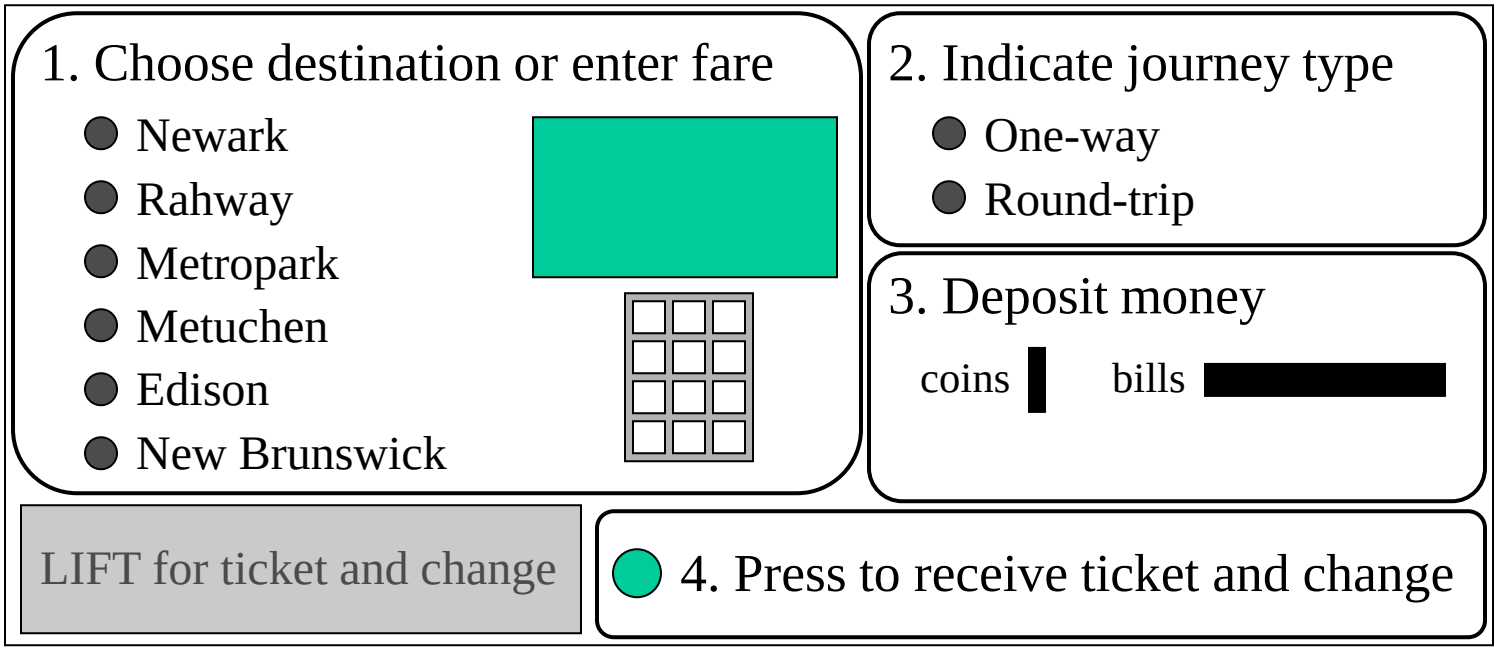
Yes, destination selection area is top left, and clearly indicated by 1, so would see it. Button clearly visible.



Cognitive Walkthrough Example:

Press button in front of New Brunswick [Button lights up]

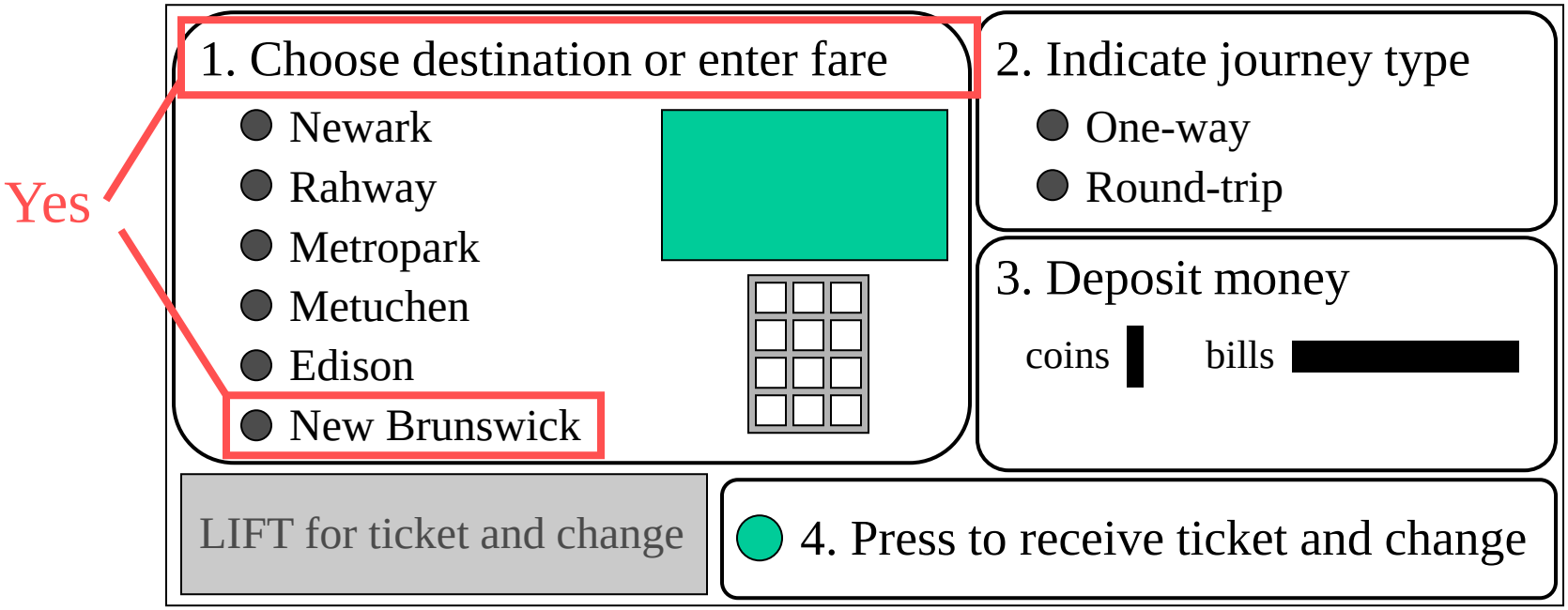
3. Will the user recognize that the control produces the desired effect?



Cognitive Walkthrough Example:

Press button in front of New Brunswick [Button lights up]

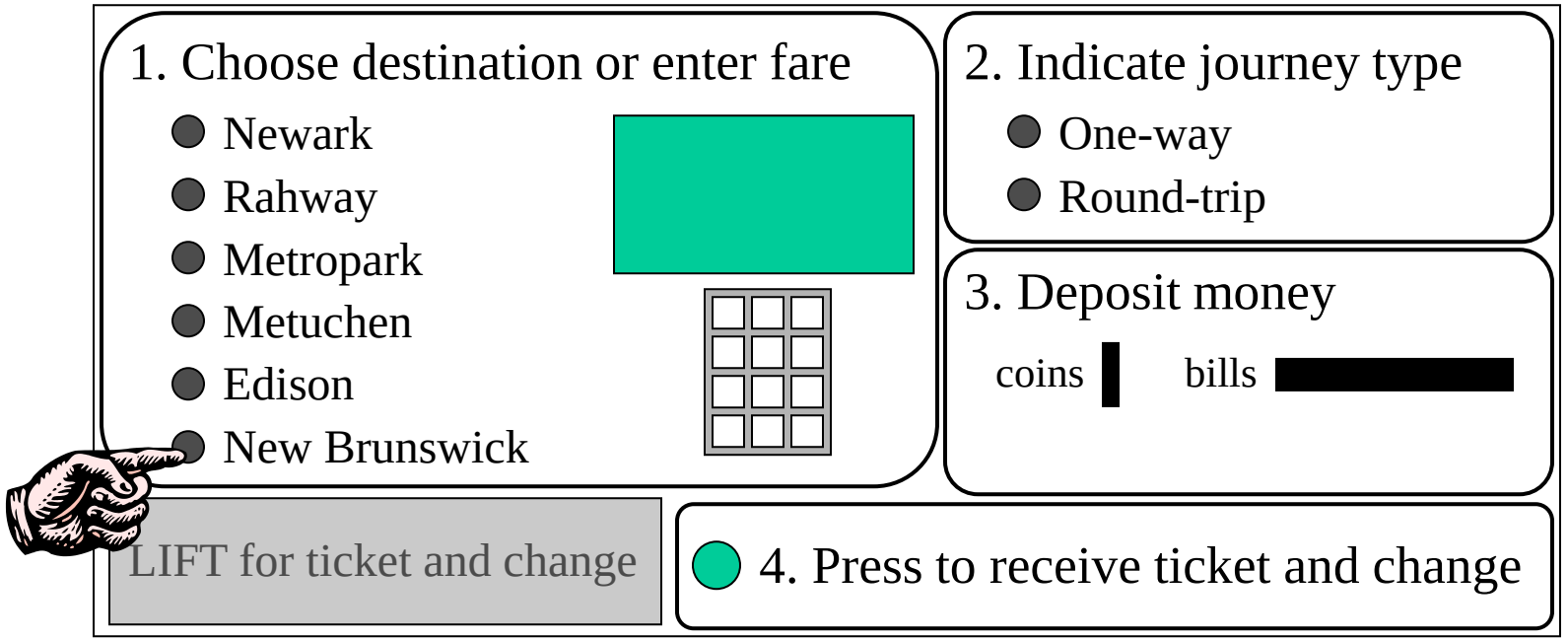
3. Will the user recognize that the control produces the desired effect?



