OIST ECSU

Participant Instruction

Self-movement cognition experiment

2307031506

Thank you for participating in the Self-Movement Cognition Experiment. In this experiment, you will be asked to sit in a chair and perform a cursor manipulation task with your hands hidden. The duration of the experiment will be **90 minutes**. This instruction manual contains the details of the experiment and what we want you (the experiment participant) to do. **Please read these instructions carefully**. If you have any questions or doubts, please ask the person in charge of the experiment as many times as you wish until everything is clear.

1 Experimental Apparatus

This experiment uses a display in front of you and a pen tablet (Figure 1). The display shows two black shapes: a circle and a square. In the experimental trial, the user manipulates this cursor by holding a pen next to the desk and sliding it across the tablet. Before the experiment, the participants are asked to familiarize themselves by holding the pen and moving it on the tablet to manipulate the cursor on the screen.

Next to the display, there is a keyboard. During the experiment, you will be asked to answer by typing numbers on the keyboard. This keyboard will be used for this purpose.

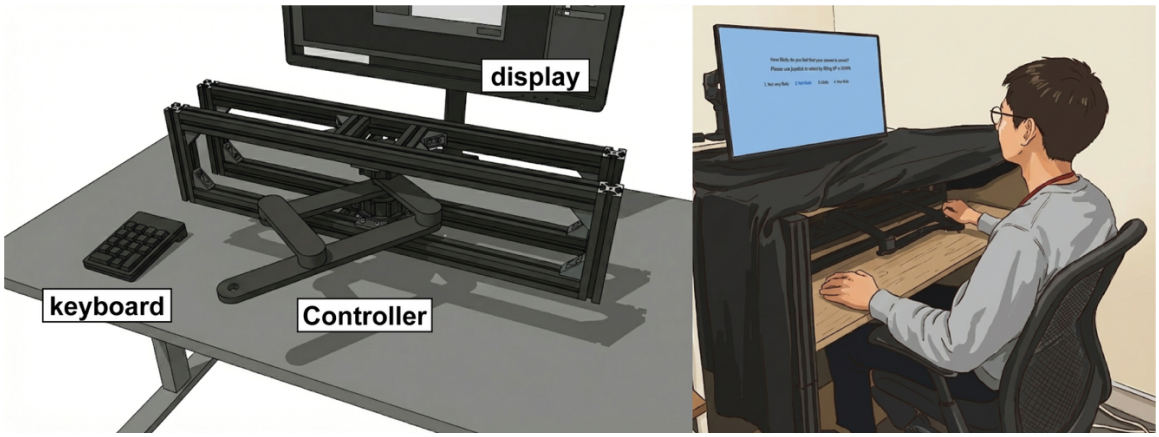

Figure 1. Experimental devices (left) and environment (right).

During the experiment, a black cloth is placed between your chair and the display so that you cannot see your hand (Figure 1, right). You are asked to adjust your posture before the experiment in order to manipulate the cursor on the display using a tablet and a pen, while keeping the black cloth in place as much as possible during the experiment. It is recommended that you take off your jacket because you may feel hot when wearing the black cloth. A circulator will be set up near the desk to keep the area hidden by the black cloth as cool and comfortable as possible.

2 Task

In the experiment, you will be asked to work on a task called the detection task. There are a total of three blocks in the experiment. This chapter will introduce each experimental block..

1. Detection task block

In the first experimental block, you will see square and round dots on the screen. When you move the controller, the two dots will move in various directions at the same time. **In this task, you will move the controller freely for 5 seconds to control the dots. During this 5-second period, you should search for the dot that is more similar to the movement of the controller you are operating. After 5 seconds, the two dots will stop moving and a number will be displayed. You will use the keyboard next to the display to enter the number of the dot you think moved in the same way as you did, and answer the question.**

