

# Comparative Evaluation of User Interfaces for Preventing Wasteful Spending in Cashless Payment

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# Contents

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- Background
- Issues
- Contributions
- Proposed UIs
  - Multi-Tap, Find Correct, Wait A Time, Sign In
  - Watch Video
  - Puzzle Game, Calculation, Input Random Text
- Evaluation
- Results & Discussions
- Conclusion & Future Works



# Issues

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- Companies purposely show an overload of information to keep users' attention focused on the product.
  - Specs, Functions, Comparisons, Past prices, Images, etc.
- Cashless payment methods make it too convenient & quick to complete paying without giving people enough time to consider the purchase carefully.



# Contributions

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1. Implement 8 user interfaces of cashless payment methods, attempting to prevent wasteful spending by shifting users' attention and increasing the time-taken at payment.
2. Evaluated the effectiveness of the proposed user interface in preventing wasteful spending through a scenario-imagination experiment, and measured changes of users' mental stress when using these interfaces.

# Proposed Method (1)

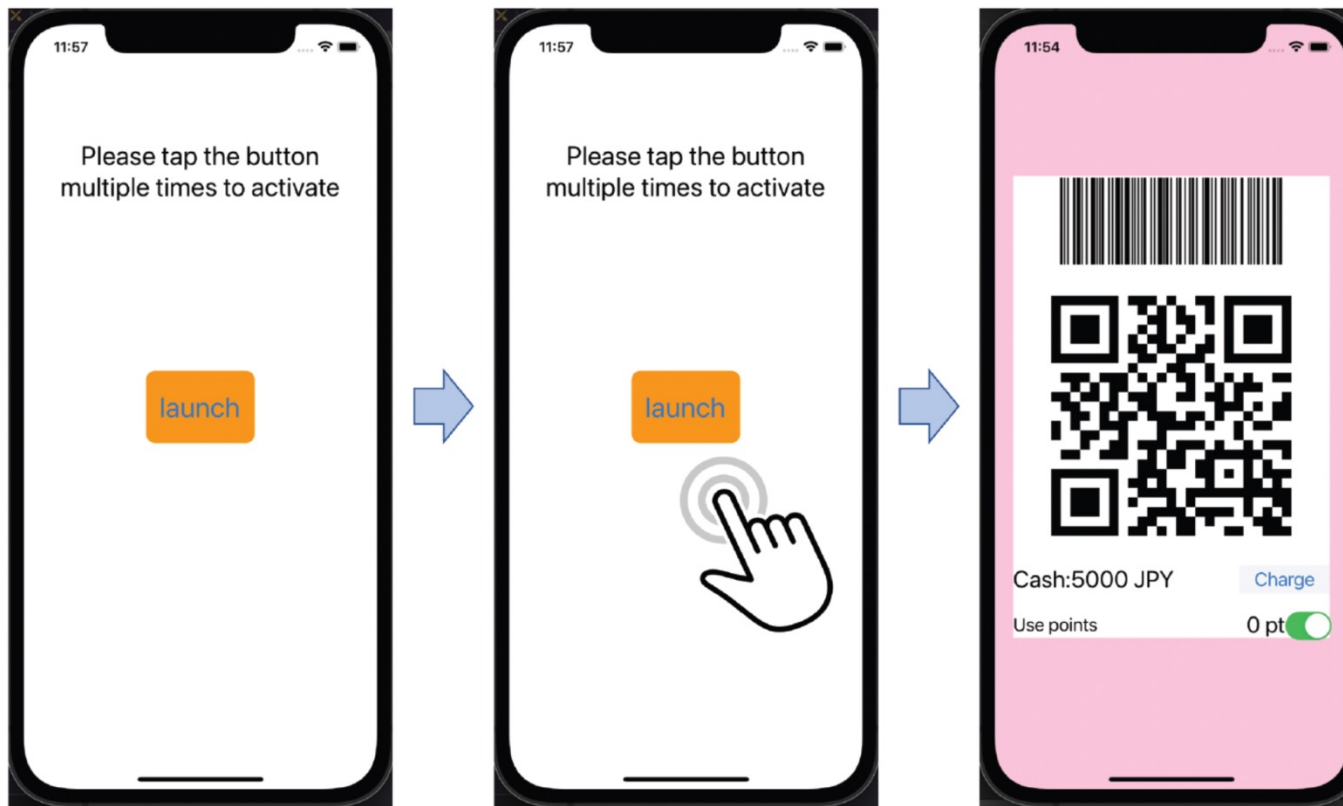
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- Adapting the user interface of cashless payments to 1, take the users' attention away from the product to be purchased; and 2, increase the time of the payment process to help users could consider the payment carefully.

