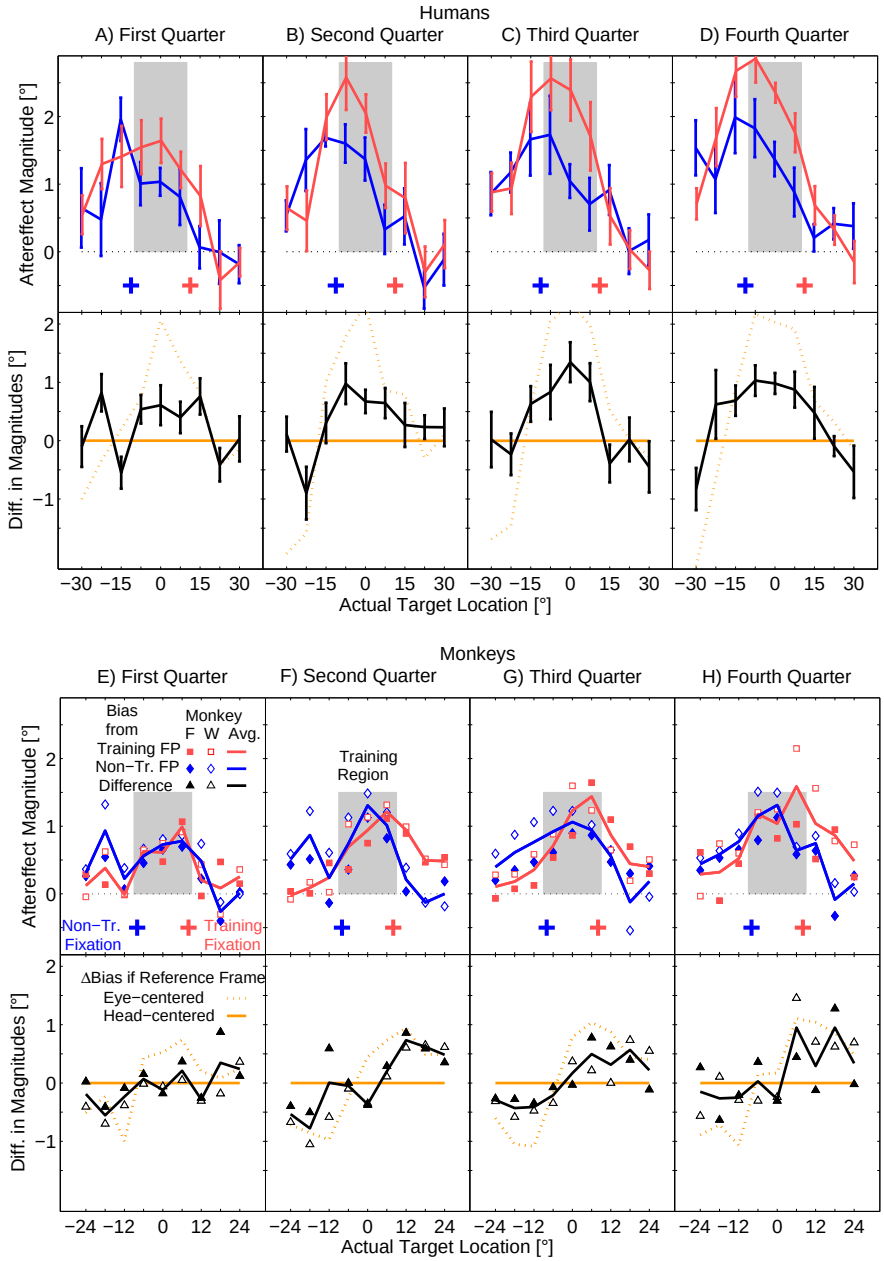
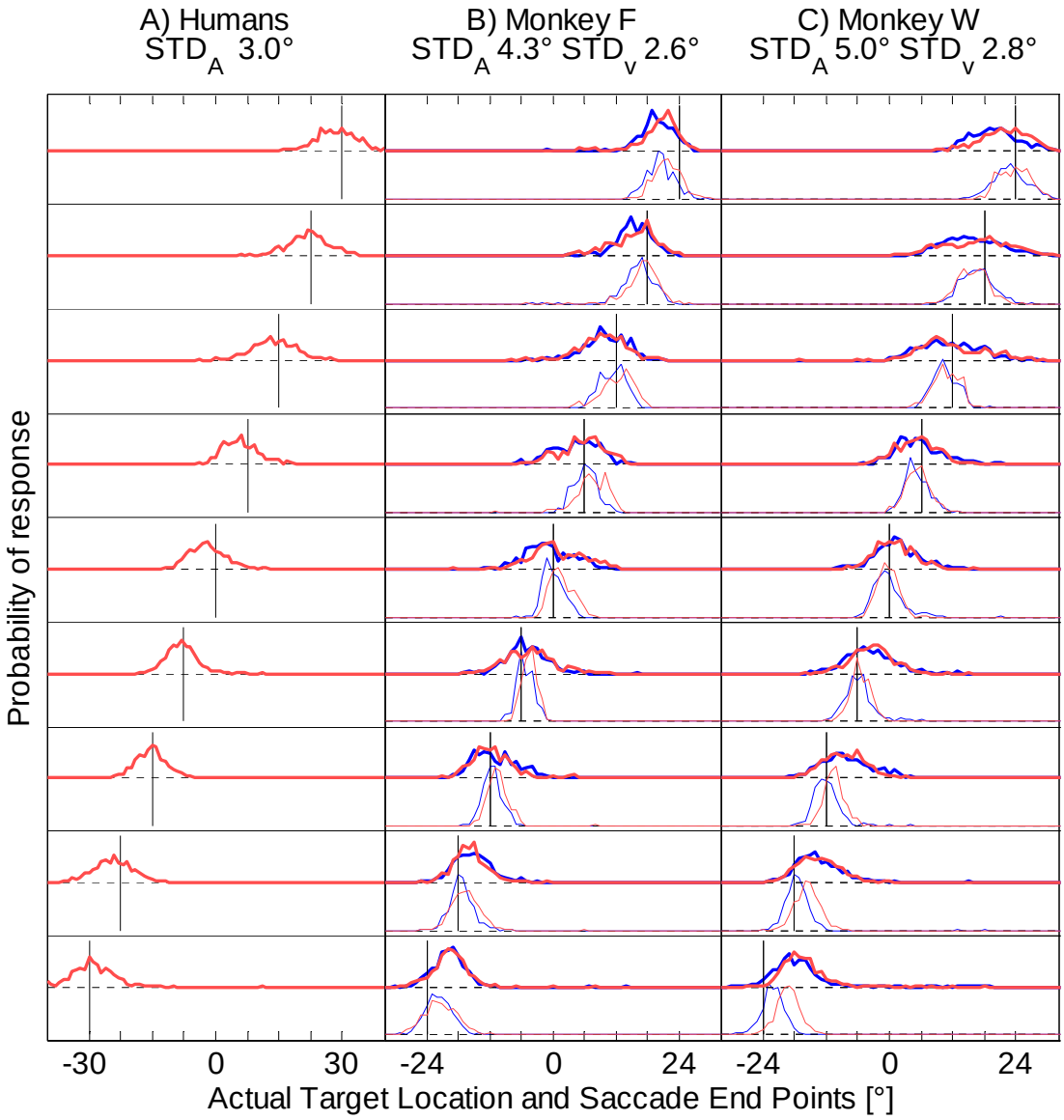
Supplementary Figure S1. Temporal analysis of the ventriloquism aftereffect. Figure layout is similar to Fig. 3 except that data from each block are divided into four quarters, plotted separately in each column (for details see the legend of Figure 3). A strong aftereffect was already present in the first quarter of a block. The eye-dependent modulation of this early adaptation was small (red and blue lines are very close to each other in panels A and E). The aftereffect continued to grow slightly, particularly for the training FP (compare red lines in panels B - D and F – H vs. red lines in panels A and E) while the effect is smaller for the non-training FP data (blue lines in panels B - D and F – H are similar to the blue lines in panels A and E). Also note the small peak in the blue graph at -18° in panels E and F. This peak is at the location at which it would be expected if the reference frame was purely eye-centered, raising the possibility that a shift in a purely eye-centered reference frame occurred (in addition to the head-centered shift) early in the block. However, future studies are necessary to determine whether this trend is robust.