Cognitive Walkthrough Example:

Press button in front of New Brunswick [Button lights up]

4. Will progress be apparent?

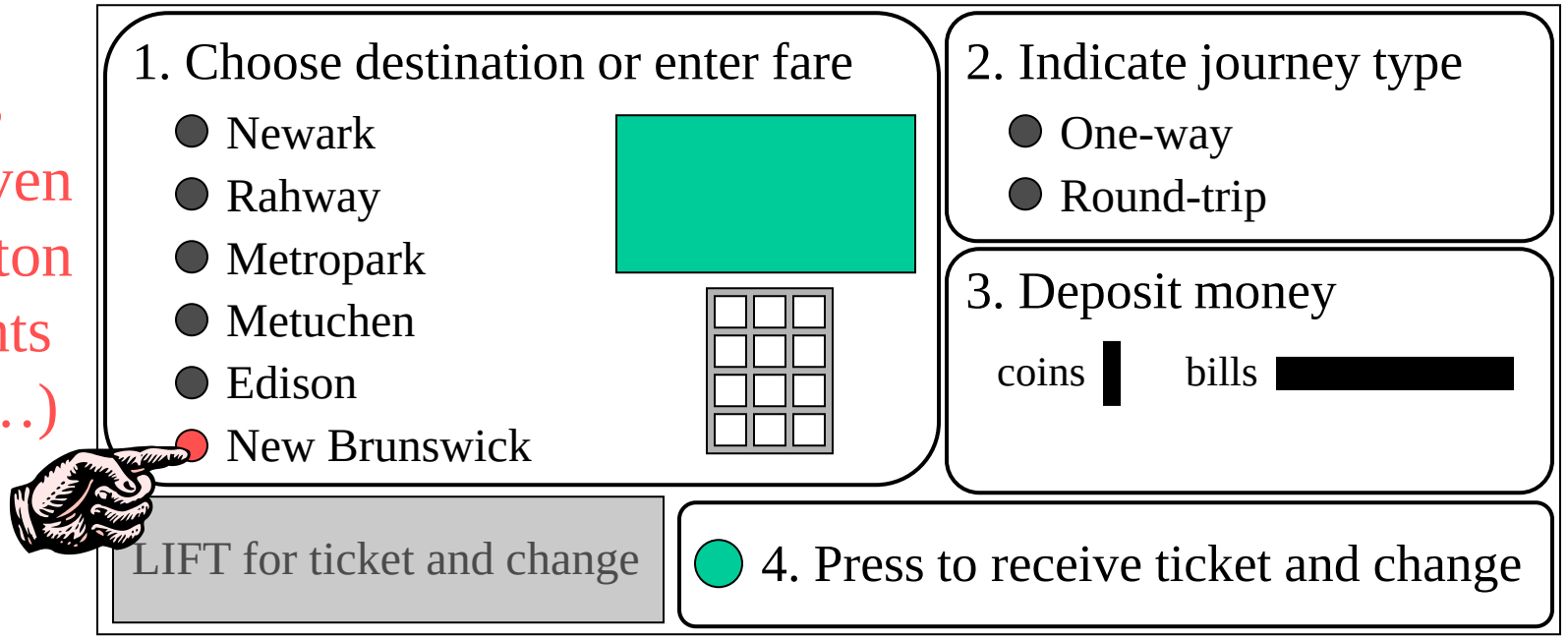


Cognitive Walkthrough Example:

Press button in front of New Brunswick [Button lights up]

4. Will progress be apparent?

Yes (given button lights up…)

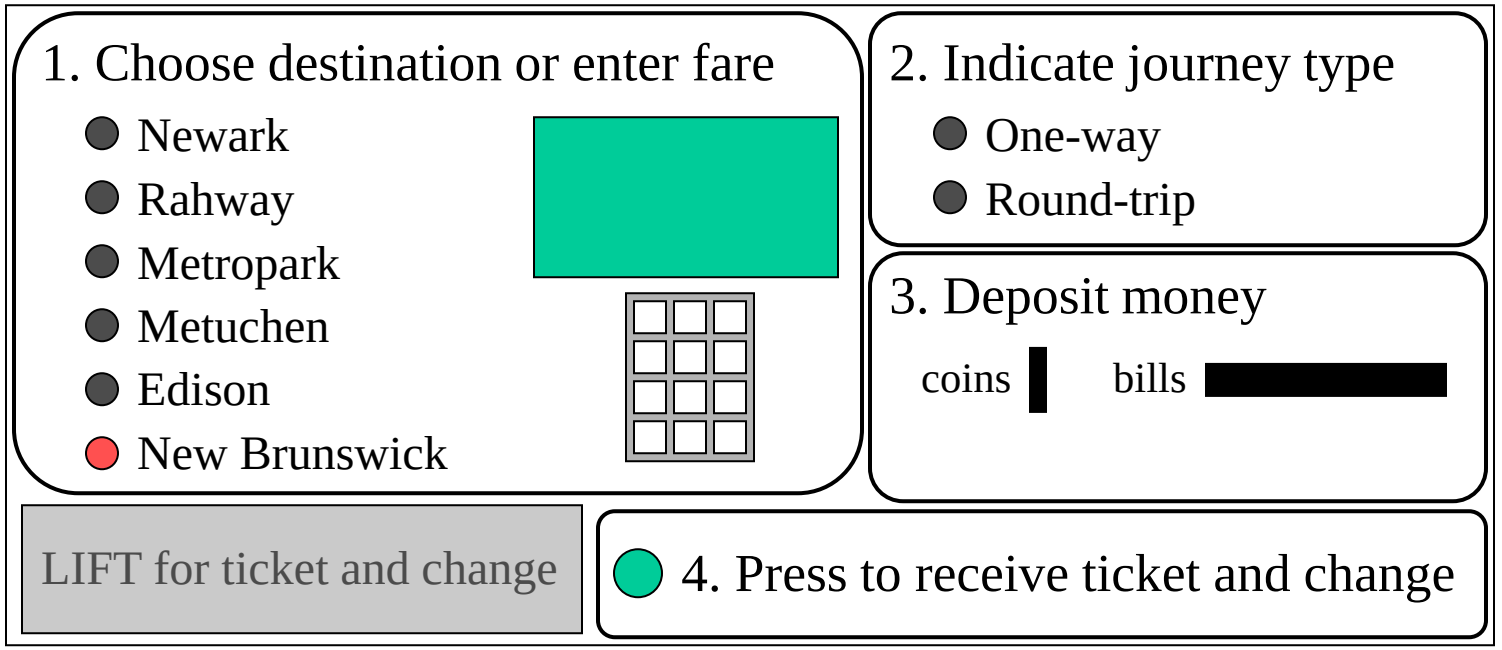


Cognitive Walkthrough Example:

Press button in front of One-way

[Button lights up, fare shown in green area]

1. Will the user expect to have to take this action?

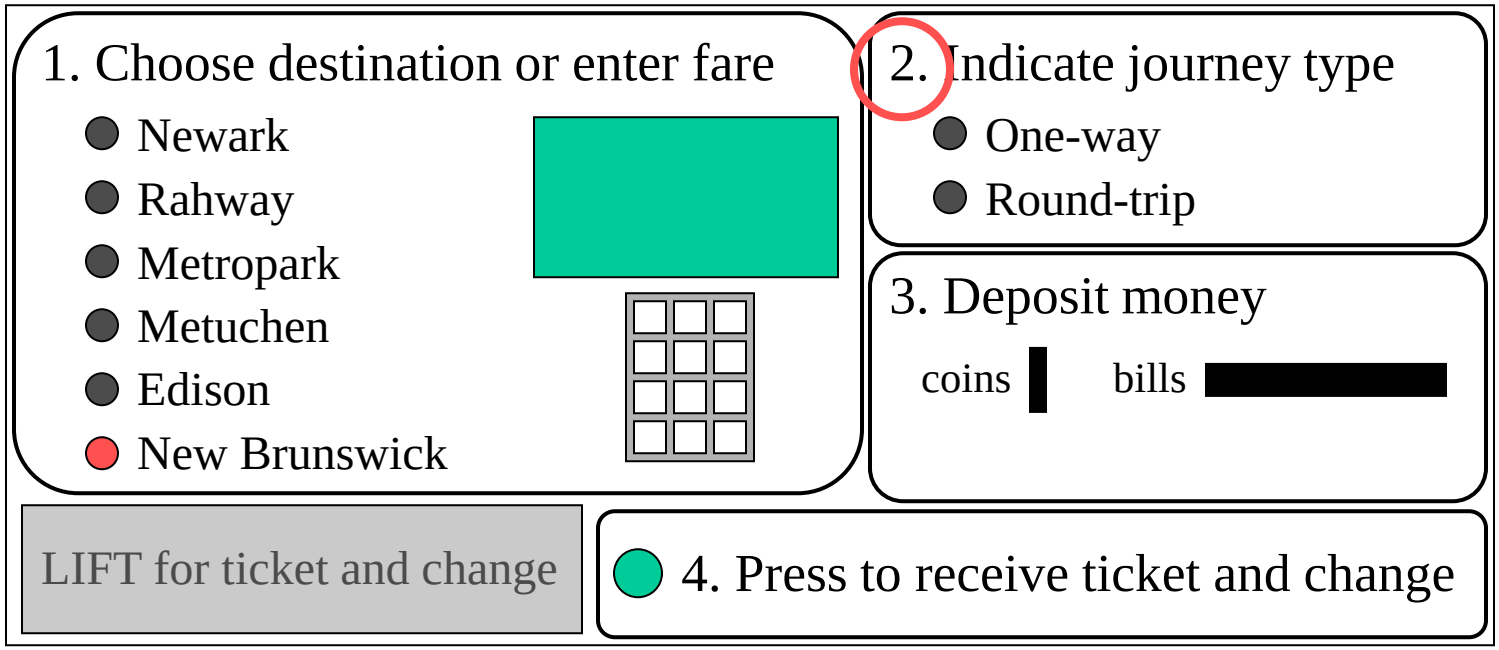


Cognitive Walkthrough Example:

Press button in front of One-way
[Button lights up, fare shown in green area]

1. Will the user expect to have to take this action?

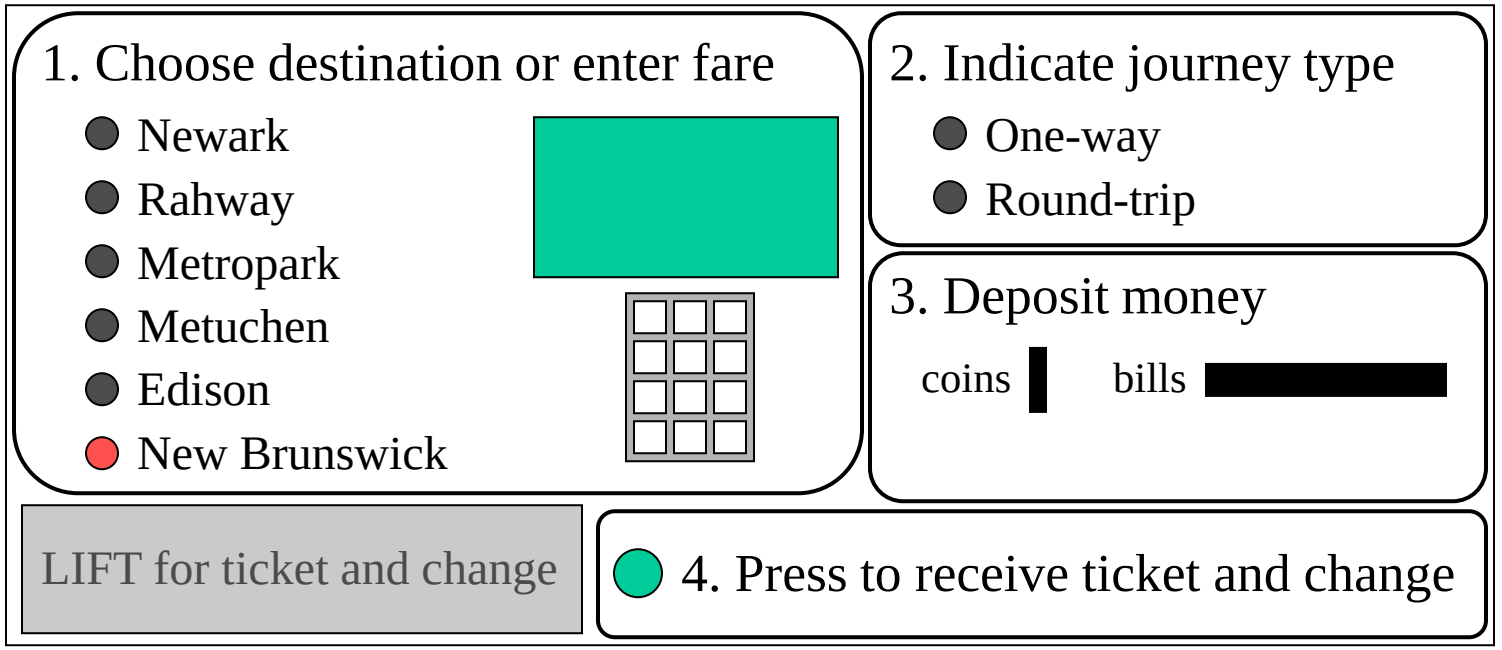
Yes, will expect to have to input that it is a single trip, and sub goals provided, so will expect to do this next