Group	User Interface	Memo
<b>Additional Operations</b>	Multi-Tap	Multiple taps before launching
	Find Correct	Find out the correct button from dummies
	Wait A Time	Wait a fixed period before continuing
	Sign In	Sign in with E-mail and password
<b>Additional Infomation</b>	Watch Video	Watching a video before launching
<b>Solve A Question</b>	Puzzle Game	Complete a puzzle game
	Calculation	Solve some calculation problems
	Input Random Text	Enter a randomly generated text

# User Interface (I): Multi-Tap

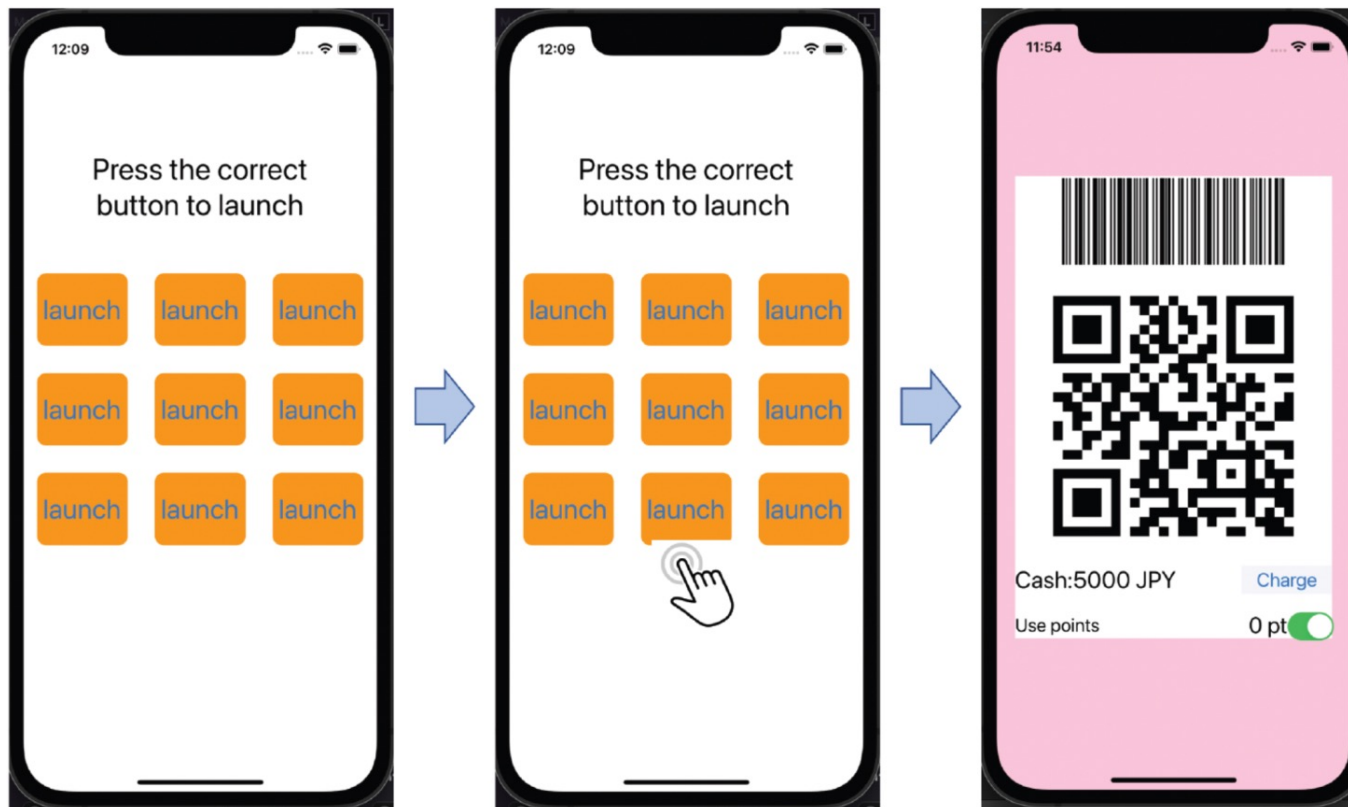
- Multiple Taps: requires multiple taps to launch the payment application.
  - The number of taps required changes randomly each time launching the payment application.
  - The more number of taps, the longer the startup time.





