

# Supplemental Materials

The data of Head Movements and the informal observation with seven participants

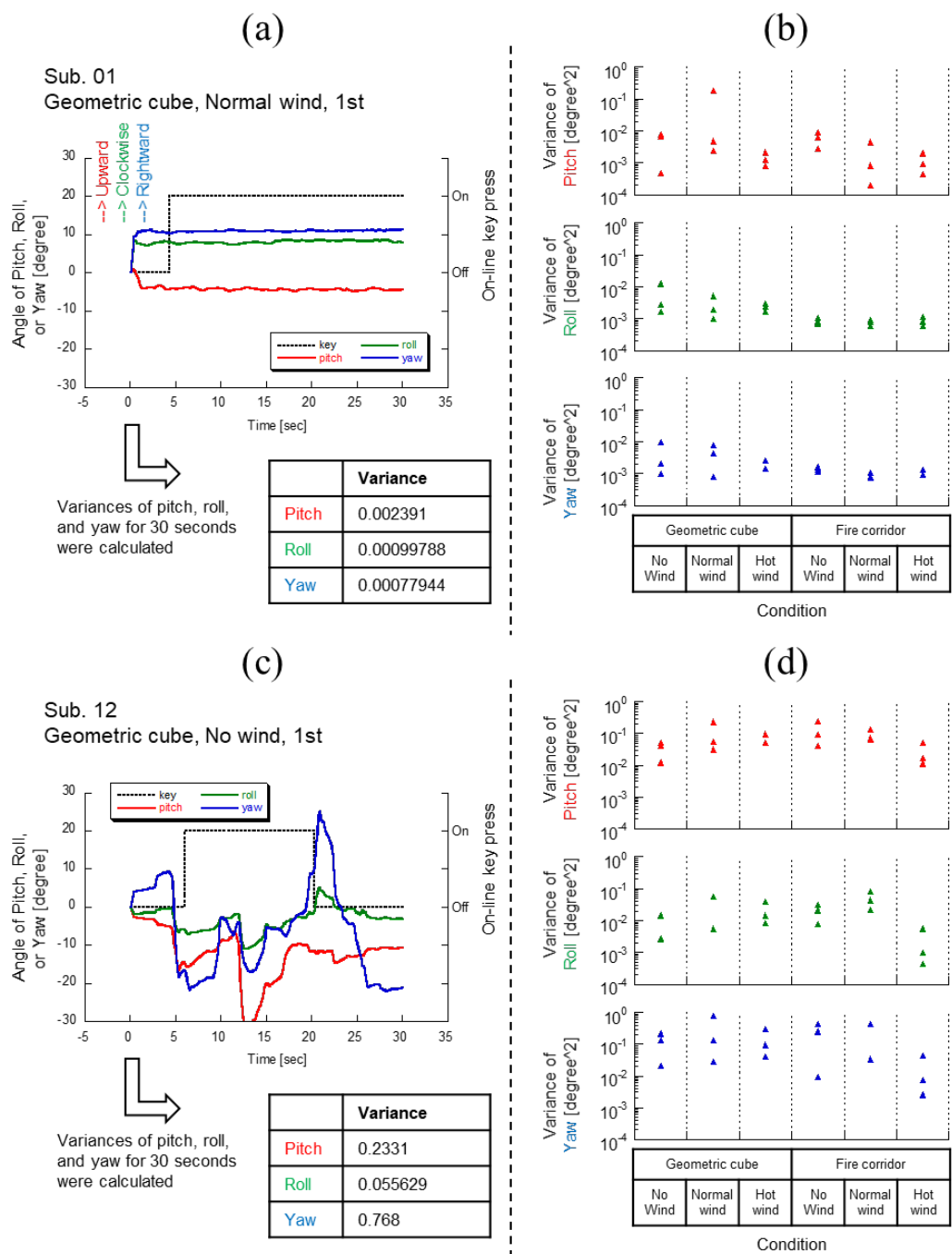
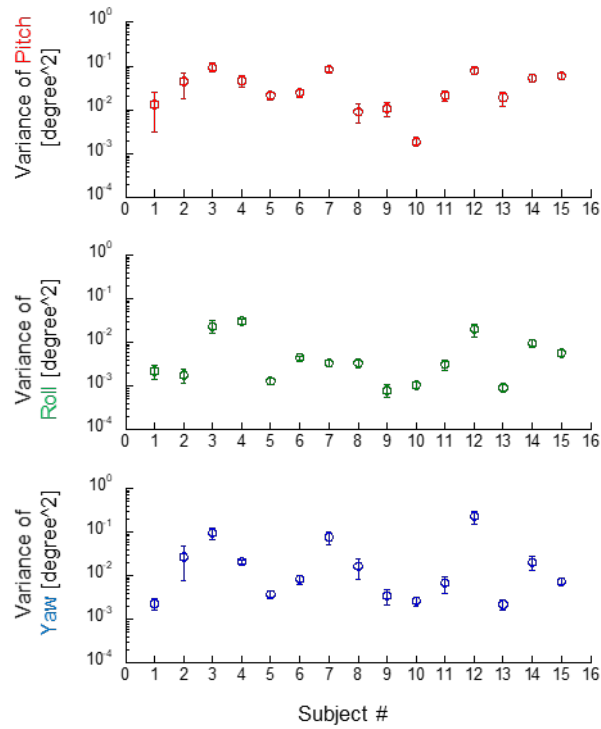


