

Aged rats display more accurate allothetic cue-based goal navigation in response to sudden changes in environmental cues

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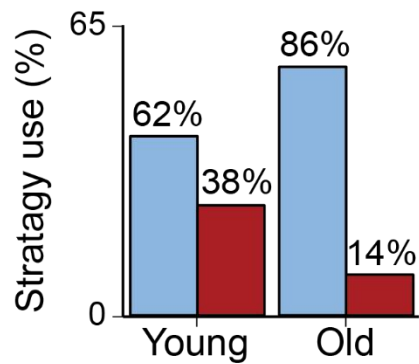
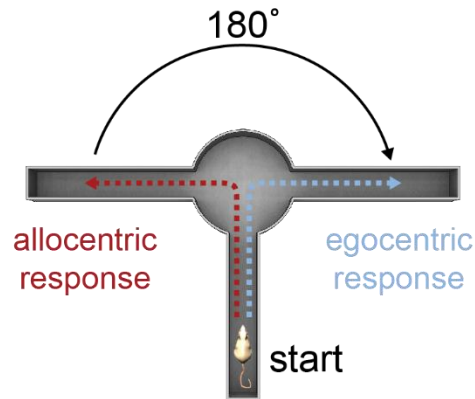
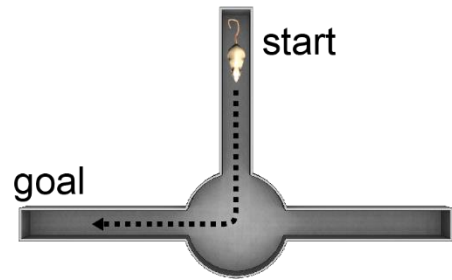
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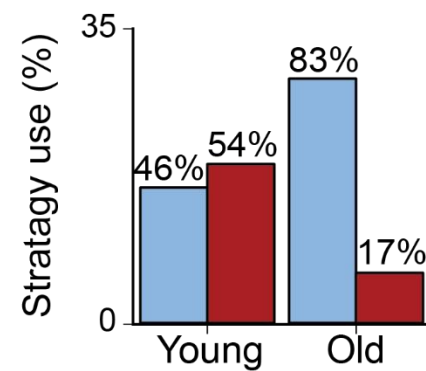
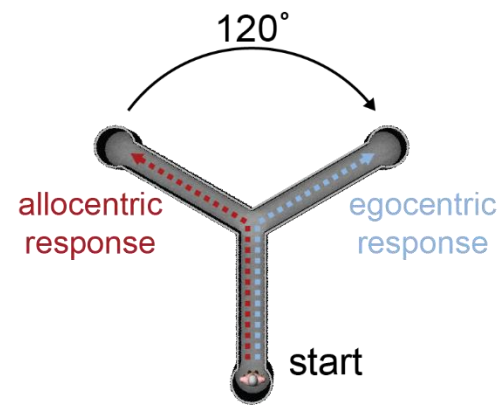
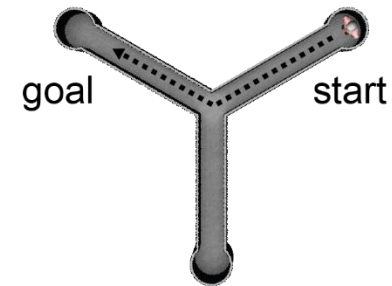
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Age-related changes in cue-based navigation