# User Interface (2): Find Correct

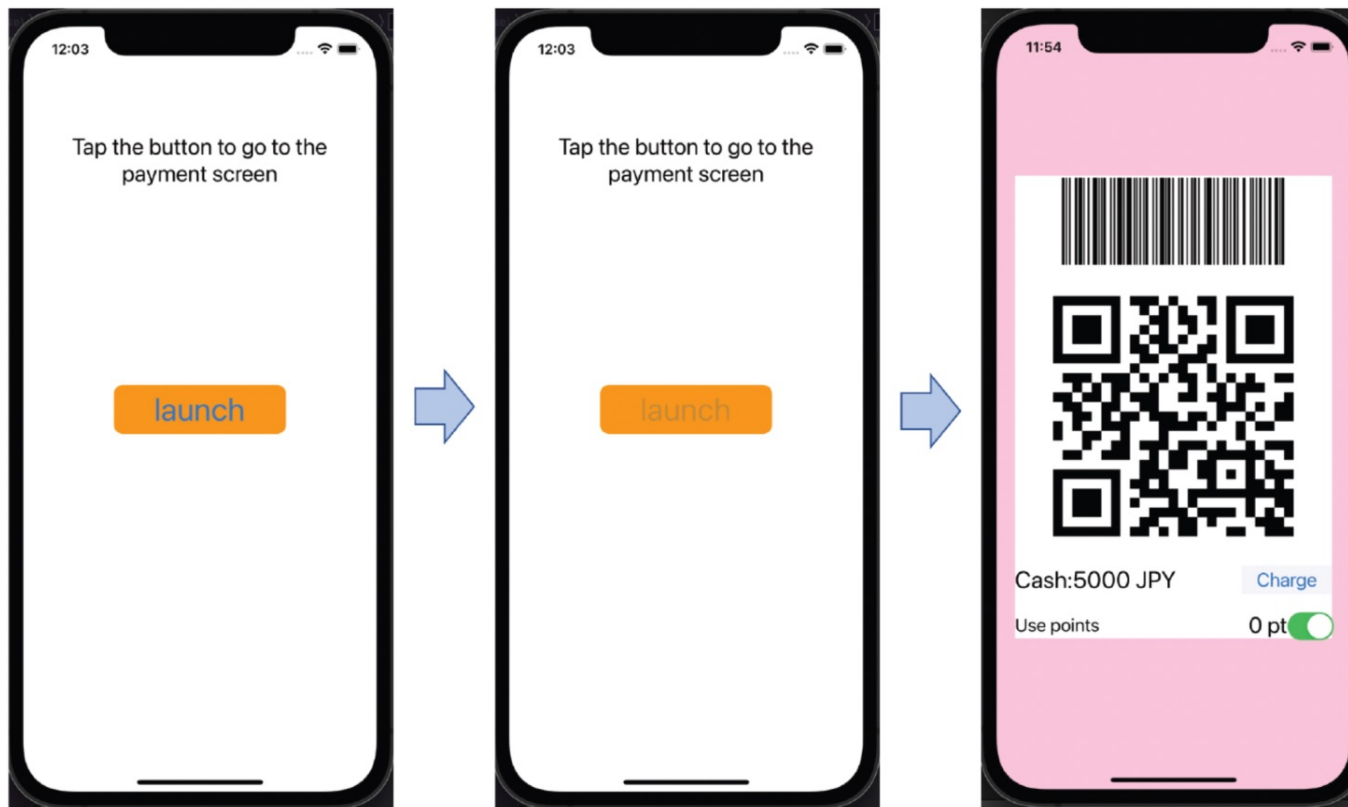
- Find Correct: requires finding out the correct button from fakes to launch the payment app.
  - Nine buttons in total, eight fakes, one correct.
  - The correct position changes every time.