Cognitive Walkthrough Example:

Press button in front of One-way
[Button lights up, fare shown in green area]

2. Will the user notice the control?

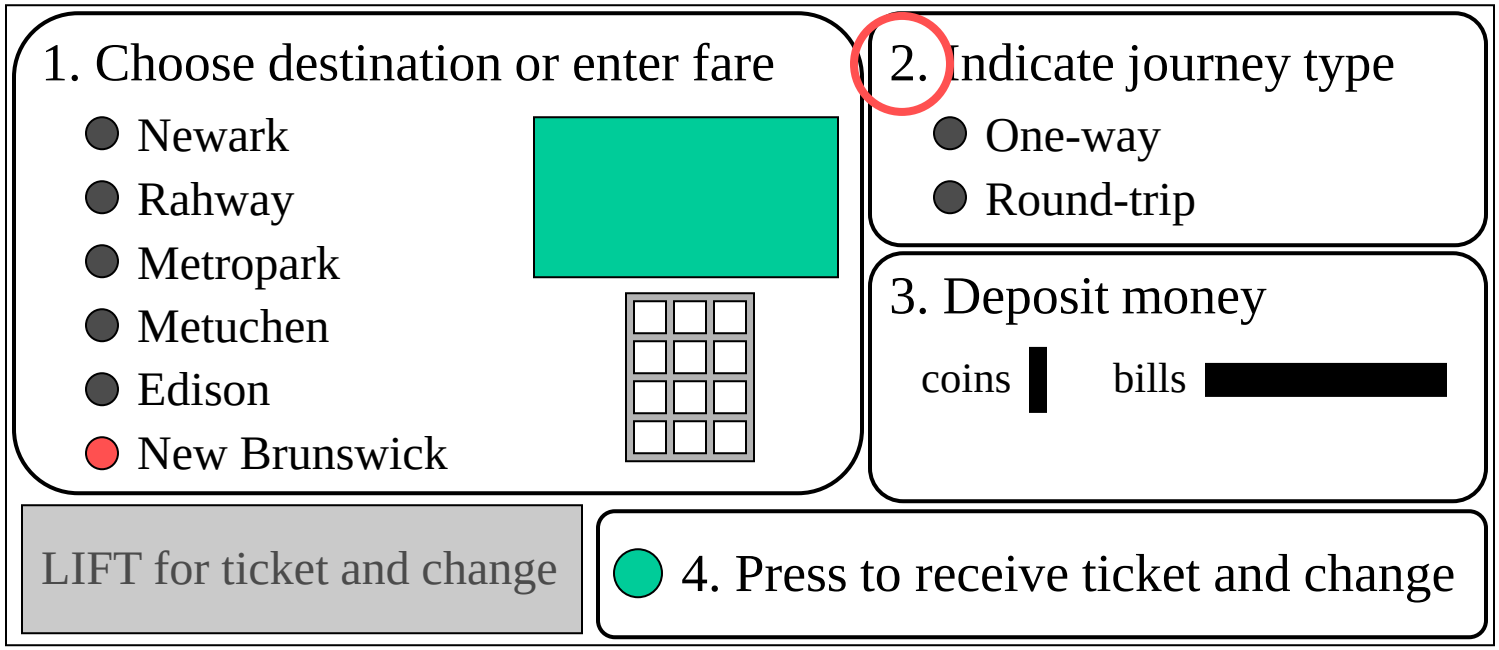


Cognitive Walkthrough Example:

Press button in front of One-way
[Button lights up, fare shown in green area]

2. Will the user notice the control?

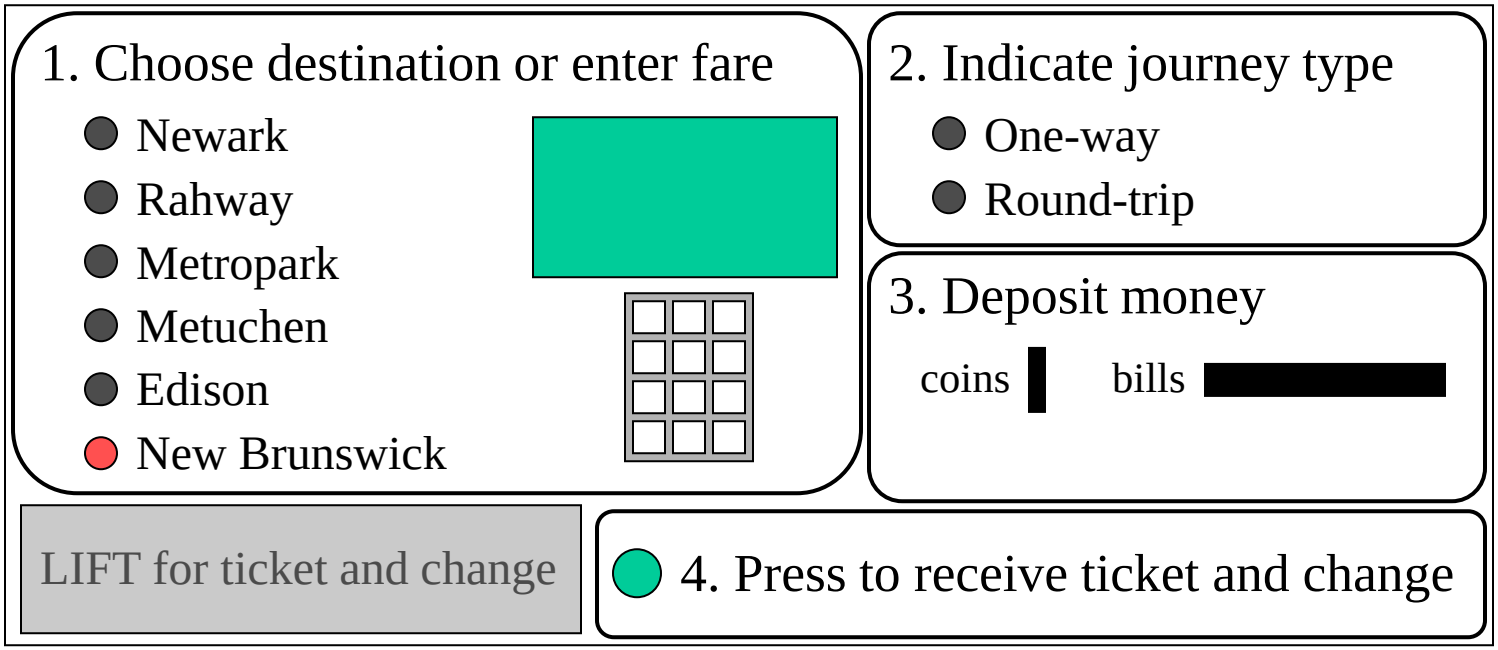
Yes, journey type area is clearly indicated by 2 and the surrounding box so would see it. Button clearly visible.



Cognitive Walkthrough Example:

Press button in front of One-way
[Button lights up, fare shown in green area]

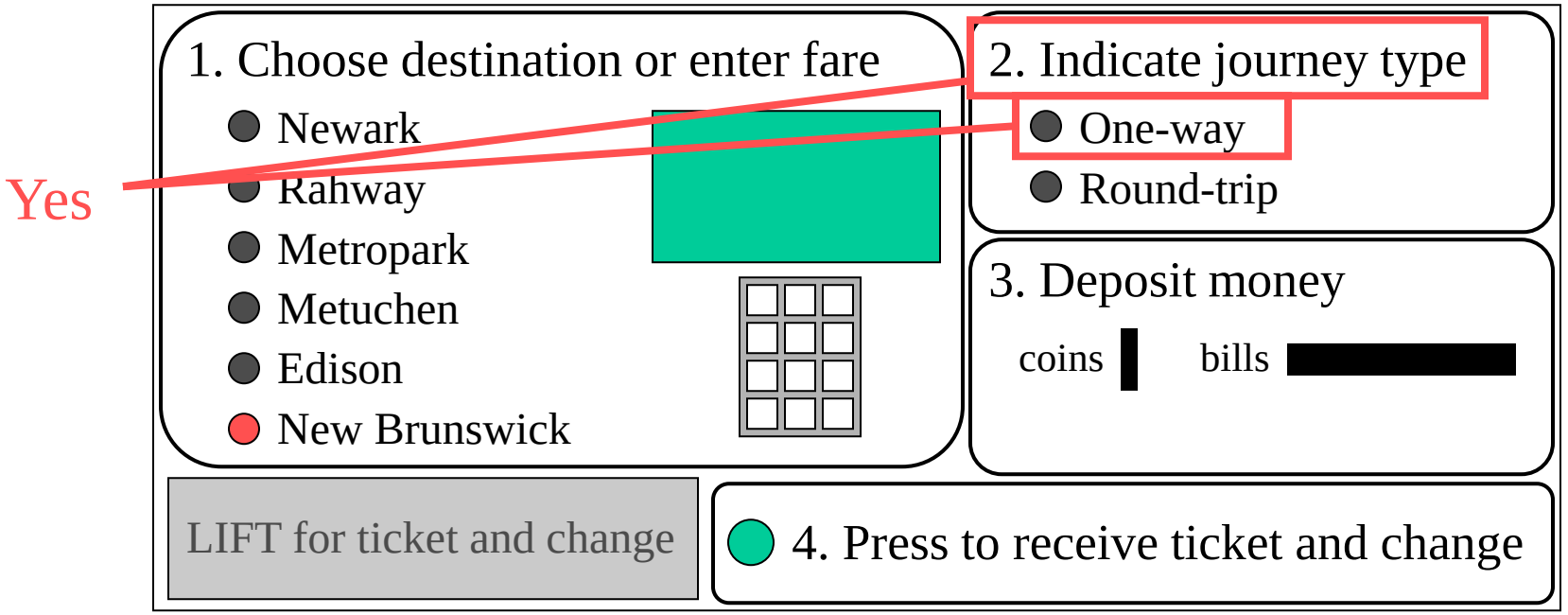
3. Will the user recognize that the control produces the desired effect?