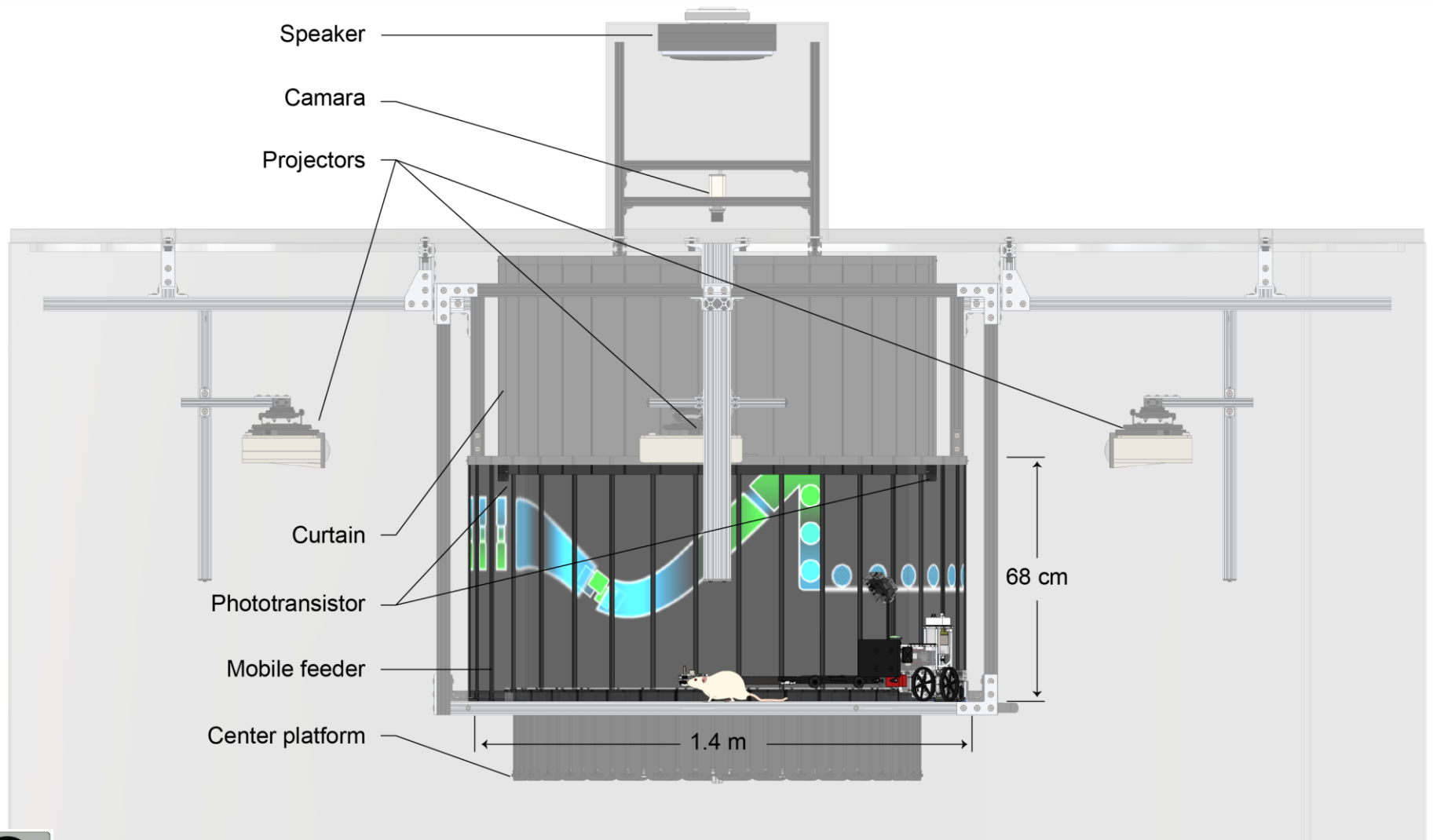


Barnes et al., 1980

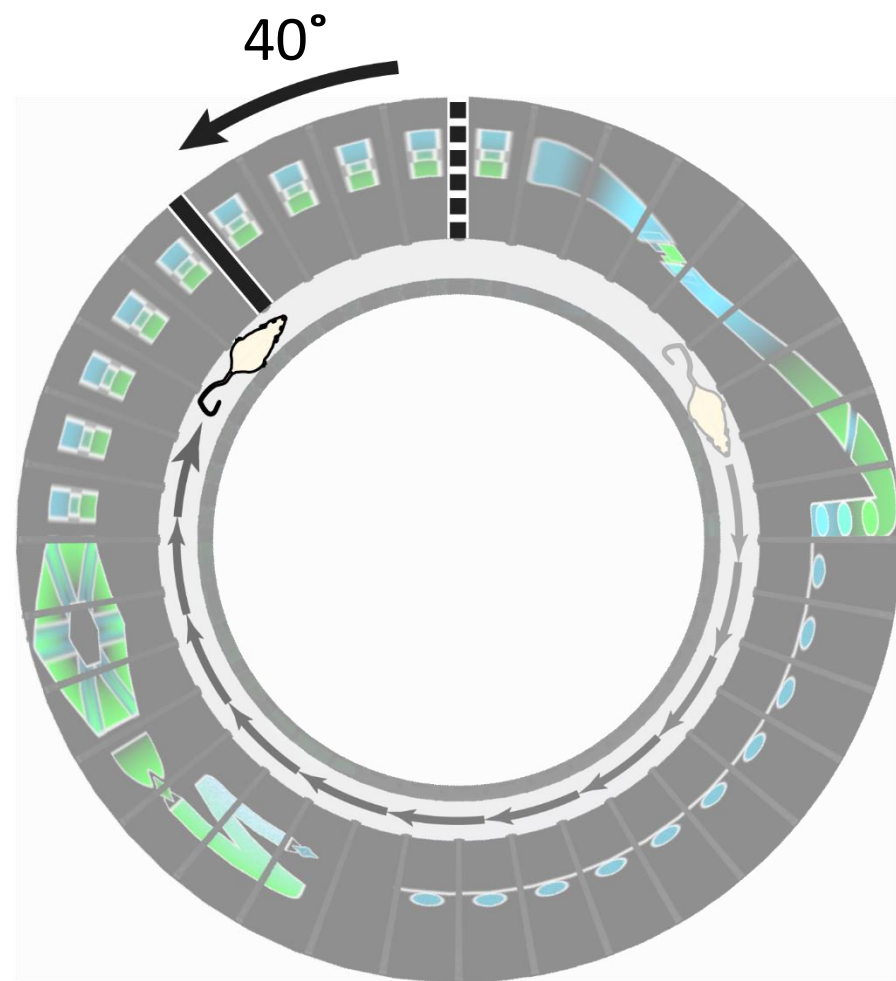