# User Interface (3): Wait A Time

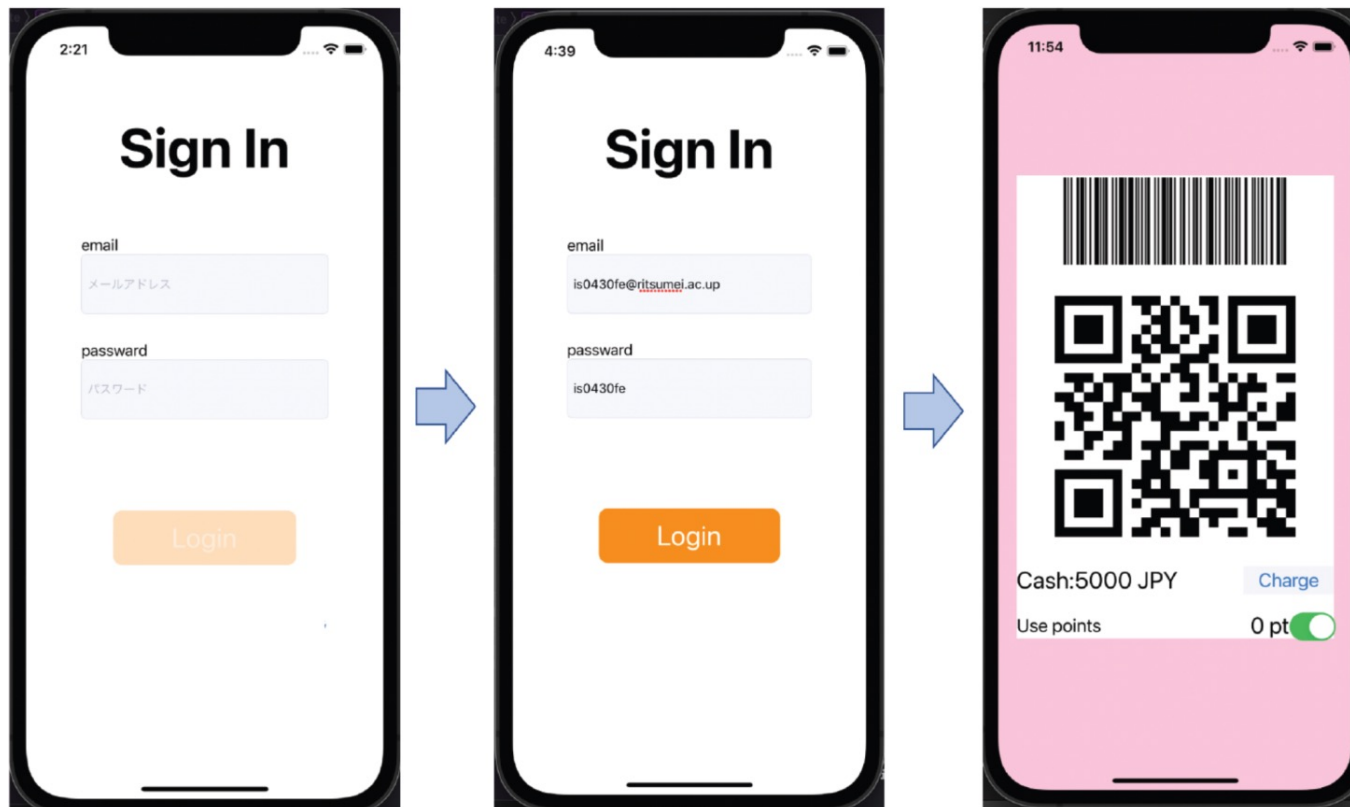
- Wait A Time: requires waiting a fixed period before the button can be tapped to launch the payment app.
  - Pure wait.
  - .



# User Interface (4): Sign-In

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- Sign In: requires e-mail account and password verified
  - Input the correct e-mail account and password every time to launch the payment app.