Cognitive Walkthrough Example:

Press button in front of One-way
[Button lights up, fare shown in green area]

3. Will the user recognize that the control produces the desired effect?

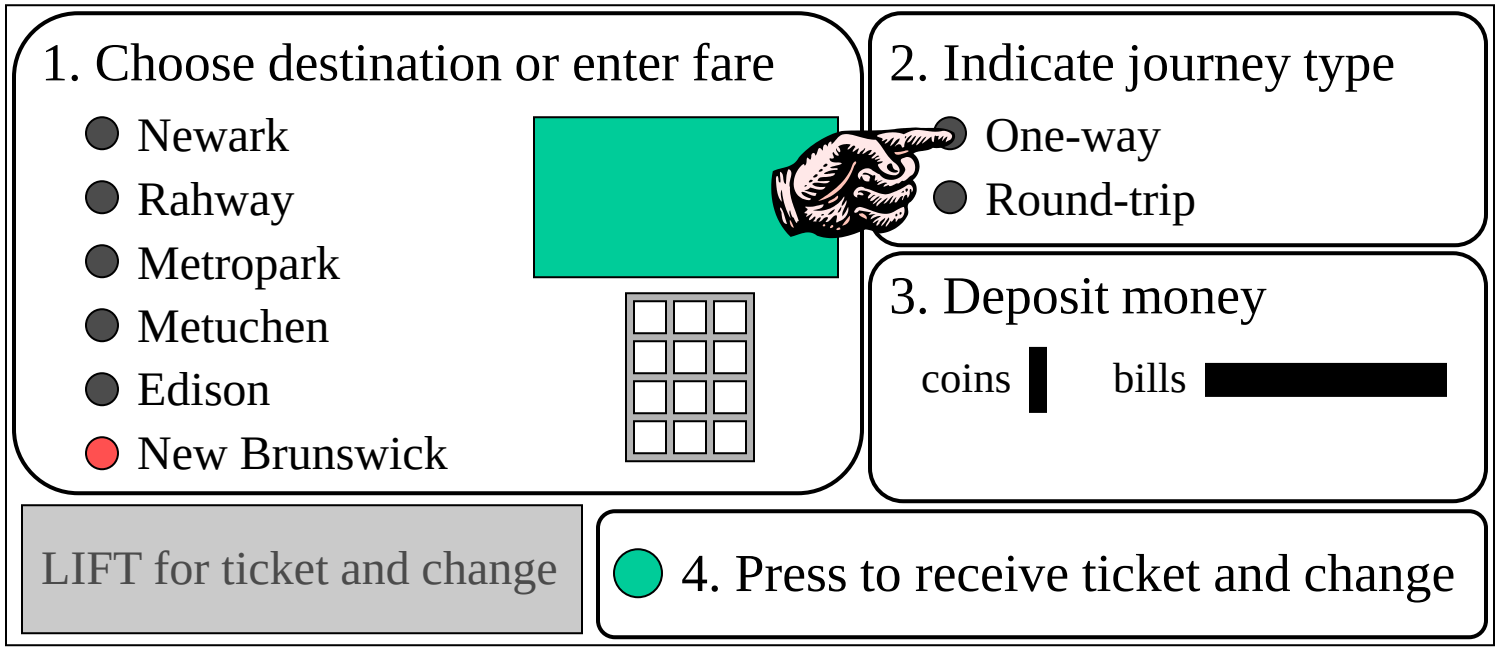


Cognitive Walkthrough Example:

Press button in front of One-way

[Button lights up, fare shown in green area]

4. Will progress be apparent?

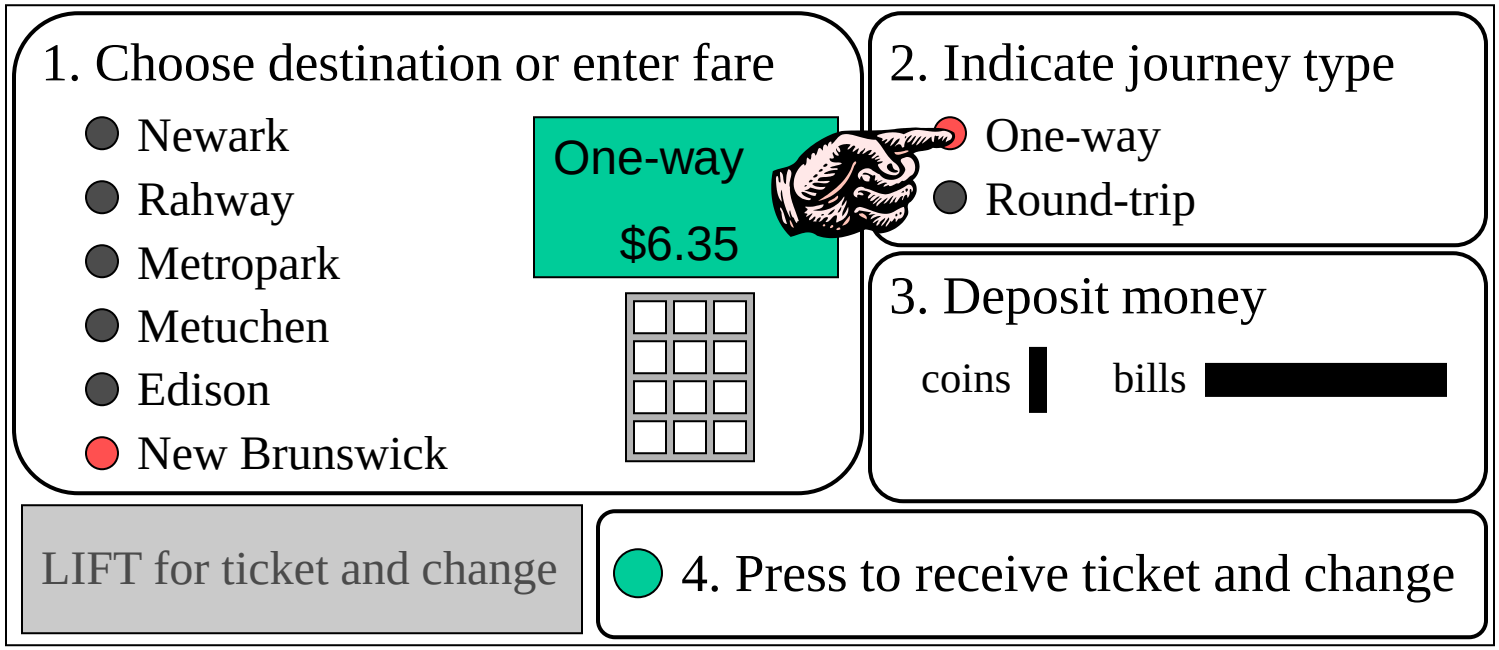


Cognitive Walkthrough Example:

Press button in front of One-way
[Button lights up, fare shown in green area]

4. Will progress be apparent?

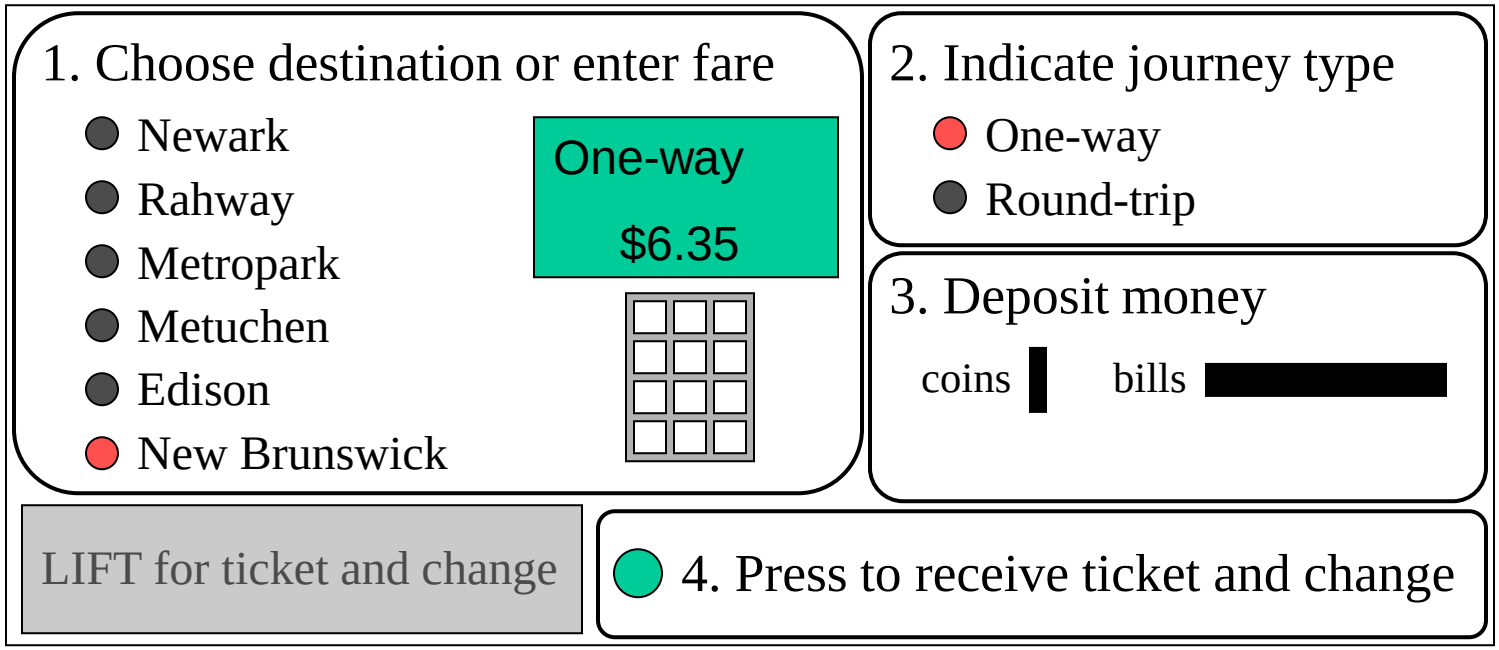
Yes, fare appears and button lights up



Cognitive Walkthrough Example:

Deposit money till fare reached

1. Will the user expect to have to take this action?

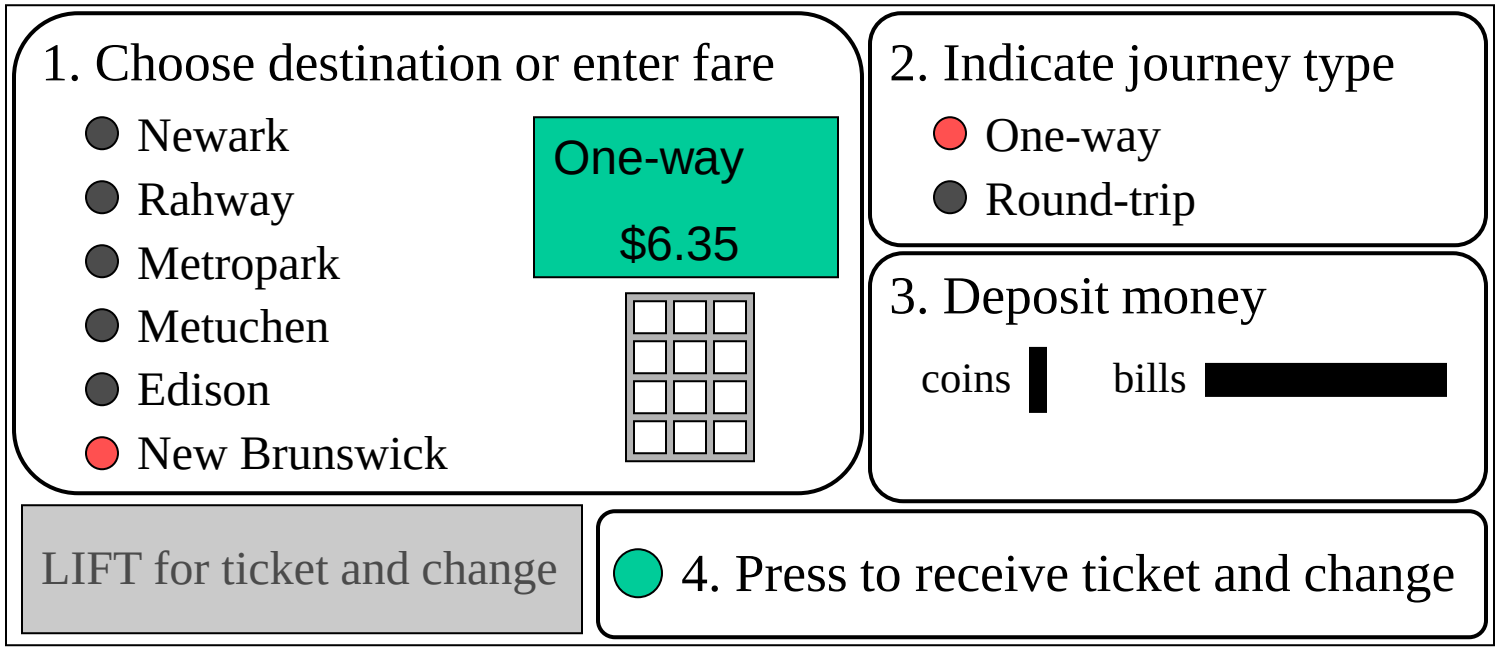


Cognitive Walkthrough Example:

Deposit money till fare reached

1. Will the user expect to have to take this action?

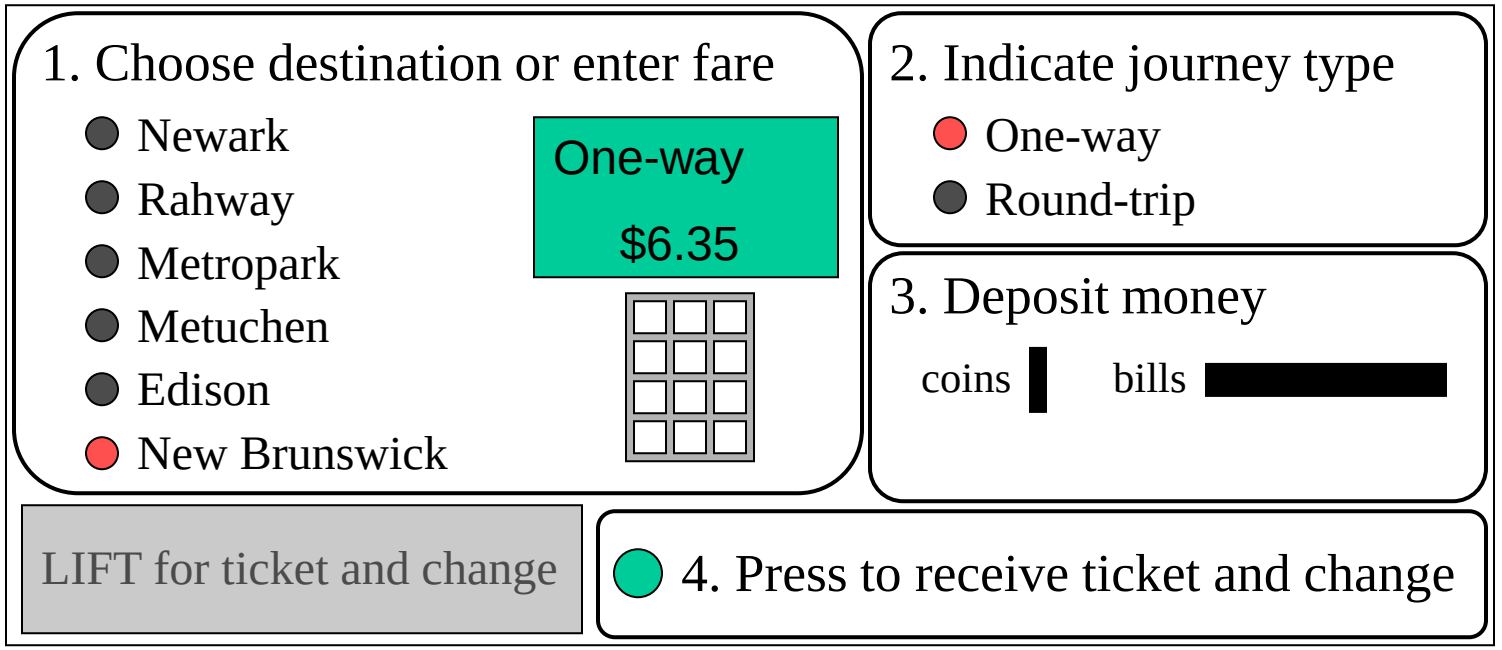
Yes, will expect to have to pay, and clear that depositing money is next step



Cognitive Walkthrough Example:

Deposit money till fare reached

2. Will the user notice the control?

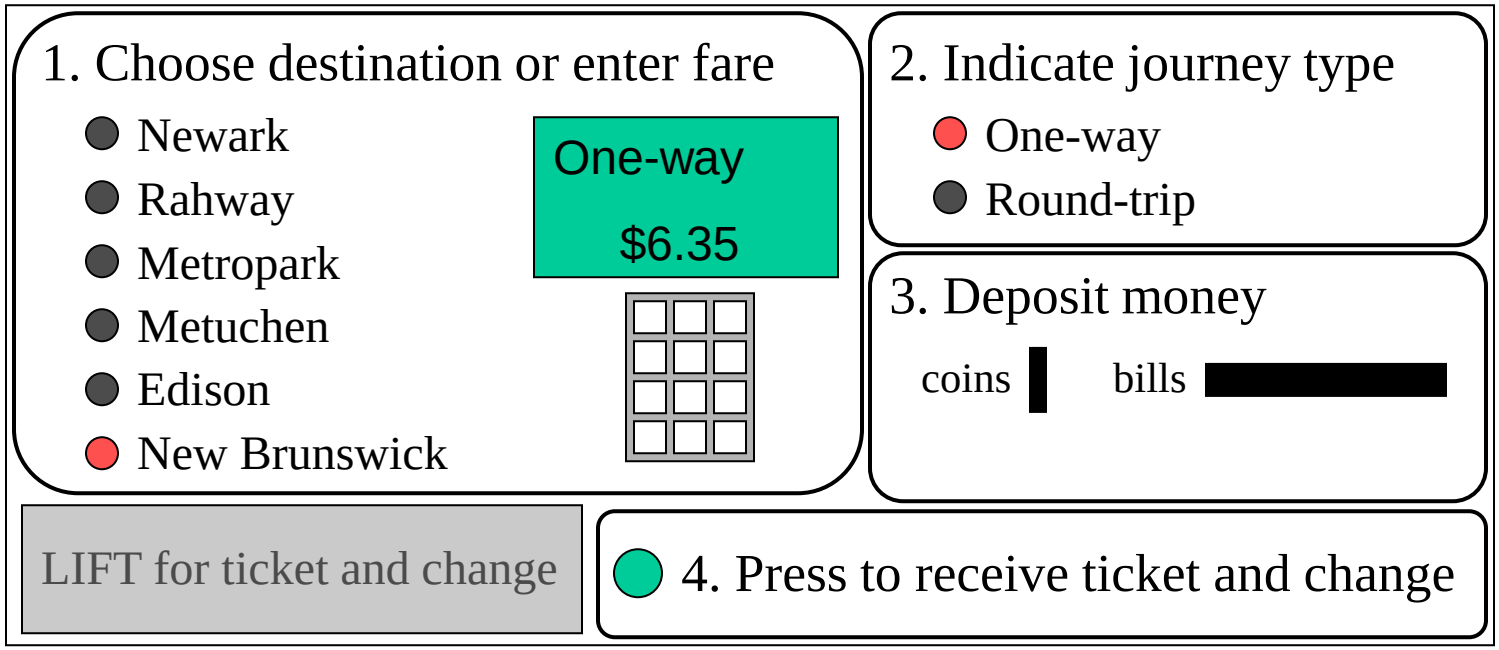


Cognitive Walkthrough Example:

Deposit money till fare reached

2. Will the user notice the control?

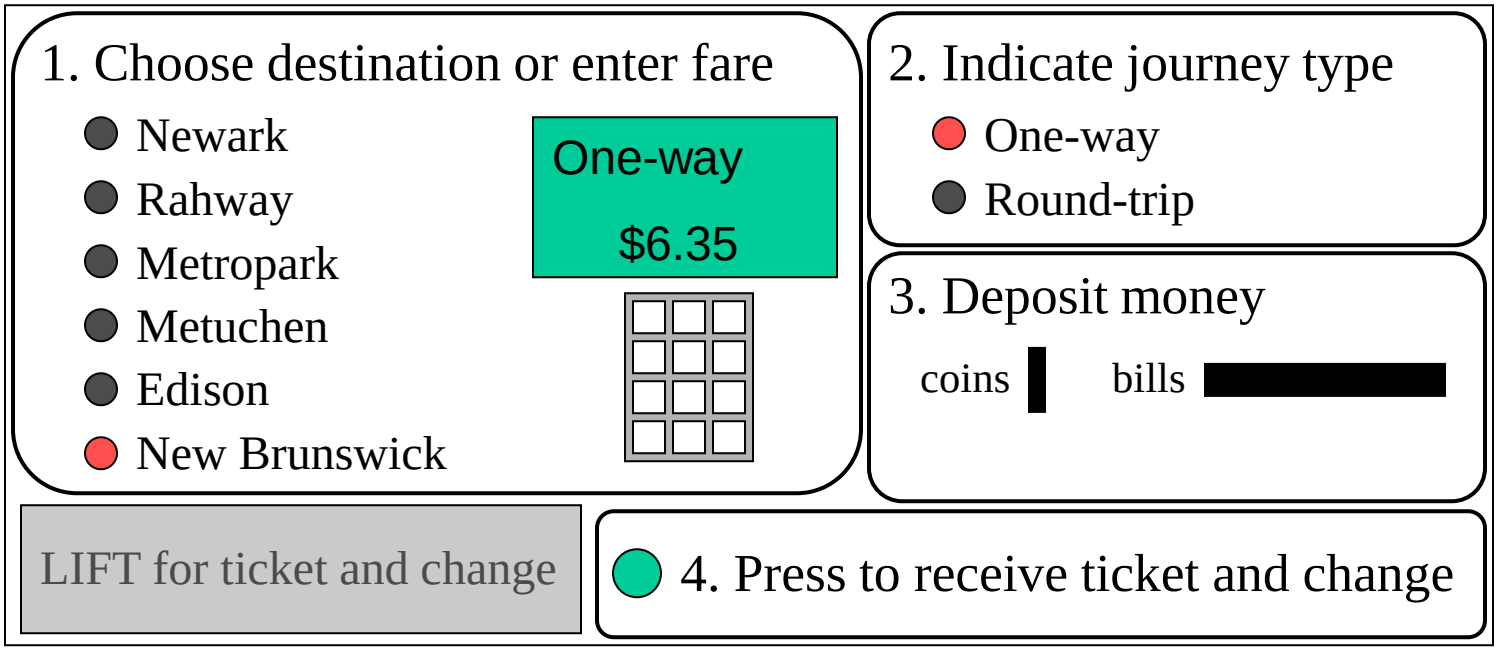
Yes payment area is clearly indicated by 3 and the surrounding box, so would see it. Money slots clearly visible.



Cognitive Walkthrough Example:

Deposit money till fare reached

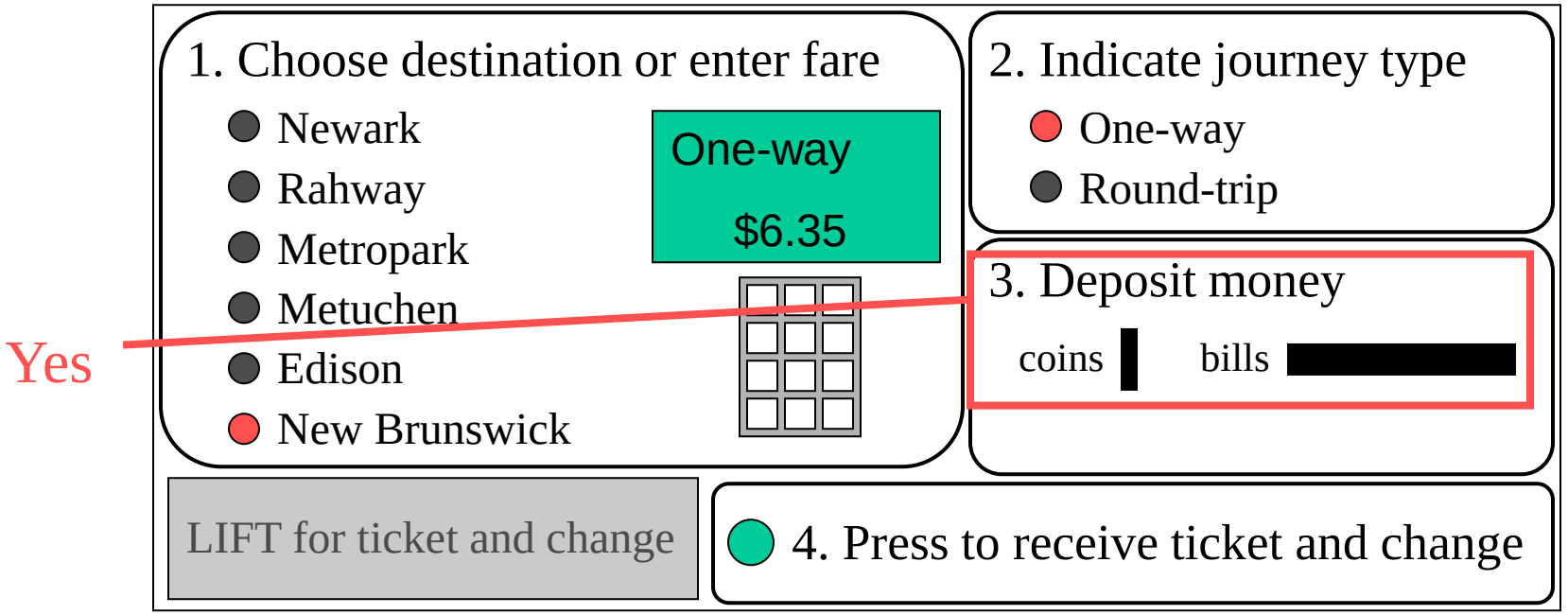
3. Will the user recognize that the control produces the desired effect?



Cognitive Walkthrough Example:

Deposit money till fare reached

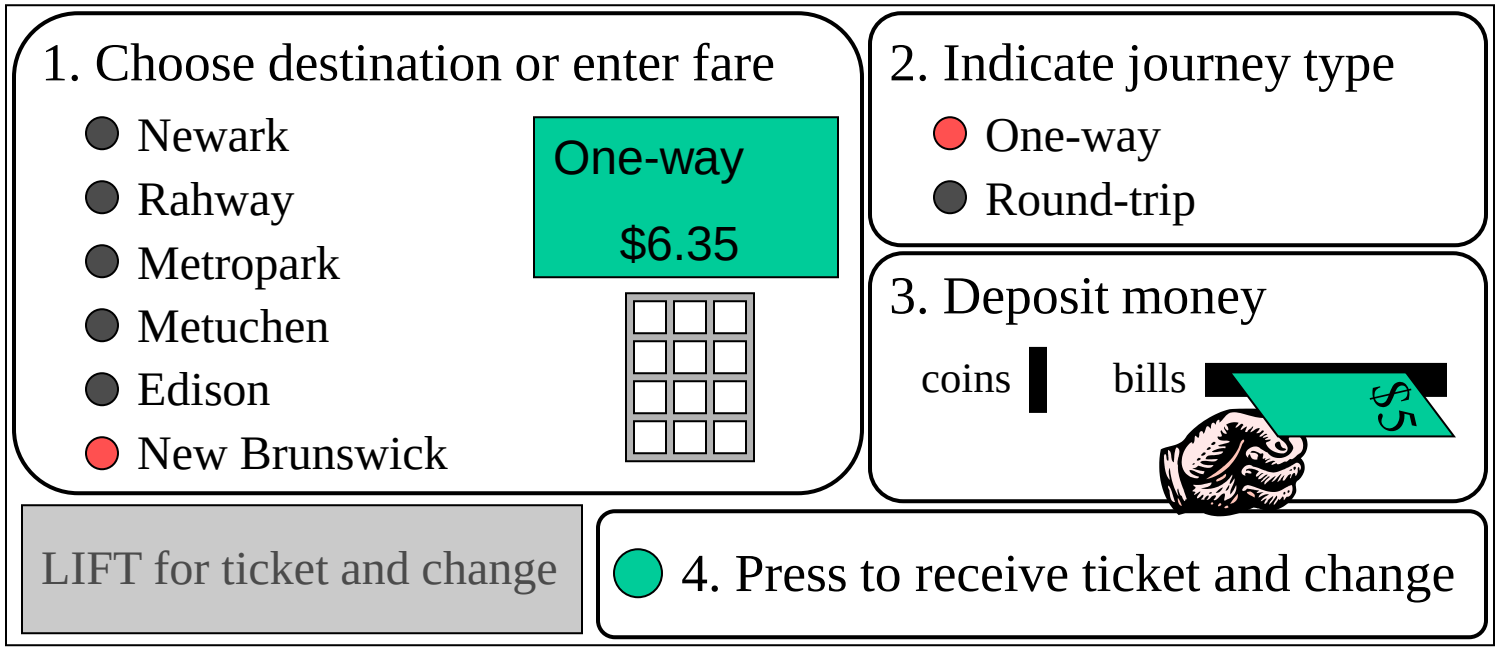
3. Will the user recognize that the control produces the desired effect?



Cognitive Walkthrough Example:

Deposit money till fare reached

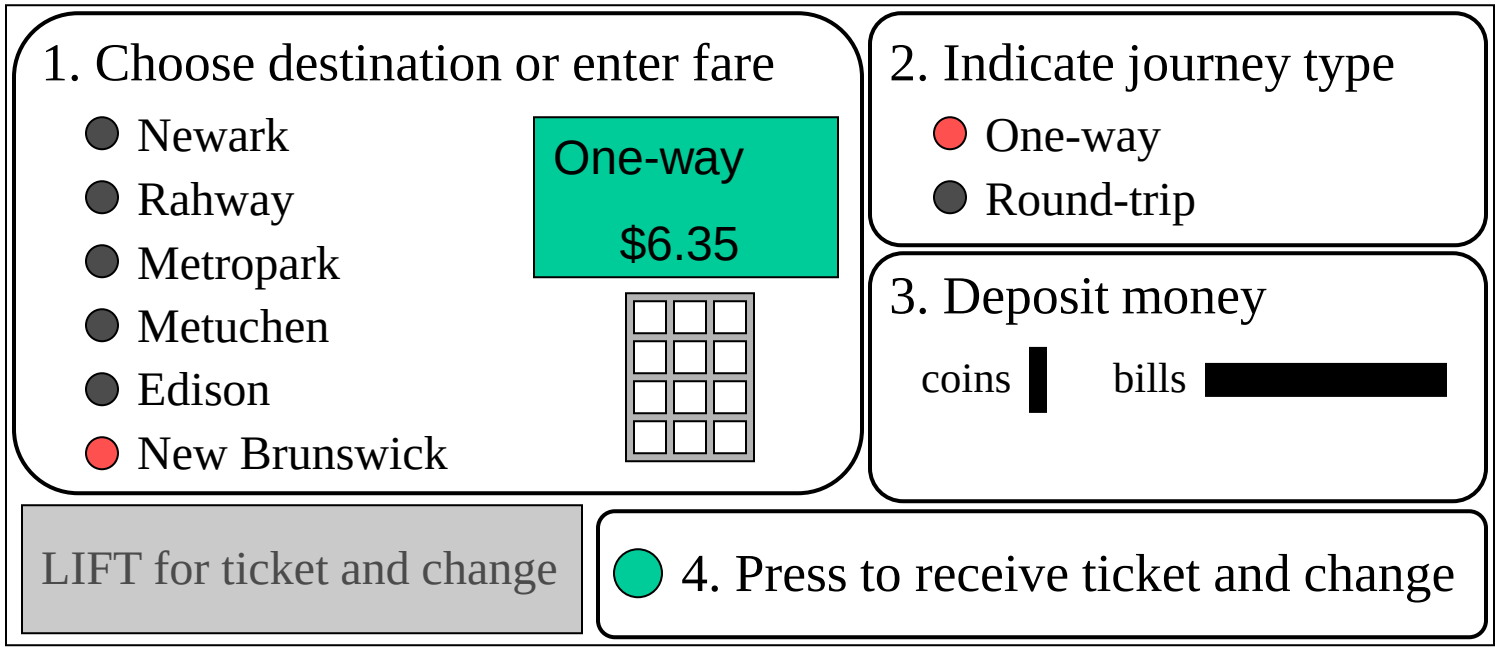
4. Will progress be apparent?