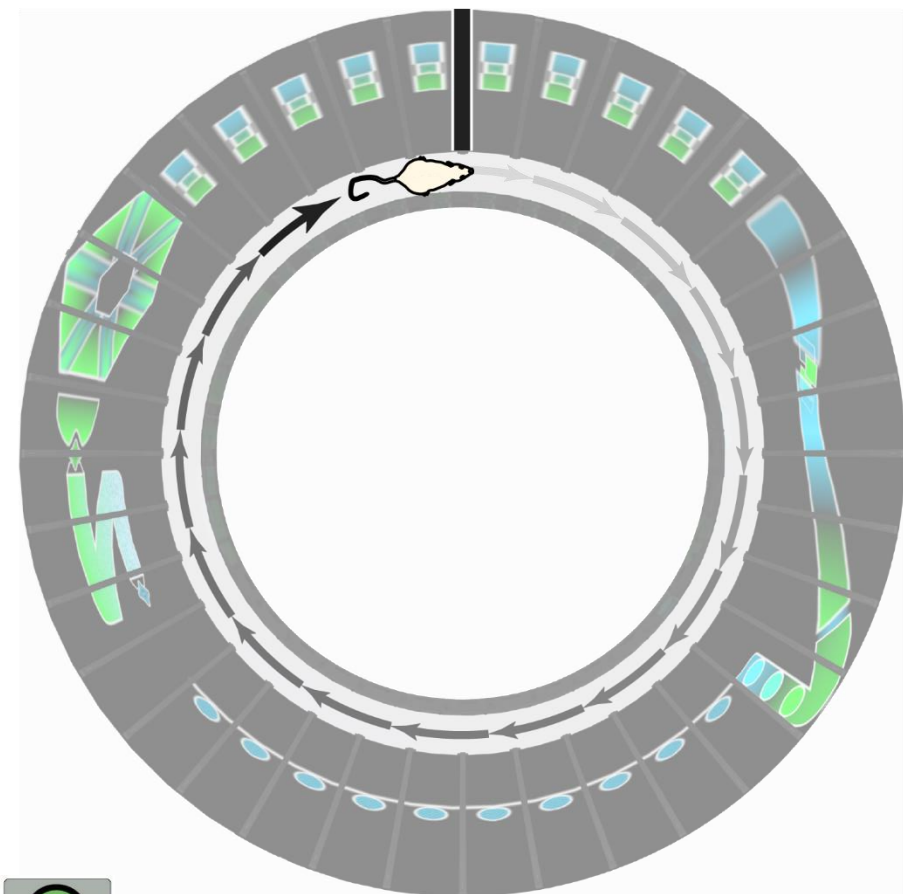
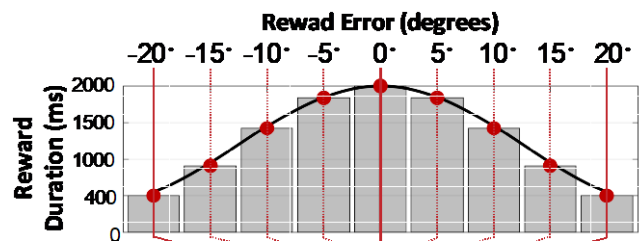