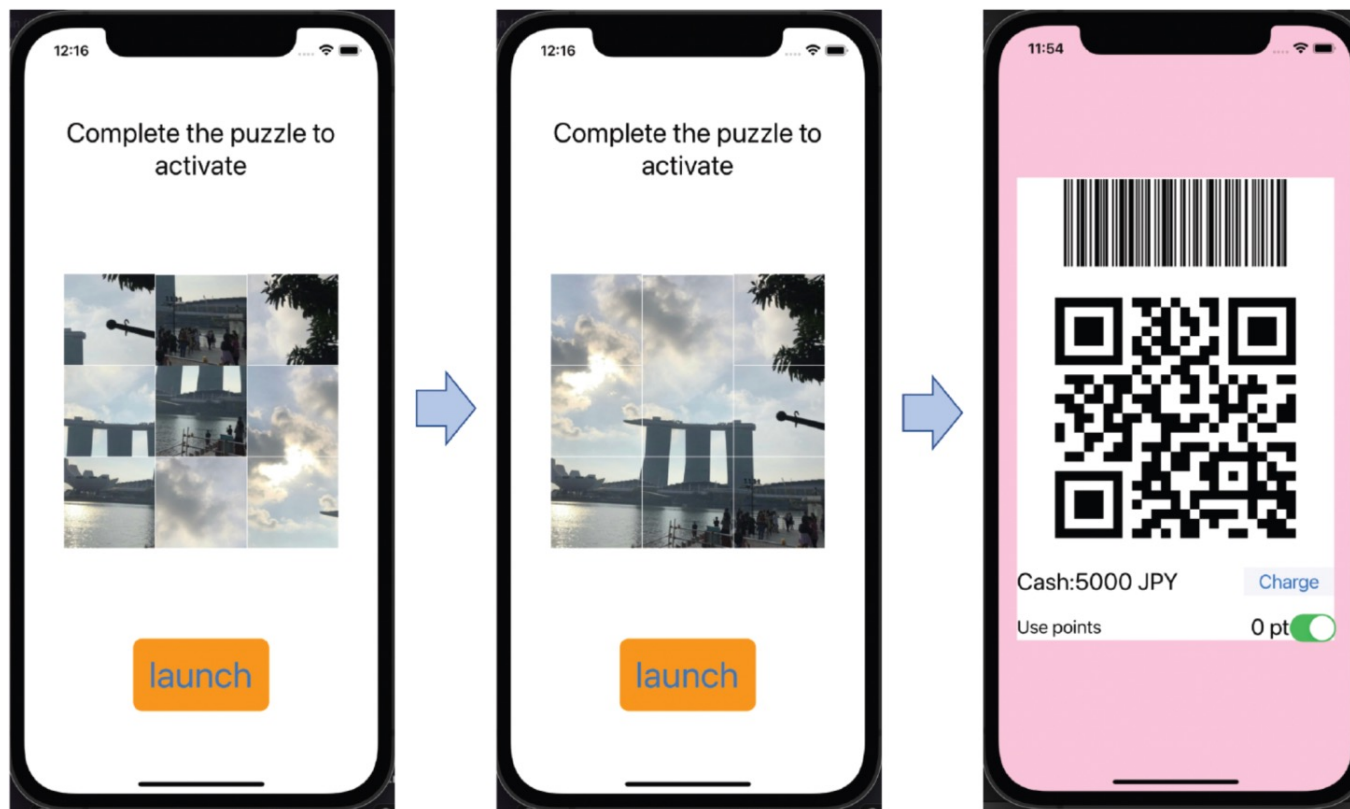
# User Interface (5): Watch Video

- Watch Video: requires watching a video before the payment application can be launched.
  - A 10-second long video.
  - Cannot skip.



