



Figure 4. Virtual object exploration experiment. **(a)** Design of the virtual environment. Three random virtual objects were presented in a fixed relative position (“center”, “corner” and “wall”), but in a randomized arena orientation. **(b)** Object interaction analysis for the center object. Group statistics (whisker plot and individual data points, $n=17$ sessions) across sessions for different measures of object exploration: occupancy, occupancy density and number of trajectories converging to the center object, all expressed as a discrimination ratio between object and sham locations away from the object (dotted gray circles in a) ($n=17$, Wilcoxon signed-rank test, ** $p<.01$, *** $p<.001$). **(c)** All locomotion trajectories (gray) in the vicinity (10cm radius) of the virtual (left two plots) and real (right two plots) objects for object and sham locations. Examples of crossing (black lines) and deflection (blue lines) trajectories are shown. Trajectories have been rotated to align entry points with the bottom of the circle. Trajectories approaching within 3 cm to the object and departing at a less-than-90-degree arc from their approach vector were qualified as “deflections” (Supplementary Fig. 8d, Online Methods). **(d)** Population statistics of deflection trajectories for all conditions in c), session-wise bootstrap mean (bars) and standard deviation (error bars) of the percentage of deflected trajectories. Deflections were significantly more likely for object than sham locations exploration in both virtual ($n-VRobj=72$, $n-sham=41$, $p<.02$) and real sessions ($n-obj=22$, $n-sham=16$, $p<.005$). See Online Methods and Supplementary Fig. 8d for more information.