Figure S1. Two examples of the on-line key press and head-movement (angle of pitch, roll, and yaw) recorded in a single trial.

**Upper two panels:** (a) Data for subject No.1's 1<sup>st</sup> trial in the Geometric cube with normal wind condition). Red, green, and blue lines show the rotation angle of pitch, roll, and yaw head movement, respectively. The zero point shows the angle of head rotation at the beginning of a trial. We calculated the variance of pitch, roll, or yaw for thirty seconds and used them as indices for the amount of head-movement. Larger variance indicates bigger head movements. (b) Variances of head-movement. The three different markers are correspondent with three different trials. Although the variance was larger in some conditions, no systematic difference was found across conditions.

**Lower two panels:** (c) Data for subject No.12's 1<sup>st</sup> trial in the Geometric cube with no wind condition. This observer's head-movement was larger than that of sub.01. (d) Variance in head-movement. Although the variance was larger in some conditions, no systematic difference was found across conditions. Differences in the absolute values of the variances within conditions reflects inter-subject variability.

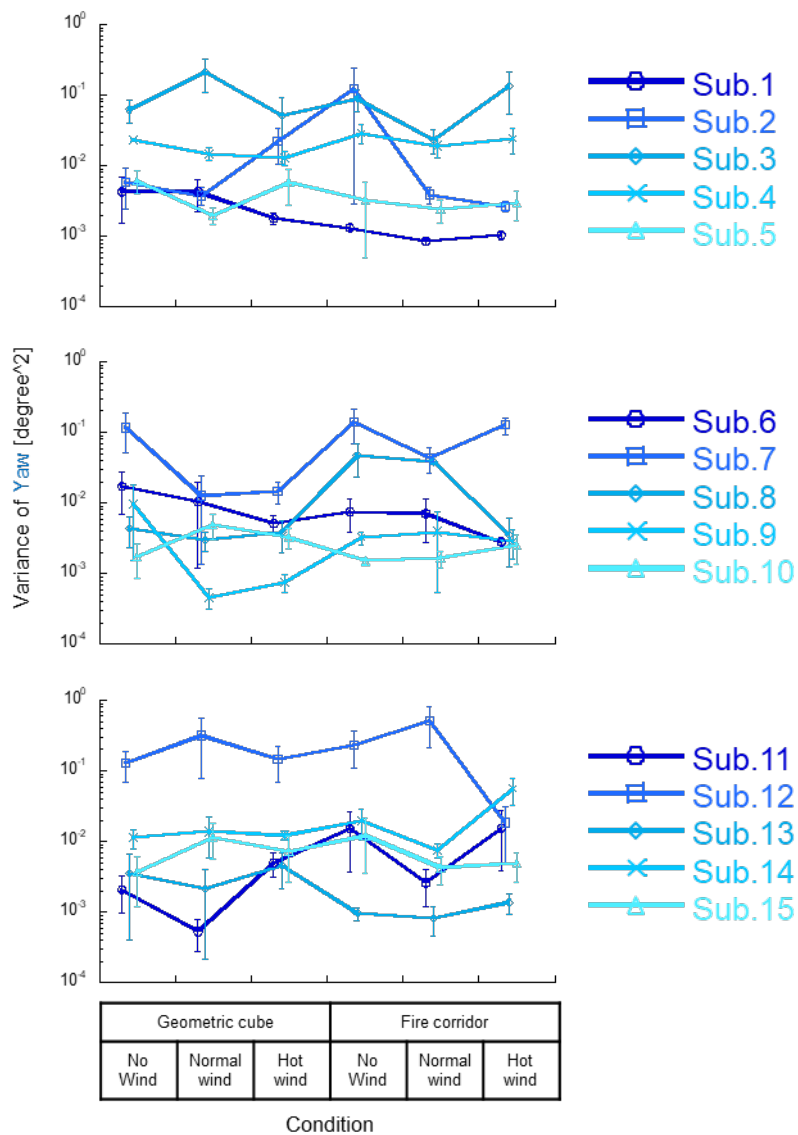