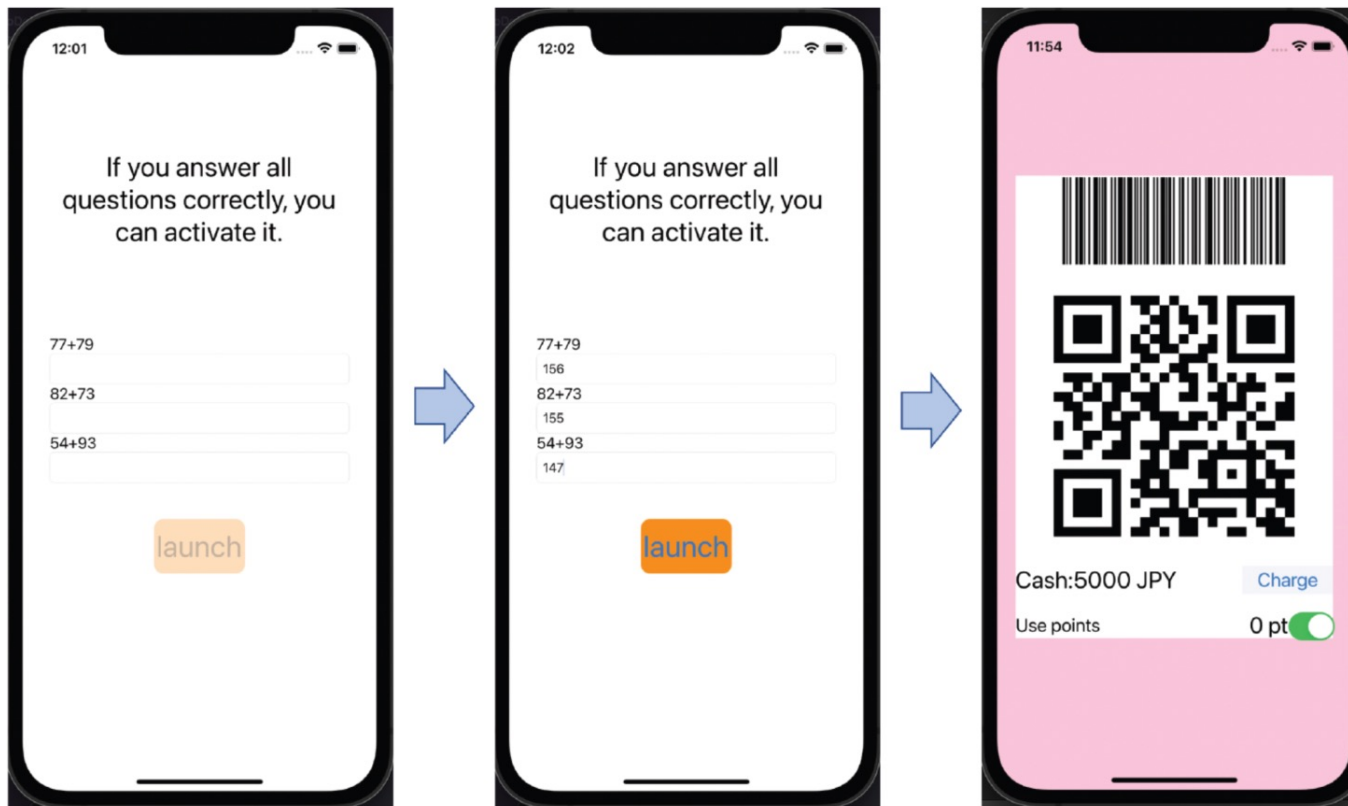
# User Interface (6): Puzzle Game

- Puzzle Game: requires solving a puzzle game before launching the payment app.
  - A 3\*3 size puzzle game.



