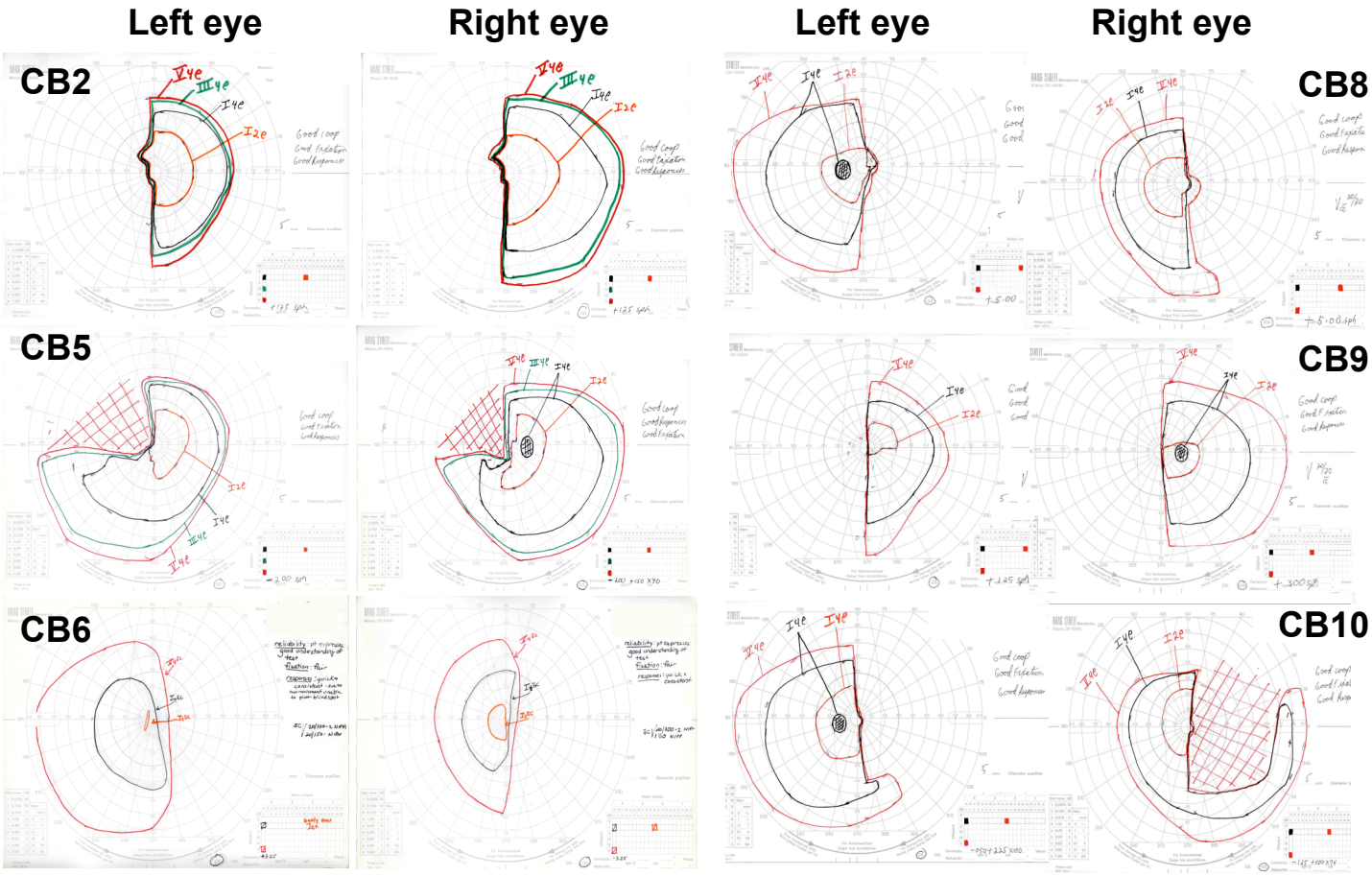
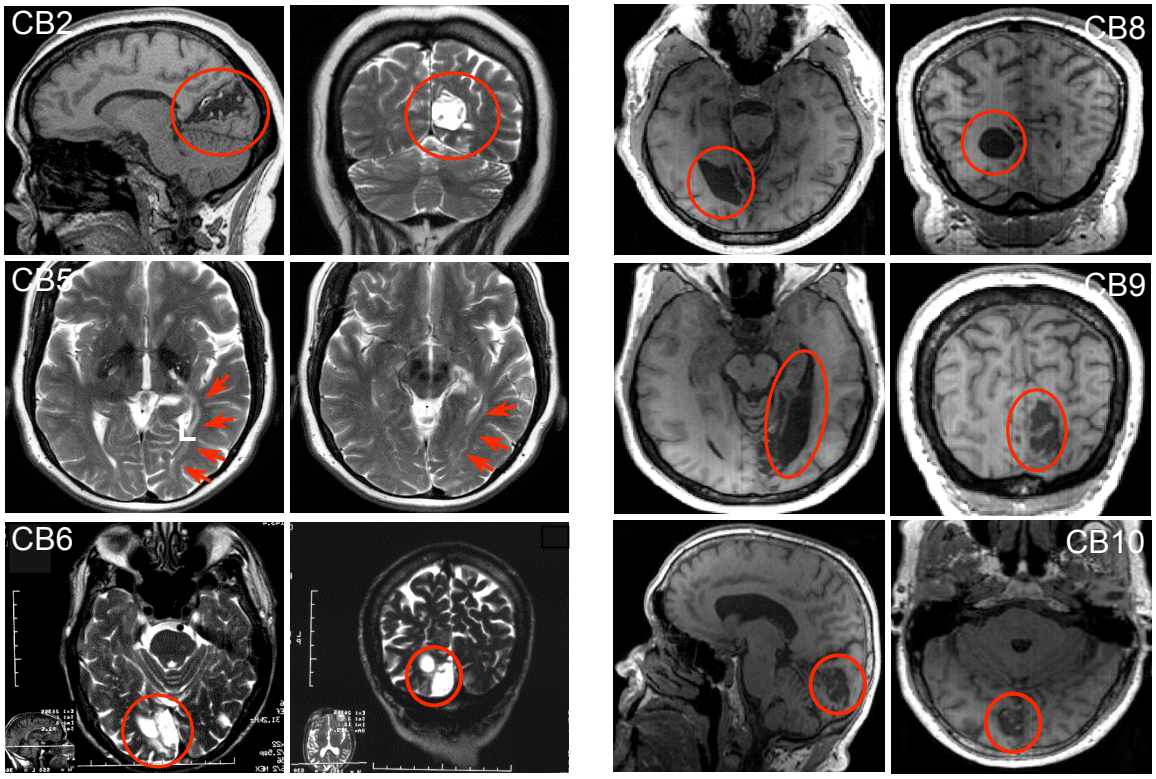
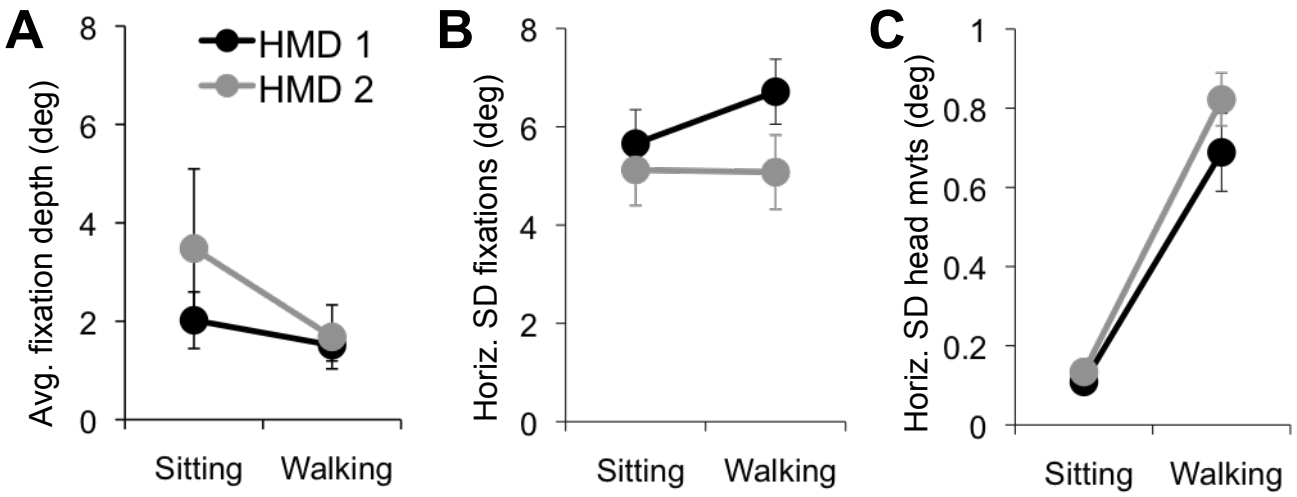


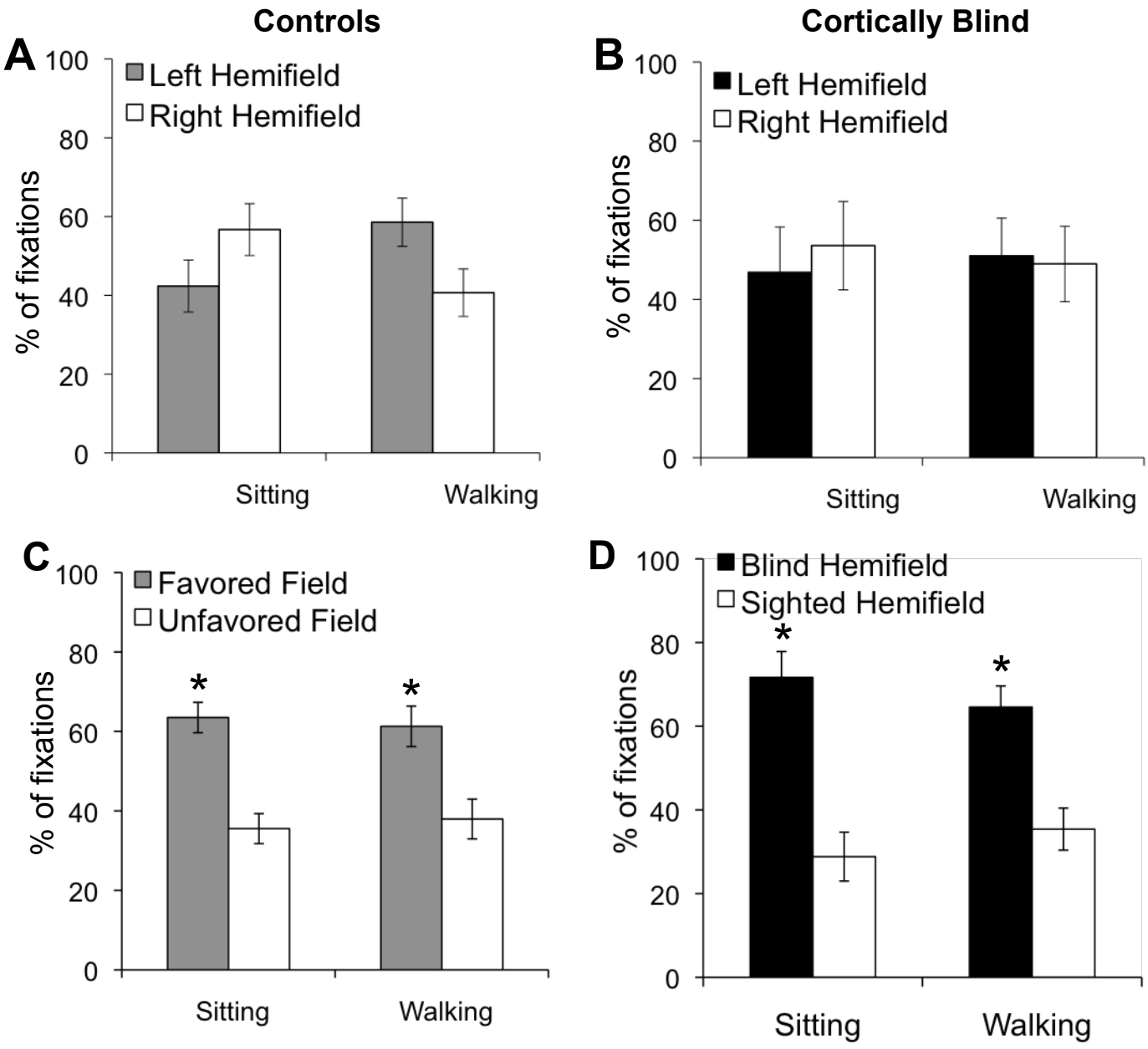
Supplementary Figure 1. Goldmann perimetry performed on the six cortically blind subjects enrolled in the present study illustrating the peripheral extent of their visual defect, measured monocularly for each eye. Intact vision is represented within the color outlines in each of the voisual fields. Differently colored lines represent detection of light stimuli of different sizes, with red being the largest and orange being the smallest.