Rodgers et al., 2012

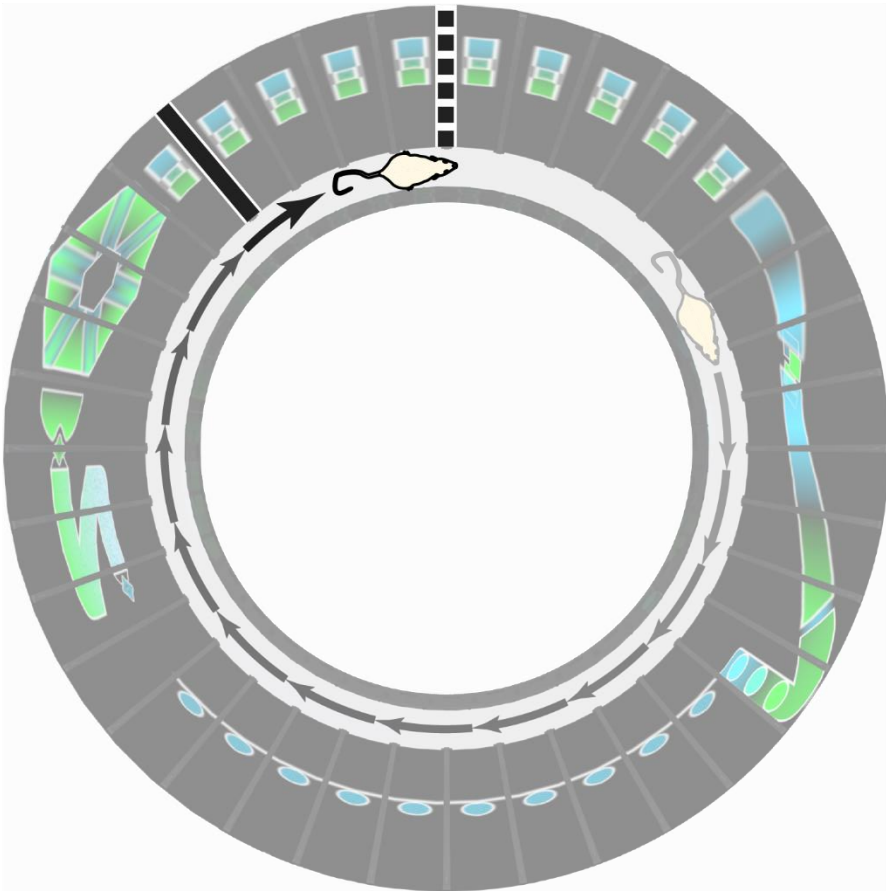
The Instantaneous Cue Rotation (ICR) arena