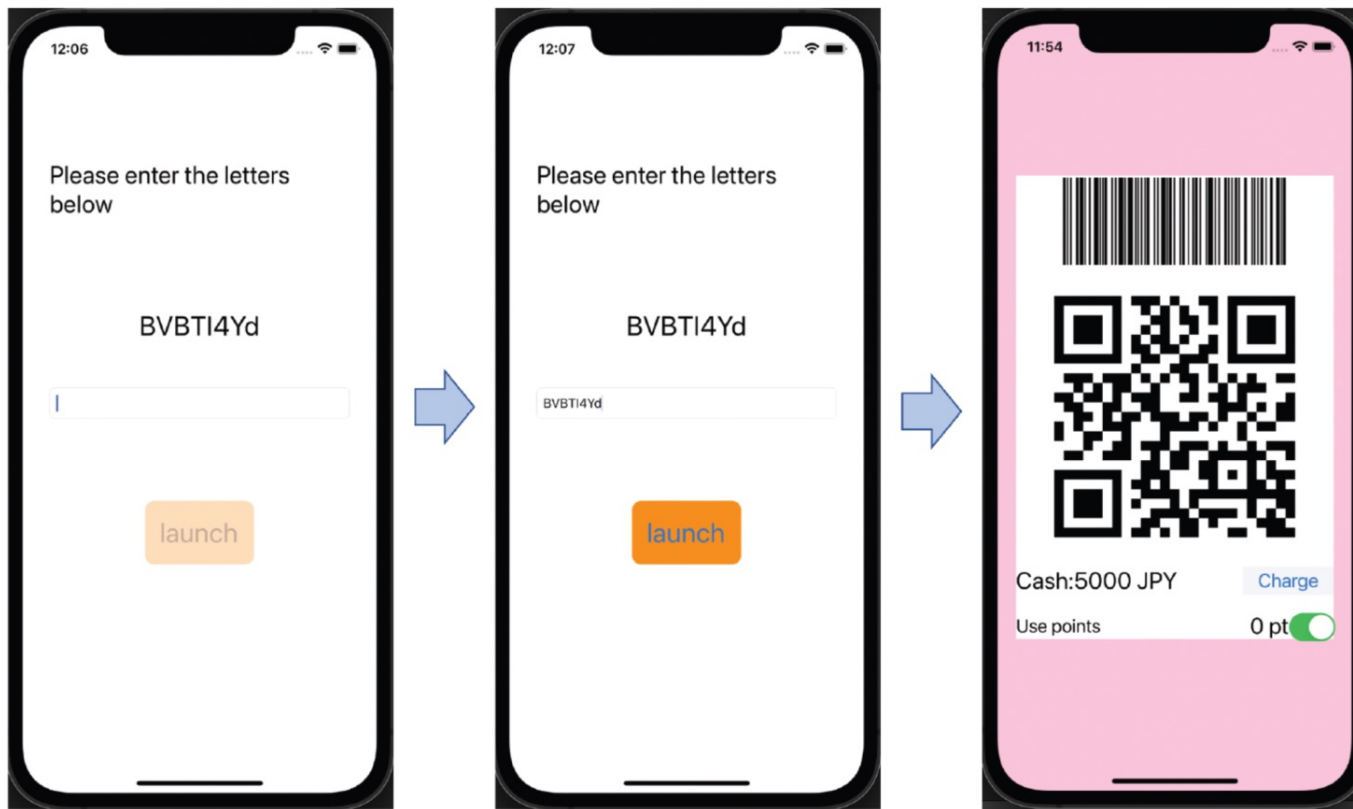
# User Interface (7): Calculation

- Calculation: requires solving some calculation problems to launch the payment app.
  - Three two-digit addition problems.



# User Interface (8): Input Random Text

- Input Random Text: requires inputting the randomly generated text string correctly to launch the payment app.
  - A string of 8-length consists of English characters and numbers.



# Evaluation Experiment

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- Evaluation on a scenario–imagination–based experiment
  - Effectiveness in preventing wasteful spending
  - Impact on users' mental stress
- Evaluation Procedures
  1. Measure participants' stress levels in the general state.
  2. Let participants read a shopping scenario.
  3. Ask participants to use an implemented user interface and imagine they are actually paying before the cashier in the scenario they read.
  4. Measure participants' stress levels after using the user interface.
  5. Ask participants to fill out a questionnaire after the experiment.