Cognitive Walkthrough Example:

Deposit money till fare reached

4. Will progress be apparent?



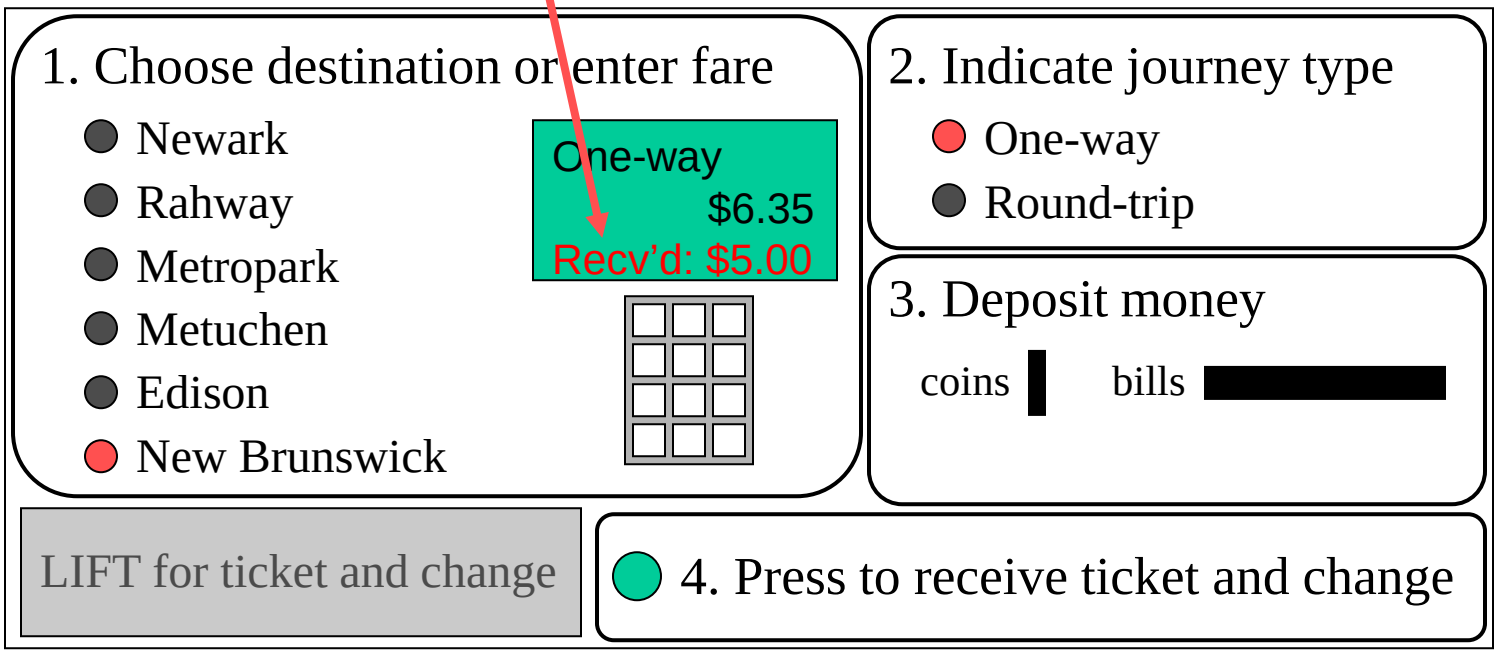
Cognitive Walkthrough Example:

Deposit money till fare reached

4. Will progress be apparent?

No, need feedback!

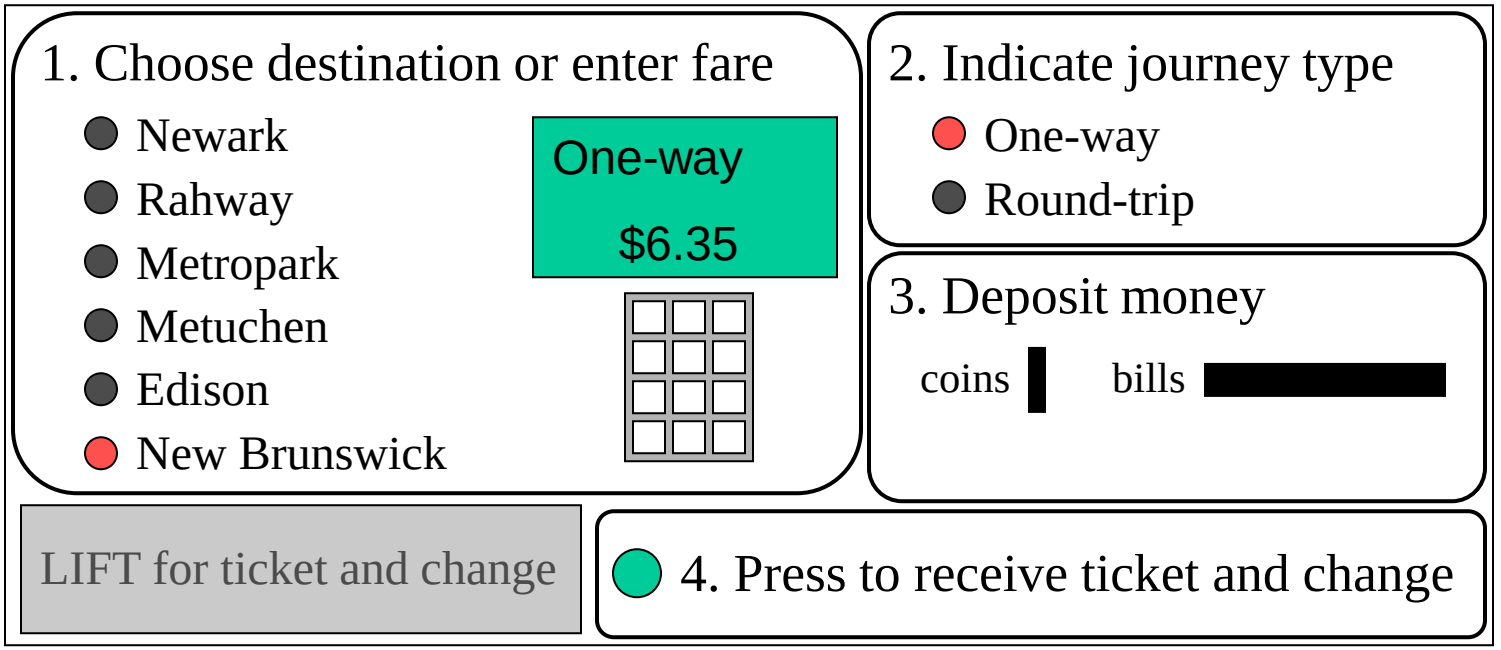
→ Add received amount display



Cognitive Walkthrough Example:

Press button in front of 4 [Ticket and change given]

1. Will the user expect to have to take this action?

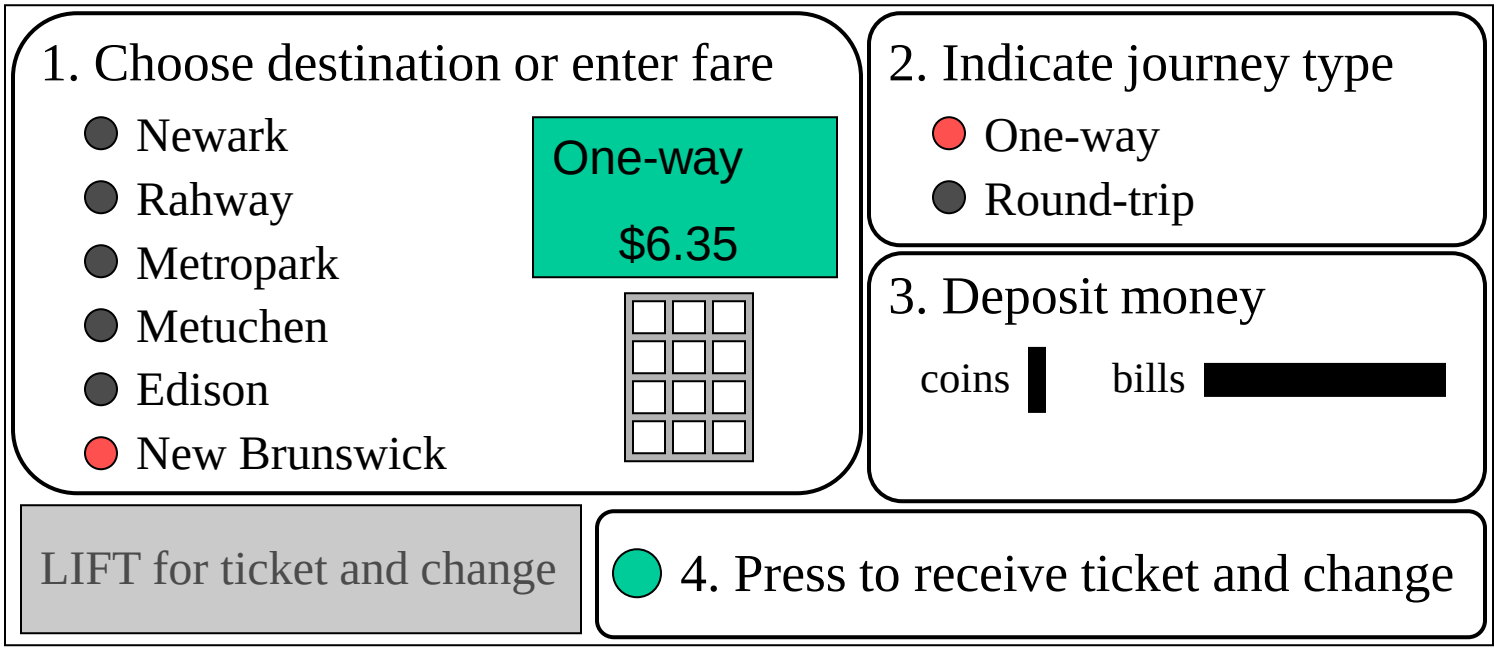


Cognitive Walkthrough Example:

Press button in front of 4 [Ticket and change given]

1. Will the user expect to have to take this action?

Maybe not…. Most self-service machines such as candy machines don't require a confirmation.