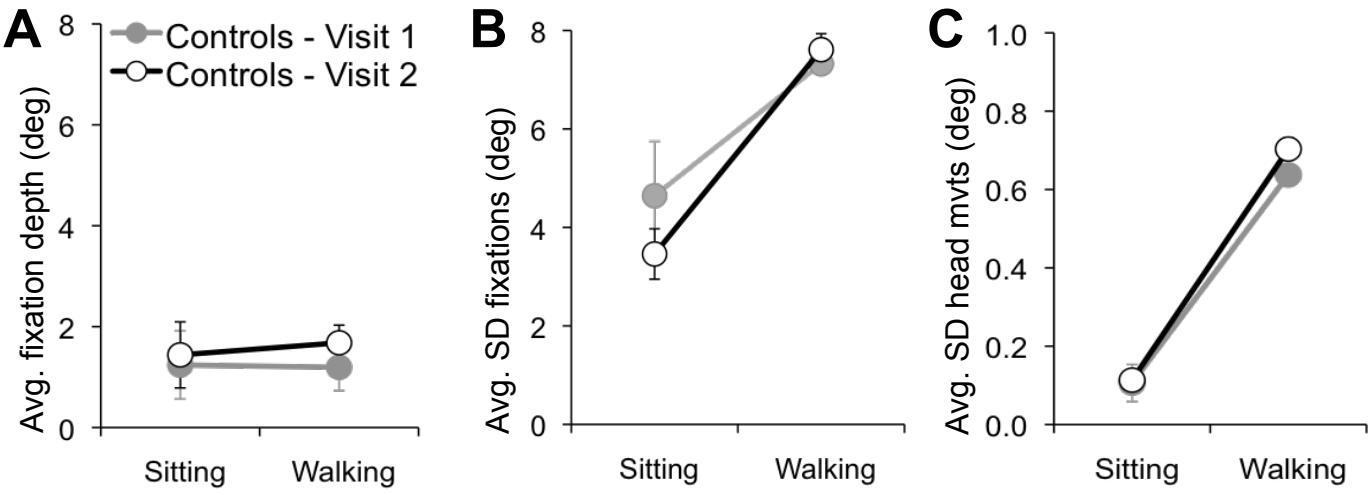
Supplementary Figure 2. T1-or T2-weighted head MRIs of the six cortically blind subjects enrolled in the present study illustrating the site of their brain lesion (red arrows/circles). All lesions either involved V1 directly (red circles) or damaged the optic radiations (red arrows), which provide most of V1's direct input. All subjects suffered damage as a result of ischemic strokes.



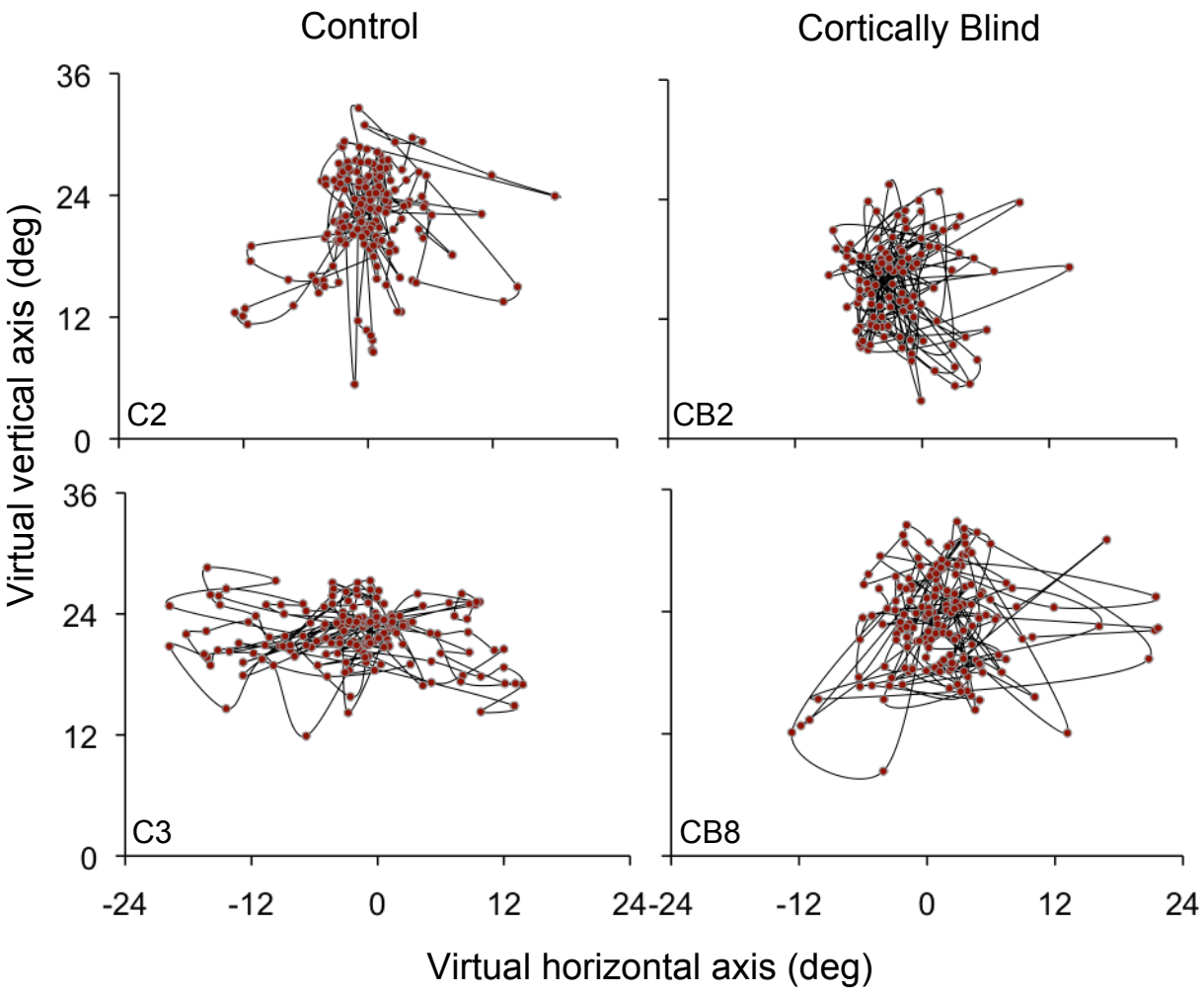
Supplementary Figure 3. Comparison of fixation distribution and head movement across the two helmet systems (HMD1 and HMD2) used in the present study. Subjects include both controls (N=6) and the cortically blind (N=6). **A.** Average absolute value of horizontal fixation locations relative to the vertical meridian of the virtual field of view, plotted as a function of condition (sitting or walking). There is no significant difference between the two setups in either condition. **B.** Plot of the average horizontal standard deviation around the mean fixation location as a function of condition. Again, there is no significant difference between setups. **C.** Average horizontal SD of head movements over a one-minute period, plotted as a function of condition. The lack of a significant difference between the two different setups for all three measures allows us to consider the setups as largely equivalent. All error bars = SEM



Supplementary Figure 4. Biases in fixation distribution across hemifields in controls (N=6) and cortically blind subjects (N=6). **A.** While sitting, controls distributed fixations evenly across the left and right hemifields of vision both when sitting and walking. **B.** Cortically blind subjects, who were all right-handed, showed no significant preference for placing fixations into either the left or right hemifields of vision when sitting or walking. **C.