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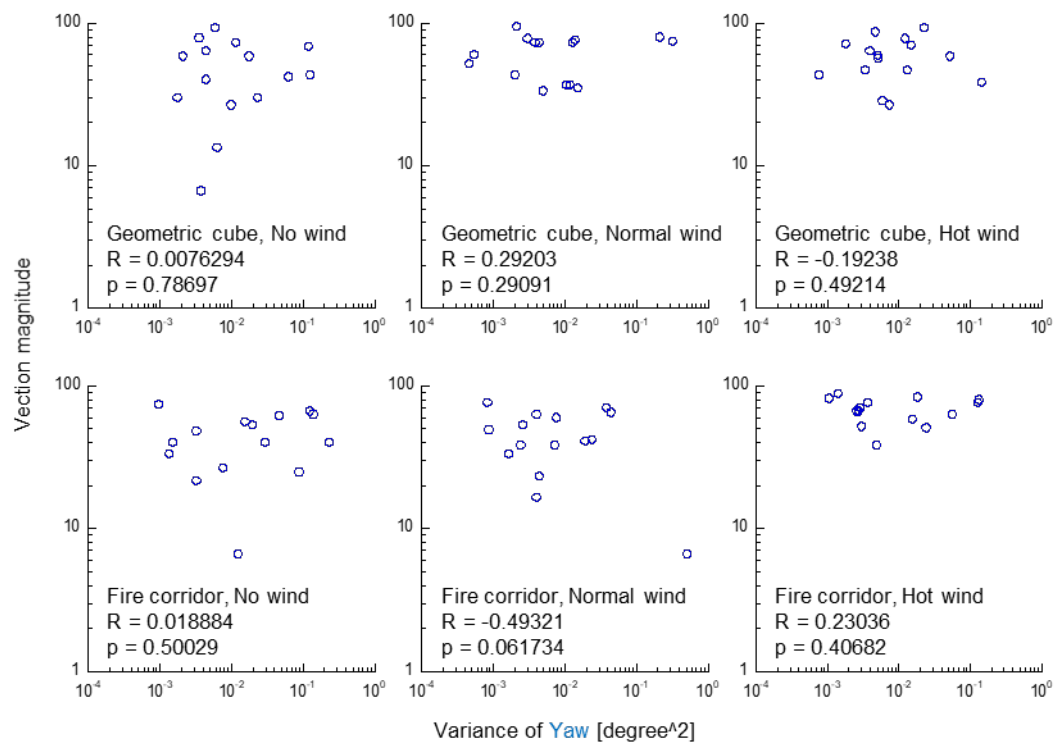
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3 **Figure S2. The amount of head-movement (angle of pitch, roll, and yaw) for fifteen**  
4 **observers.** Each data point and error bar show the mean and standard error of eighteen  
5 trials (six conditions x three repetitions). There were large individual differences in  
6 head-movement. We focused on the yaw component of head-movement as this  
7 contained the largest differences, and the trends in the data were the same for each axis  
8 of head movement.

9



**Figure S3. The amount of head-movement (yaw) for fifteen observers.** Each data point and error bar shows the mean and standard error of three trials. It appears that the head-movement became larger occasionally in some trials, though there were no systematic differences. We did not find any trends in the data.



**Figure S4. The relationships (correlations) between head-movement (yaw) and vection magnitude.** Each panel corresponds to one stimulus condition, and fifteen observer's data was plotted on a log-log scale. No statistically significant correlations ( $p < .05$ ) were found. We therefore speculate that head-movement does not contribute to vection response.