

Relative 2D Pointing with Conduction Fabric

Starting the user studies:

Welcome the participant.

Tell participant:

- We want you to help us understand how we can use fabric to control a cursor on the screen.
- The study has 2 main parts.
- The first one is to see how you prefer to use the fabric for control. This will take about 10 mins.
- The second one will be more hands on and we will give you some conductive fabric and ask you to do an object acquisition task. This will take about 20 mins.
- Any questions?
- You can of course leave the study whenever you want.
- The study will be video recorded.
- Your identity will be anonymised.
- This is the **consent form** (attached). It mentions what I just told you.
- You can read it if you want.
- Please sign here. (All other fields should be already filled by you.)

Fill with them the **demographic** questions (attached).

Participant Study Part 1: Mapping between pinch sliding direction and 8 directions of cursor on screen

Variable 1: upper non-dominant arm, upper dominant thigh, in hand fabric.

Variable 2: the direction of movement (N, E, W, S, NE, NW, SE, SW).

Setup:

- Give the participants fabric (not our prototype) and loosely attach it to the body parts (order for each user in the table below).
- Set 2 GoPro cameras to capture how the participants interact with the fabric from 2 angles (make them close enough to capture details).
- Show the participants all 8 directions on a screen image (attached).
- Have the participant table (attached) to write what they say during the study and anything you notice.

Tell participant:

- The first study is to understand how you pinch the fabric and define directions.
- We will place the fabric on upper arm, upper thigh, and in hand.
- We will ask you to pinch the fabric and move in the directions that appears on the screen.
- Please give tell me what is on your mind when you perform the gestures.
- Ready?

Tasks:

For each participant, repeat T1, T2, and T3 for arm, hand and thigh in the other in the table:

Assuming the cursor is at the centre.

T1

- **Group A:** Move to N, now move to S.
- **Group B:** Move to E, now move to W.

T2

- Assuming the cursor is at the centre.
- **Group A:** Move to NW, now move to SE.
- **Group B:** Move to NE, now move to SW.

T3

- Assuming the cursor is at the centre.
- **Group A:** You want to control the volume. Assume a horizontal slider. Increase volume, decrease volume, increase volume, increase more.
- **Group B:** You want to control the volume. Assume a vertical slider. Decrease volume, increase volume, decrease volume, decrease more.

T4

- Assuming the cursor is at the centre.
- **Group A and B:** You want to control the tracks your listing to with your MP3 player. Go to the next track, go three tracks further, go back two tracks.

ID	Do 1st	Do 2nd	Do 3rd
1	arm, A	thigh, B	hand, A
2	thigh, B	hand, A	arm, B
3	hand, B	arm, A	thigh, A
4	hand, A	thigh, B	arm, A
5	thigh, A	arm, B	hand, A
6	arm, A	hand, B	thigh, A
7	arm, B	thigh, B	hand, A
8	thigh, A	hand, B	arm, B

Participant Study Part 2: Performance of prototype in 2D linear navigation and selection (Fitts' law)

Variable 1: Fitts' circles or ribbons

Variable 2: iPhone or prototype

Setup:

- Show the participants the fabric.
- Demonstrate with one Fitts' law trial ($W = 64$, Amplitude = 384) how it works (directions, velocity control: if you slide more, and tapping with the space button).
- Give them the fabric and let them try it with one Fitts' law trial.
- Show them how the phone works as a trackpad and let them try it with one Fitts law trial.
- The space button should also be used in the phone condition for clicking.
- Let them put their non-dominant hand on the peace button while the prototype in their dominant hand.
- Delete the log files created for Fitts' law and in the Processing folder from the previous step.
- The participant should hold the phone in landscape like the prototype.
- The participant should hold the fabric in their hand not put it on the table.
- Use the go pros to record hands of user during Fitts.

Fitts' setup:

- Trials per condition 10.
- Treat as practice 3.
- Circles or ribbons (order for each user in the table below)
- Amplitudes: 384, 512, 650
- Widths: 64, 96, 128 (if possible replace one of these with 43)
- Randomised order: Yes
- Run all conditions: 4
- When use is done, save model that appears.