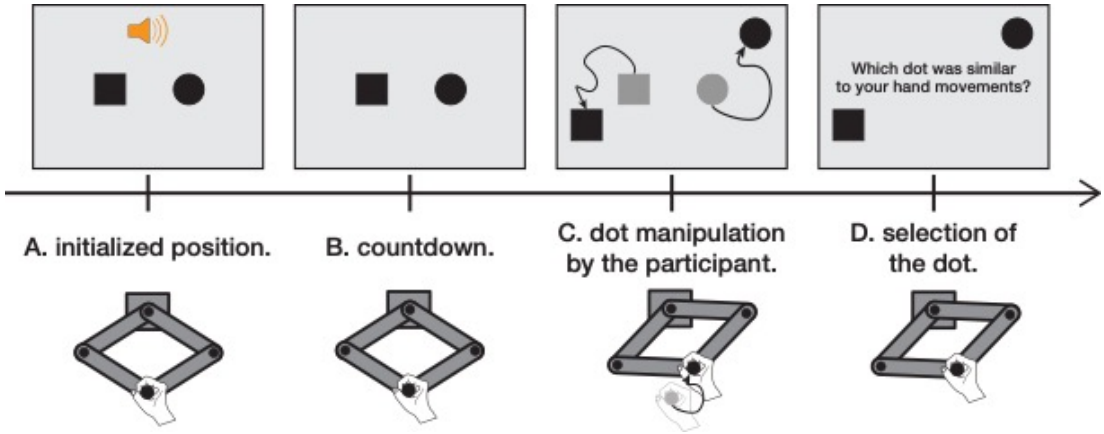

Figure 2. Detection task

Following Figure 2, we will introduce the flow of a single trial of the detection task. First, two dots will appear on the screen. At this time, please hold the controller. After a short sound, the controller will move automatically to the initial position (Figure 2. A). After that, a 3-second countdown will appear on the screen (Figure 2. B). You cannot move the controller until the countdown is over. After the countdown is over, you can move the controller. When you move the controller, the two dots on the screen will move. Move them freely for 5 seconds and try to find out which one is closer to your hand movements (which one you can control more) (Figure 2. C). After 5 seconds, you will no longer be able to move the controller, and a number will appear on the display. At this point, please use the keyboard next to the display to select the dot that you feel is closer to your hand movements (the one you feel you can control more) (Figure 2. D). After you have made your selection, a short sound will be played, the controller will move automatically back to its initial position, and the next trial will begin.

2. Detection task block with active movement

The experimental task in this block is the same as the first experimental block. You will have 5 seconds to search for the dot that is closest to your movement (the one you feel you have more control over). After **selecting the dot through movement, you will answer on a 4-point scale how confident you are of your answer (1: not at all confident, 2: not very confident, 3: a little confident, 4: very confident).** After that, a short sound will play and the controller will automatically return to its initial position. After that, the next trial will begin.

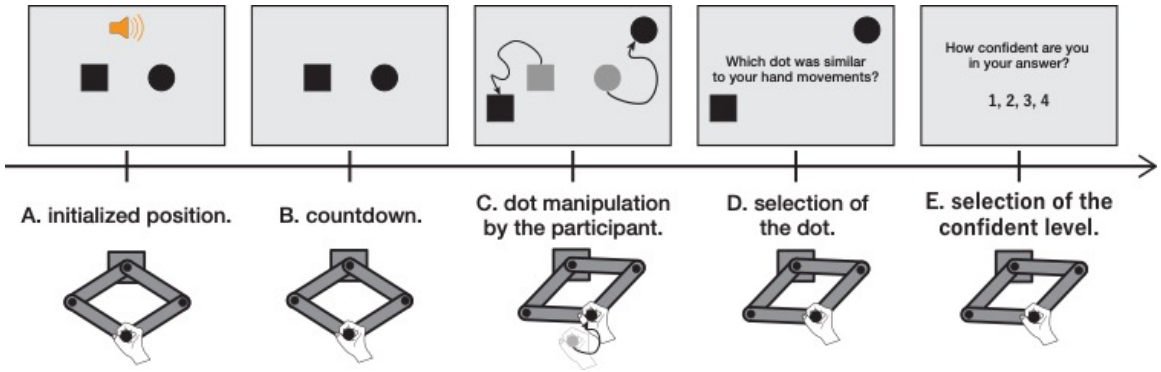

Figure 3. Detection task by passive movements.

Figure 3 shows the flow of a single trial in the detection task. First, two dots are displayed on the screen. At this time, please hold the controller in your hand. After a short sound is heard, the controller will move automatically and return to its initial position (Figure 3. A). After that, a 3-second countdown will be displayed on the screen. You will not be able to move the controller until the countdown is over. After the countdown is over, you will be able to move the controller (Figure 3. B). When you move the controller, the two dots on the screen will move. Move them freely for 5 seconds and try to find out which one is closer to your hand movements (which one you can control more) (Figure 3. C). After 5 seconds, you will no longer be able to move the controller, and a number will appear on the display. At this point, please use the keyboard next to the display to select the dot that you feel is closer to your hand movements (the one you feel you can control more) (Figure 3. D). After you have made your selection, the screen will change. Here, please rate your confidence in your answer in Figure 3.D on a scale of 4 (Figure 3.E). After you have made your selection, a short sound will be played, the controller will move automatically back to its initial position, and the next trial will begin.