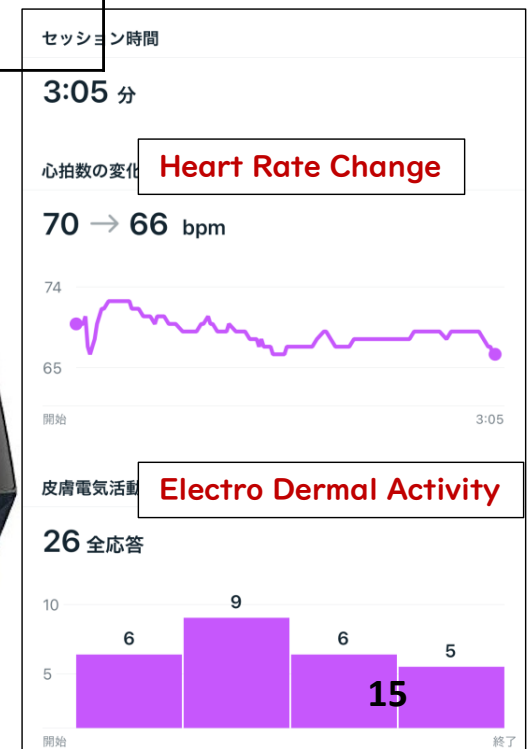


# Evaluation Settings

- Group of Scenario Settings
  - 25 participants of university students.

Group No.	Location of Store	Reason to Buy
1	Store in real-life	Because you are interested in that product.
2	Online store	Because you are interested in that product.
3	Store in real-life	Because the product is on-sale now.
4	Online store	Because the product is on-sale now.

- Mental Stress Measurement Device
  - Fitbit Charge 5
  - Measure people's mental stress via Electro Dermal Activity



# Evaluation Method

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- Subjective Questionnaires
  - 5-point scale to show whether the UI changed the user's mind.
    - "5" → participant decided to stop buying
    - "1" → participant chose to continue buying
- Records of Mental Stress
  - Record users' mental stress before and after using an UI (check if the UI gives users stress or makes them unhappy)

# Evaluation Results

- Results of Preventing Wasteful Spending (Aver of users' rating)

UI	Store in Real-life		Online		UI Aver
	Interested	On-sale	Interested	On-sale	
Multi-Tap	1.4	1.6	1.2	2.4	1.55
Find Correct	1.8	3.0	2.4	1.8	2.25
Wait A Time	1.8	1.2	2.0	1.2	1.55
Sign In	1.2	2.8	2.4	2.8	2.3
Watch Video	1.2	2.6	2.4	3.6	2.35 ②
Puzzle Game	2.0	2.6	2.6	3.4	<b>2.85</b> ①
Calculation	2.8	1.8	1.6	2.8	2.25
Input Random Text	2.0	3.2	2.0	2.0	2.3
<b>Scenario Aver</b>	2.01	2.35	2.11	<b>2.55</b>	

- Results of Mental Stress Changes (Aver of users' After - Before)

UI	Store in Real-life		Online		UI Aver
	Interested	On-sale	Interested	On-sale	
Multi-Tap	-0.2	-0.4	1.2	1.8	0.6
Find Correct	1.0	1.0	2.6	1.6	1.55
Wait A Time	3	-3.4	0.6	2.4	0.65
Sign In	-0.8	3.4	1.8	2.6	1.75
Watch Video	0.8	2.2	0.6	1.8	1.35
Puzzle Game	-2.4	0.6	0.2	-5.2	<b>-1.7</b>
Calculation	-5.4	2.6	-1.6	2.6	-0.45
Input Random Text	-1.8	-1.4	-2.2	5.4	0
<b>Scenario Aver</b>	-1.22	0.58	0.08	1.48	

# Analysis & Discussion

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- "Puzzle Game" UI earned both the highest average score for preventing wasteful spending (2.85) and the lowest average score for mental stress (-1.7).
  - Needs more focus, not as boring as others.
- "Watch Video" UI obtained the second-highest average score for preventing wasteful spending (2.35), but its mental stress score was in the top-3 (1.35).
  - Can shift users' attention, but easy to make users weird. (feels like Ads)
- Effect of preventing wasteful spending for "Online" (2.11, 2.55) was better than "in real store" (2.01, 2.35).
- Mental stress for "on-sale" product (0.58, 1.48) was larger than for "interested" product (-1.22, 0.08).
  - Unexpected. Maybe for "on-sale" products, users are more hurrying?

# Conclusion & Future Work

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- Implement 8 user interfaces to prevent wasteful spending for cashless payment methods.
- All user interfaces are designed based on 1, taking users' attention away from complex information about products, and 2, increasing the payment process time to help users consider carefully.
- Evaluated through scenario-separated imagination experiments and recorded the impact on users' mental stress.
- Repeating the experiments in Actual cashless payment shopping, not based on imagination, will be one of the main future works.



**Thank you very much!**