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?"
  - Add to scenario:

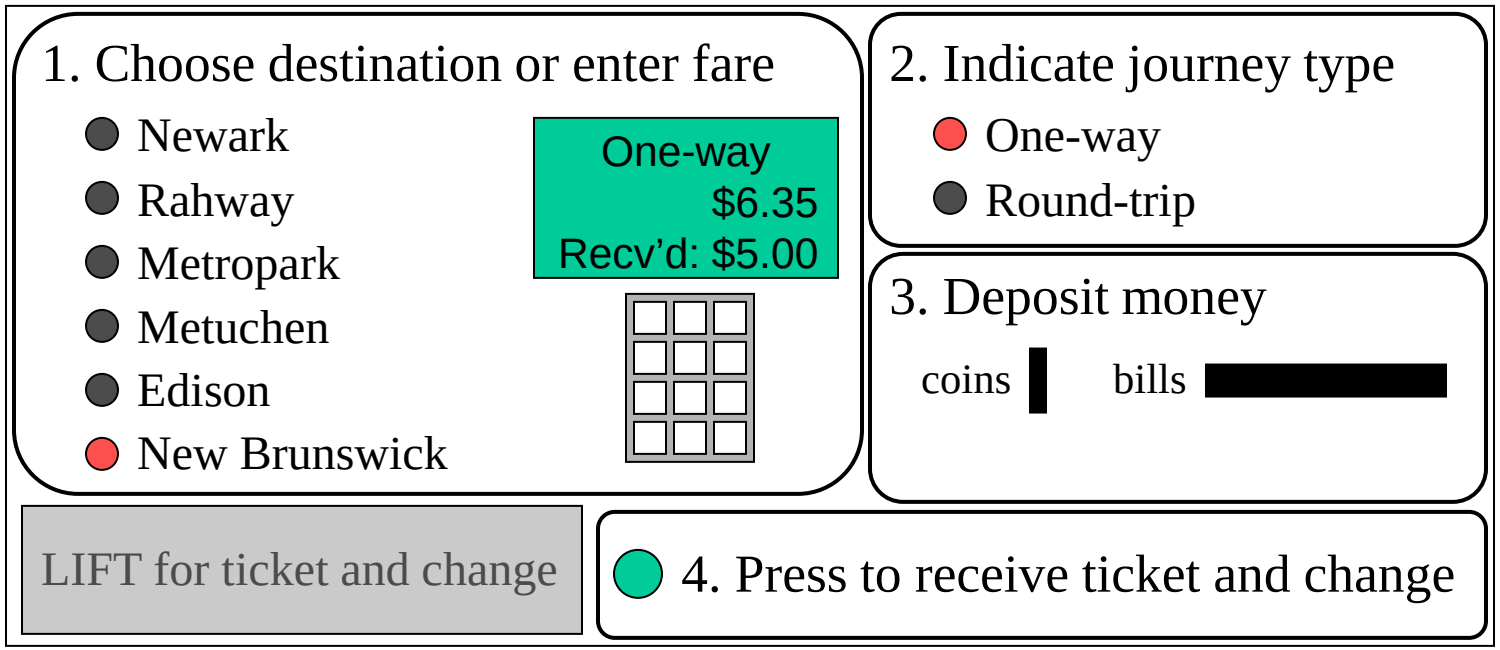
"Whilst paying Maria discovers she has not got enough coins and wants to cancel and get her money back"

Cognitive Walkthrough Example:

Not enough $: Press button in front of 4

[Money returned, System back in starting state]

3. Will the user recognize that the control will have the desired effect?

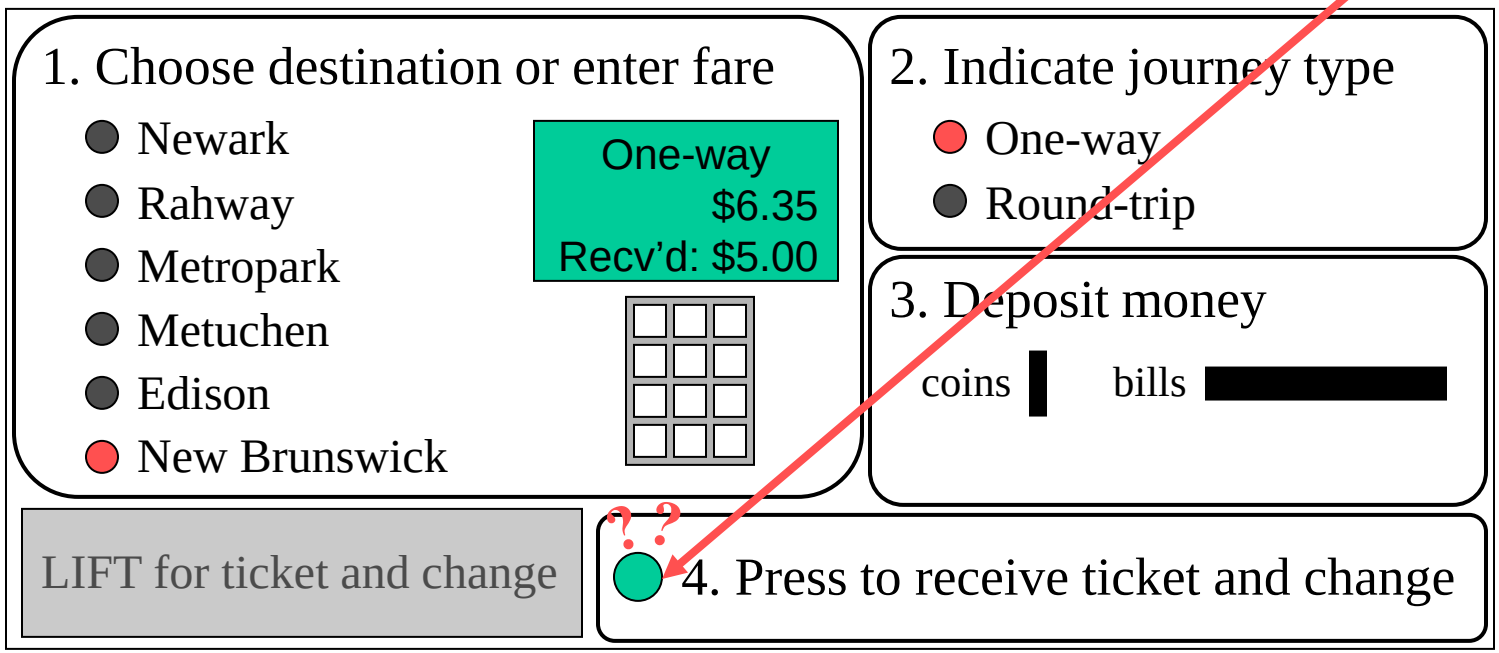


Cognitive Walkthrough Example:

Not enough $: Press button in front of 4

[Money returned, System back in starting state]

3. Will the user recognize that the control will have the desired effect?



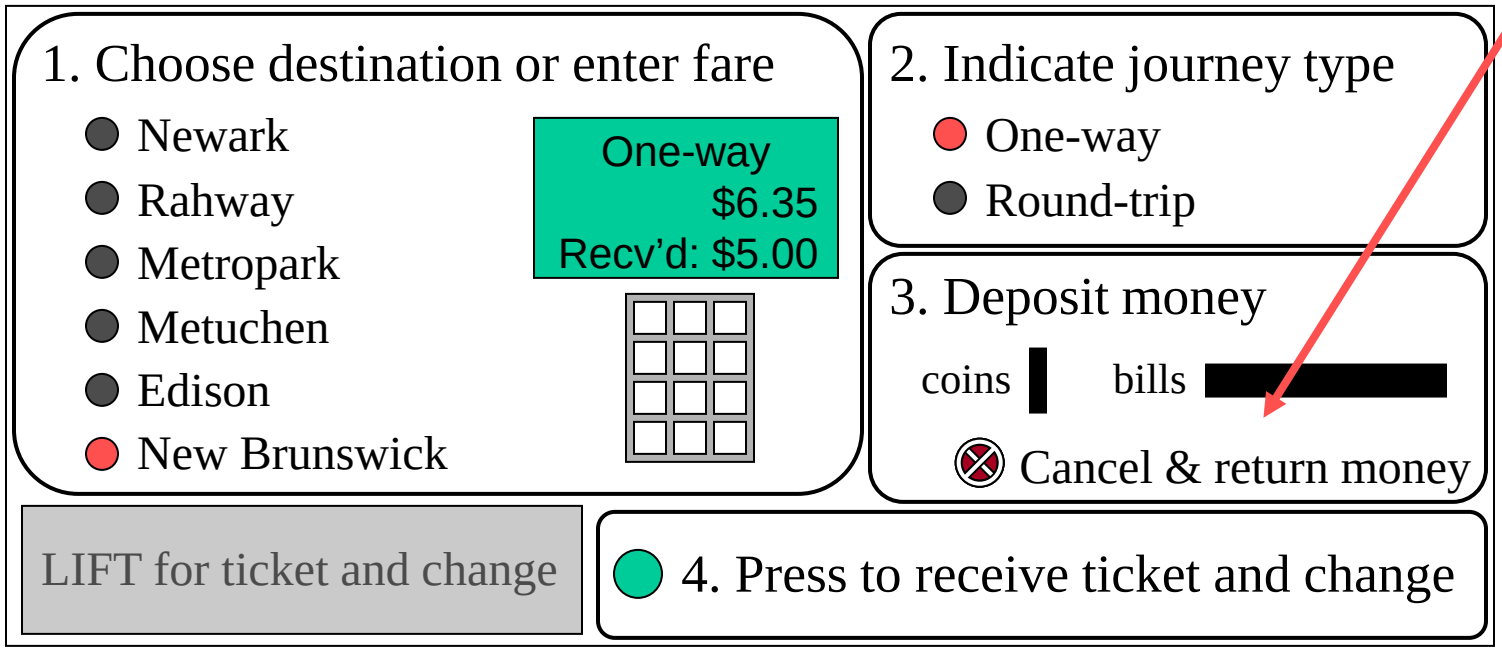
Cognitive Walkthrough Example:

Not enough $: Press button in front of 4

[Money returned, System back in starting state]

3. Will the user recognize that the control will have the desired effect?

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



Group walkthrough

- Performed by a mixed team
- Capture information on group displays (such as flipcharts)
- Perhaps videotape whole process

Strengths of cognitive walkthrough

- Early detection of problems
- Low cost
- Task perspective

Weaknesses

- Some training required
- Need to understand user tasks
- Applies only to ease of learning problems
- Only looks at correct action sequences
- Critical defects can be missed
- Time consuming