3. Detection task block with passive movement

The experimental task in this block is the same as the first experimental block. You will have 5 seconds to find the dot that most closely matches your movement, but **in this block the controller will move automatically for 5 seconds**. While it is moving, please do not try to force it to stop or move it in a different direction. This could cause unexpected errors. After 5 seconds, the controller will stop automatically. After the controller has stopped, please select the dot on the screen that most closely resembles your hand movement. After selecting the dot, please answer on a scale of 4 how confident you are in your answer (1: not at all confident, 2: not very confident, 3: a little confident, 4: very confident). After that, a short sound will be played and the controller will automatically return to its initial position. After that, the next trial will begin.

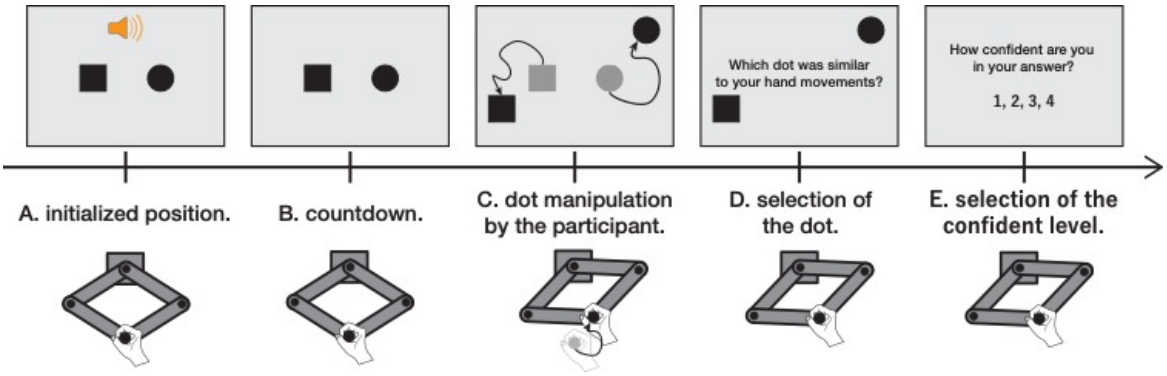

Figure 4. Detection task by passive movements.

Figure 4 shows the flow of a single trial in the detection task. First, two dots are displayed on the screen. At this time, please hold the controller in your hand. After a short sound is heard, the controller will move automatically and return to its initial position (Figure 4. A). After that, a 3-second countdown will be displayed on the screen. The controller will not move until the countdown is over. After the countdown is over, the controller will start moving automatically (Figure 4. B). When the controller starts moving, the two dots on the screen will also start moving. The controller will move automatically for 5 seconds. At this time, do not try to move against the controller's movement, but follow the controller's movement while holding the handle. While the controller is moving your hand, search for and identify which of the two dots is closer to the movement of your hand (Figure 4. C). After 5 seconds, the controller will stop moving and become unmovable, and a number will be displayed on the display. At this point, please use the keyboard next to the display to select the dot that you feel is closest to your hand movement (Figure 4. D). After you have made your selection, the screen will change. Here, please evaluate your confidence in your answer in Figure 4. D on a scale of 4 (Figure 4. E). After you have made your selection, a short sound will be played, the controller will move automatically back to its initial position, and the next trial will begin.

3 Experimental Procedure

In the experiment, the three blocks mentioned above will be carried out. The first block (which does not include the confidence rating) is always carried out first. The order of the next two blocks is randomized for each participant, and the experimenter will tell you on the day. There will be a maximum of 10 minutes break between each block. The timing of the change between blocks and the start of each trial will be indicated by the current block and the number of trials remaining. After all the experimental blocks have been completed, the experimenter will conduct a short interview. After that, you will sign the receipt for your reward, and the experiment will be over.

3.1. Instruction, practice
3.2. Experimental block 1: detection task
3.3. Rest block
3.4. Experimental block 2: detection task with active or passive movement
3.5. Rest block
3.6. Experimental block 3: detection task with active or passive movement
3.7. Interview by experimenter
3.8. The end of experiment.

If you have any questions, please ask the person in charge of the experiment on the day you participate in the experiment. Please keep this manual with you until the end of the experiment.