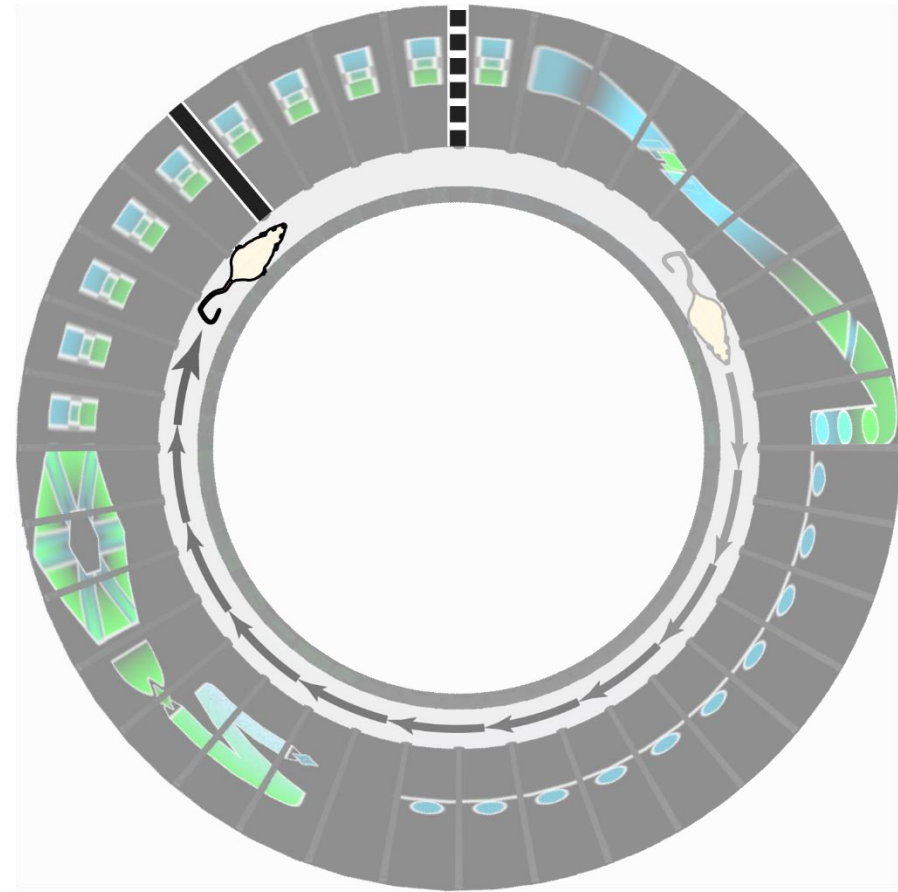
The ICR task



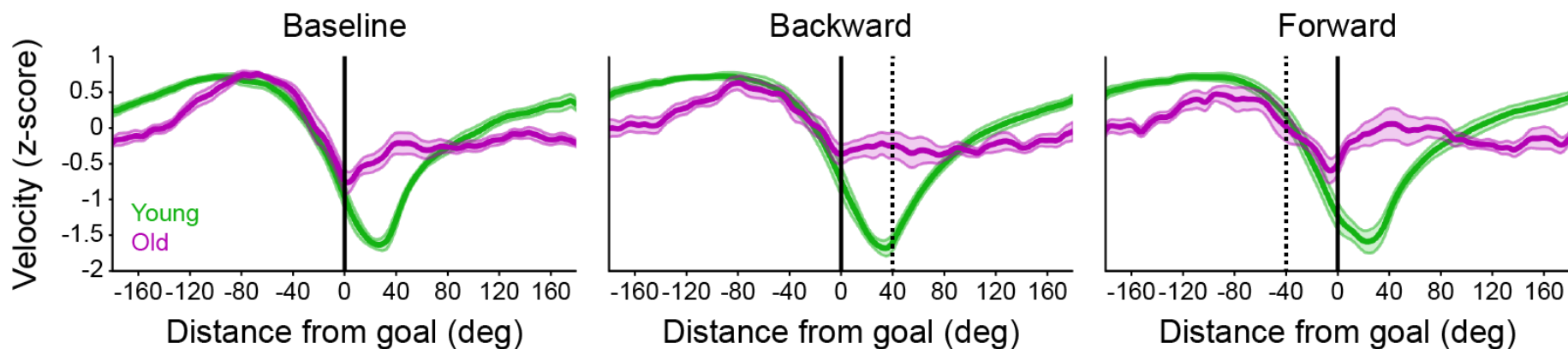
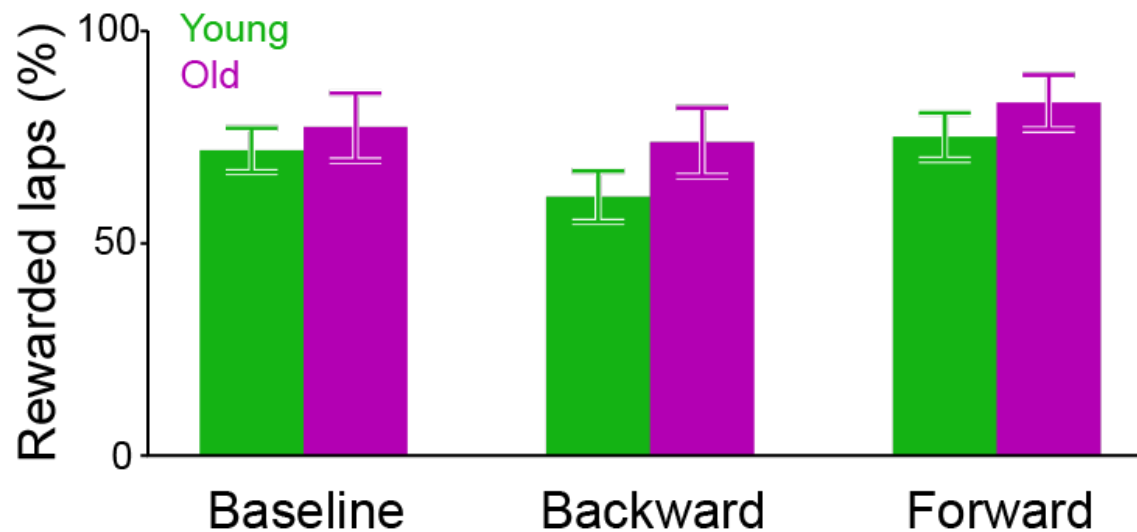
