The data in this set comes from measurements during experimental trials conducted by 19 participants at Tokyo Metropolitan University in Japan. The purpose of the experiment was to investigate a possible impact of vection on postural stability. When a large region of the visual field is stimulated by coherent motion, stationary observers often (illusorily and incorrectly) perceive that they themselves are moving (typically in the opposite direction to the stimulus motion). This type of visually induced illusion of self-motion has traditionally been referred to as vection. In the study, participants were shown visual stimuli mimicking that of postural sway. Their Center of Pressure motion and experience of vection were then recorded using a Wii fit board and a Wii remote.

The trials were conducted for five amplitudes of simulated motion (0, 25, 50, 100 and 200 mm) and three visual field conditions (full visual field, central visual field and peripheral visual field). For each trial, two posture variables and three section variables were recorded per participant. These variables are defined below.

The posture variables

For upright standing a simplified approach using the horizontal Center of Pressure (CoP) is used; CoP displacement is the common approach in modeling postural stability. Included in the data set are two CoP variables, Y-axis (anterior-posterior) range of the CoP trajectory and total length of CoP trajectory (cm), calculated from the CoP trajectory data. The Y-axis range of the CoP trajectory represents the motion of the foot joint and how big the postural sway was in a quantitative way. We focus on the anterior-posterior motion, as the presented visual stimuli simulate postural motion along this axis only, and the participants are viewing the display face-on. The total length of CoP shows how much effort a participant needs to adjust to the dynamic visual stimuli in order to keep their posture stable, giving a qualitative measure. A low value of this variable means more effective postural control.

Definition of the posture variables

The equations of the variables are shown below, using the definitions:

$X=\{X_1,X_2,\ldots X_N\}$ = X-axis coordinates

$Y=\{Y_1,Y_2,\ldots Y_N\}$ = Y-axis coordinates

N=number of data points

Y-axis range of CoP trajectory (cm)

The difference between the maximum and minimum values of the data points.

$$L_Y = Max_{(Y)} - Min_{(Y)}$$

L_Y=Y-axis range of CoP trajectory

Total length of CoP trajectory (cm)

The sum of trajectory between consecutive data points

$$L = \sum_{i=1}^{N} \sqrt{(X_{i+1} + X_i)^2 + (Y_{i+1} + Y_i)^2}$$

L=total length of CoP trajectory

Definition of vection variables

For the vection evaluation, two variables, latency (sec) and duration (sec), were calculated from the information gathered via the Wii remote button. Latency is the time between the start of presenting dynamic visual stimuli until the participants to report vection (time the button was first pressed). Duration is the total time the button is pressed during each trial. After each trial, the participants were asked to rate the strength of their vection experience using a magnitude estimation method. The estimated values ranged 101 points (0: no vection to 100: very strong vection). Vection is by nature a subjective sensation, and the approach of button pressing during the trial and magnitude estimation methods after each session allows us to quantify it using well-established methods.

Procedure

The participants, who were tested individually, were asked to perform quiet standing for 60 seconds on the Wii fit board in Romberg's standing posture (i.e., both bare feet placed side by side with no gap) and arms relaxed at either side of their body. During the trials they were asked to stare at the green fixation cross presented at their eye level in front of them throughout the trials. At the same time, the participants were also instructed to keep pressing the hand-held button of the Wii remote whenever they perceived vection in a trial. After each trial, they were asked to rate the strength of their vection. The following instruction was given to

the participants regarding the button: “Please press the button while you are perceiving forward or backward self motion. If such a decision becomes difficult, or if self-motion perception disappears, please release the button.” Any more suggestion would lead to a cognitive bias about our hypothesis, because vection can be modulated by such instruction.

For all participants, quiet standing was performed three times for each experimental condition, giving a total of 45 trials (5 levels of amplitude condition × 3 level of visual field condition × 3 trials) per participant. We used CoP data collected in the interval of 15 to 60 s during the 60 s standing trial for subsequent analyses. The first 15 s period of standing presented static random dots, and was considered a “settlement period”, in which a relatively large postural sway tended to occur (shown in our preliminary examination). A one-minute break was given after every trial, and a five-minute break was given after every five trials to avoid physical fatigue and prevent visual after effects. The length and timing of the rest were freely changeable by the participant for ethical reasons and to avoid motion sickness. The total experiment time was around 120 minutes.

The data set contains the postural and vection variables for each participant in each visual field and amplitude condition. The value presented is the average of the three trials conducted in that condition.