



Head anticipation can be observed during auditory instructed locomotion.

Head anticipation during auditory instructed locomotion

Felix Dollack, Hideki Kadone, Monica Perusquía-Hernández, and Kenji Suzuki

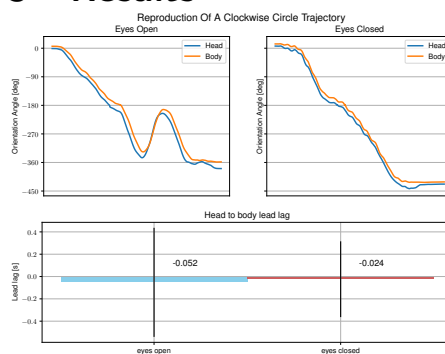
1 Intro

- Head anticipation is the turning of the head towards the future heading direction [3, 4]
- Anticipation persists in darkness and with closed eyes, suggesting that the fundamental function is independent of the visual condition [1, 2]
- Experiments so far have only explored this phenomenon with visual instructions
- The objective is to show head anticipation in auditory instructed locomotion

2 Methods

- 10 sighted subjects (27 ± 4 years)
- Counterbalanced visual conditions: eyes open and eyes closed
- Counterbalanced trajectories: eight shape, circle clockwise and counterclockwise
- First, follow a moving sound to memorize trajectory twice, then reproduce trajectory without sound
- Motion tracking of position and orientation of head and body

3 Results

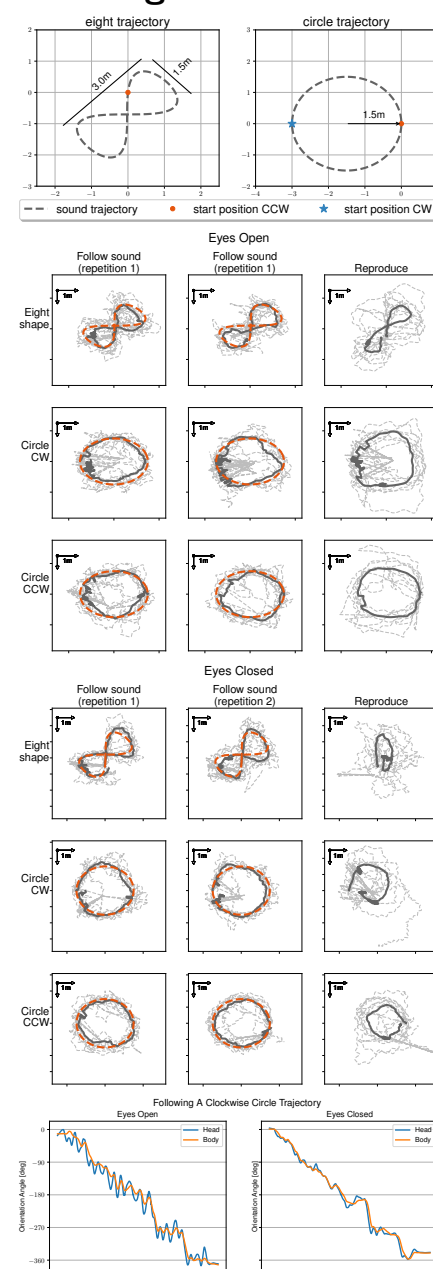


- Anticipatory head behavior, eyes open ($\bar{t} = -32\text{ms}$) and eyes closed ($\bar{t} = -34\text{ms}$) conditions
- Average head lead lag is significant (eyes closed: $p < 0.05$, eyes open: $p < 0.01$)

4 Conclusion

- Head anticipation was observed in auditory instructed locomotion
- Reproducing a sound trajectory was possible with eyes open but not with closed eyes
- Current audio system needs improvement

Extra figures



References

- [1] Colas N. Authie et al. "Differences in gaze anticipation for locomotion with and without vision". In: *Frontiers in Human Neuroscience* 9.June (2015). ISSN: 1662-5161. DOI: 10.3389/fnhum.2015.00312. URL: <http://journal.frontiersin.org/Article/10.3389/fnhum.2015.00312/abstract>.
- [2] Delphine Bernardin et al. "Gaze anticipation during human locomotion". In: *Experimental Brain Research* 223.1 (2012), pp. 65–78. ISSN: 00144819. DOI: 10.1007/s00221-012-3241-2.
- [3] Renato Grasso et al. "Eye-head coordination for the steering of locomotion in humans : an anticipatory synergy". In: *Neuroscienc Letters* 253 (1998), pp. 115–118.
- [4] Hideki Kadone et al. "Gaze anticipation during human locomotion - Top-down organization that may invert the concept of locomotion in humanoid robots". In: *Proceedings - IEEE International Workshop on Robot and Human Interactive Communication* (2010), pp. 552–557. ISSN: 1944-9445. DOI: 10.1109/ROMAN.2010.5598631.