Supplementary Figure S2. Distribution of responses to auditory (and visual) stimuli on the pre-adaptation baseline trials. Each color trace represents distribution of responses for one target location (indicated by the vertical line) pooled across experiments and blocks. A) In the humans, only auditory targets were presented and only one fixation point (+11.8°) was used (data pooled across subjects). B, C) In the monkeys, both auditory (thick traces) and visual (thin traces) stimuli were presented while the eyes fixated either the right (8°, red trace) or the left (-8°, blue trace) prior to stimulus presentation. STD_A and STD_V represent the standard deviation in responses to auditory and visual targets, respectively, averaged across target locations, experiments, blocks, and fixation point locations. Caution should be used in interpreting these

response distributions, as no post-hoc eye coil calibration was applied to the data presented in this figure. Although the auditory saccades do undershoot the target locations, they undershoot the means of the distributions of visual saccades to the corresponding target by a considerably smaller degree. The means of the visual saccade distributions are assumed by calibration procedures to lie at the location of the target, so the true degree of undershooting is best estimated from a comparison of auditory to visual saccades.


Humans
A) First Quarter
B) Second Quarter
C) Third Quarter
D) Fourth Quarter
Aftereffect Magnitude [°]
Diff. in Magnitudes [°]
Actual Target Location [°]
Monkeys
E) First Quarter
F) Second Quarter
G) Third Quarter
H) Fourth Quarter
Bias from
Monkey
F W Avg.
Training FP
Non−Tr. FP
Difference
Training Region
Non−Tr. Fixation
Training Fixation
ΔBias if Reference Frame
Eye−centered
Head−centered
Aftereffect Magnitude [°]
Diff. in Magnitudes [°]
Actual Target Location [°]


A) Humans
STD_A 3.0°
B) Monkey F
STD_A 4.3° STD_V 2.6°
C) Monkey W
STD_A 5.0° STD_V 2.8°
Probability of response
-30
0
30
-24
0
24
-24
0
24
Actual Target Location and Saccade End Points [°]