Q3: Formal Experiment Design and Interpretation

Formal Experiment Design

- **Hypotheses**

The testable hypotheses that I want to test using this formal experiment design are:
1. color screens will be better than b/w screens
2. data entry using stylus will be faster than small keypad entry.
3. data entry using stylus result in fewer mistakes as compared to small keypad entry

- **Independent variables and their levels**

The variables that will be manipulated by the experimenter to test the hypotheses are:
1. Data entry mechanism :
   The Data entry mechanism variable has 2 levels- (S,K)
      - Stylus (S)
      - small keypad (K)
2. Screen type : black and white screen, color screen

- **Dependent variables and their levels**

The variables that are going to be measured to test the hypotheses are:
1. Response time – This measures the time the users take to complete a task or a set of tasks
2. number of errors – this measures the number of errors committed by the users during the execution of the assigned tasks
3. subjective satisfaction- This is measured by a questionnaire to be filled by the users to test their satisfaction and level of comfort with each feature.

tasks	Hate it	Dislike it	doesn't matter	Like it	Love it
Entering meter number using stylus					
Entering meter number using keypad					
Locating things on black and white screen					

Locating things on color screen					
Edit meter reading using stylus					
Edit meter reading using keypad					

Each user is asked to fill the satisfaction table depending on their ease of use and execution of the tasks using the various mechanisms.

- **Tasks that participants will do**

Task A : Enter meter number

Task B : Edit meter number

Task C : Save data by clicking enter button

Task D : Enter meter reading

Task E : Edit meter reading

Task F :Save data by clicking enter button

For each task the time taken by the participant is noted to finally calculate and compare which task took more time, which task seemed more difficult with which data entry mechanism etc.

- **Blocking of experiment**
  1. One Between- subject factor: Screen type

     Screen type has two levels: black and white screen, Color screen (B, C)

     (including within subjects Vs between subjects; how many times each task is done, which level of each factor are used in each condition, how many participants are there in each condition.)
  2. One within-subject factor: Data entry mechanism.

     Data entry mechanism has two levels : Stylus and Small keypad (S, K)

     The 32 participants were randomly assigned to one of the two groups (black and white screen, color screen). Each participant was given a list of tasks to perform as quickly as possible using the stylus and small keypad for each of the tasks.

     Then the experiment was repeated by assigning the participants the other screen type which was different from their first experiment. The participants were again assigned a list of tasks to do using the stylus and keypad for each task.

     Thus the arrangement of the tasks is as shown in the table below:

B (Black and white screen)	Color screen
S (Stylus)	K (Keypad)
K(Keypad)	S (Stylus)
32	32

Each of the 32 participants do each of the tasks in the two columns for each experiment. The column which each participant does first is random.

Thus

- Number of times each task is done = 4. Each task is performed twice in each experiment, once with a stylus and the other with a keypad. Since the entire experiment is conducted twice, the total number of times each task is performed is 4.
- The number of participants in each experiment is 32.

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