Tell participants:

- In this study we will try to use this fabric to click on targets that will appear on the screen.
- This is how the fabric works.
- You will get objects of different sizes and distance on the screen.
- Your goal is to tap at the object.
- Try to be as fast and as accurate as possible.
- After each trial you will get a dialog, press enter when you are ready to continue.
- When you are done we will repeat the study with a different shape in the screen.
- Ready?

Tasks:

ID	Do 1st	Do 2nd	Do 3rd	Do 4th
1	iphone, circles	prototype, ribbons	iphone, ribbons	prototype, circles
2	prototype, circles	iphone, circles	prototype, ribbons	iphone, ribbons
3	iphone, circles	prototype, ribbons	iphone, ribbons	prototype, circles
4	prototype, circles	iphone, circles	prototype, ribbons	iphone, ribbons
5	iphone, circles	prototype, ribbons	iphone, ribbons	prototype, circles
6	prototype, circles	iphone, circles	prototype, ribbons	iphone, ribbons
7	iphone, circles	prototype, ribbons	iphone, ribbons	prototype, circles
8	prototype, circles	iphone, circles	prototype, ribbons	iphone, ribbons

Log File

For each participant we should have:

- Fitts' law log files:
 - iPhone+ribbons
 - iPhone+circles
 - Prototype+ribbons
 - Prototype+circles
 - After each participant make sure each of these is labeled correctly with iPhone or prototype by adding r or p to the end of the name of each file (circles or ribbons is already part of the logs).
 - Copy the 4 files to folder with the ID of the participant
- Processing log file:
 - Add a column for **trial** that increments every time the participant hits **enter**.
 - Between each of the 4 tasks, manually change in the processing code the name of the _Data file to:
 - ID_iphone_ribbons_Data.txt
 - ID_iphone_circles_Data.txt
 - ID_prototype_ribbons_Data.txt
 - ID_prototype_circles_Data.txt
 - Alternatively add a column to the log file called **condition** and use keyboard strokes a,b,c,d to mark the files. (In this case you need to reinitialise the trial counter too).
 - a: iPhone+ribbons
 - b: iPhone+circles
 - c: Prototype+ribbons
 - d:Prototype+circles
 - Copy the files(4 files if you used the manual option and 1 file if you used the second option) to a folder with the ID of the participant

Participant study 3: Performance of prototype in two-level hierarchal menu navigation

Variable 1: Fitts' circles or ribbons

Variable 2: 7 ID levels.

Setup:

- Show the participants the menu interface.
- Show them how it works.
- Give them 5 menus to see how it works.
- Start the participant study.

Tell participants:

- Now I will show you a menu of 2 levels.
- At the top you will see an item I want you to select from the menu.
- The highlighted object is the selected menu.
- Slide down to open it and slide the highlight to the right menu item.
- Slide up to close a menu and slide left and right to choose another one.
- Be as fast and as accurate as possible.
- Ready?

Tasks:

- Each participant 8 tasks.
- Order of menu for participants (menus: Clothing, Fish, Instrument, Job, Animal, Color, Country, Fruit)
- 1 2 8 3 7 4 6 5
- 2 3 1 4 8 5 7 6
- 3 4 2 5 1 6 8 7
- 4 5 3 6 2 7 1 8
- 5 6 4 7 3 8 2 1
- 6 7 5 8 4 1 3 2
- 7 8 6 1 5 2 4 3
- 8 1 7 2 6 3 5 4
- At menu 1 go down 8, and menu 2 go down 7,
- Table encodes everything.
- Log time duration until success and all upper centres and gain changes.

Sweater	Salmon	Apple	Flute	China	Driver	Blue	Bears
Salmon	Flute	Sweater	Driver	Apple	Bears	China	Blue
Flute	Driver	Salmon	Bears	Sweater	Blue	Apple	China
Driver	Bears	Flute	Blue	Salmon	China	Sweater	Apple
Bears	Blue	Driver	China	Flute	Apple	Salmon	Sweater
Blue	China	Bears	Apple	Driver	Bears	Flute	Salmon
China	Apple	Blue	Sweater	Salmon	Bears	Driver	Flute
Apple	Sweater	China	Salmon	Blue	Flute	Bears	Driver