** Bias in fixation distribution plotted in terms of favored/unfavored hemifields in sitting and walking control subjects. Note that as a group, controls did exhibit a significant fixation preference for one or the other hemifield of vision during both sitting and walking conditions. As shown in A, this preferences was inconsistent with respect to left or right hemifield across subjects. **D**. Magnitude of bias in fixation distribution in sitting and walking cortically blind subjects. Note that blind subjects have a large and significant bias in their fixation distribution, placing most of their fixations into the hemifield of vision containing their visual deficit. Just like controls, this does not correlate with left or right hemifields, and occurs under both sitting and walking conditions. Error bars = SEM, * = $p<0.05$.



Supplementary Figure 5. Subjects' performance is consistent across separate study visits. **A.** Average absolute value of horizontal fixation locations relative to the vertical meridian of the virtual field of view, plotted as a function of condition (sitting or walking), for three control subjects across two separate study visits (Visit 1 and Visit 2). **B.** Average standard deviation around the mean fixation location as a function of condition, for the same subjects as in A. **C**. Average horizontal SD of head movements over a one-minute period, plotted as a function of condition, for the same subjects whose behavior is illustrated in A and B. Note there are no significant differences between Visits 1 and 2, demonstrating the reliability of our measures and the subjects' behavior over time. Error bars = SEM.



Supplementary Figure 6. Comparison of scan paths during the walking condition for two controls and two cortically blind subjects. The red dots indicate fixation positions and the black lines connect each fixation point in a consecutive manner temporally. Note that neither subject group makes systematic, frequent, wide horizontal scanning eye movements. The majority of eye movements are centered around the subjects' average fixation position. Subjects appear to be waiting for a ball to appear instead of actively searching for each ball.