Egocentric response



Allocentric response



Results: navigation performance and goal-related running velocity

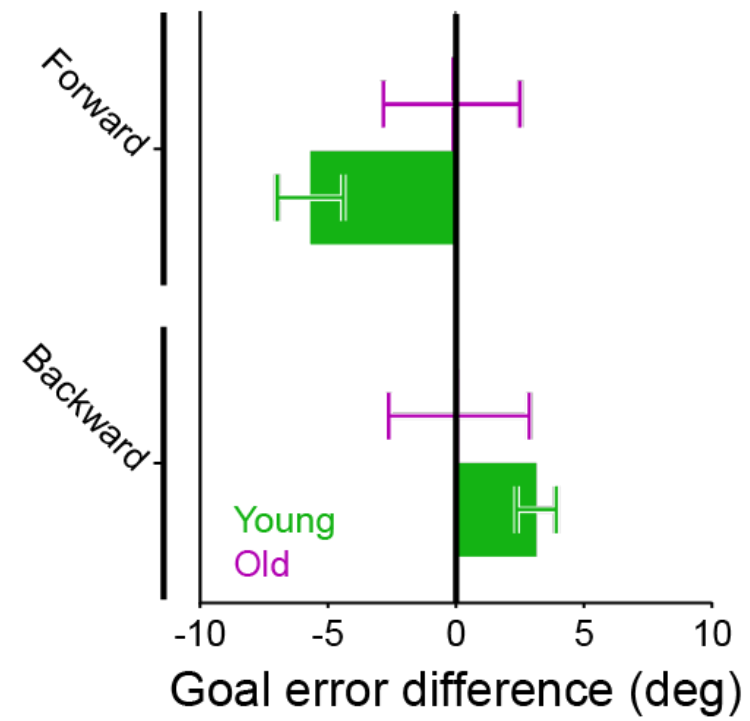
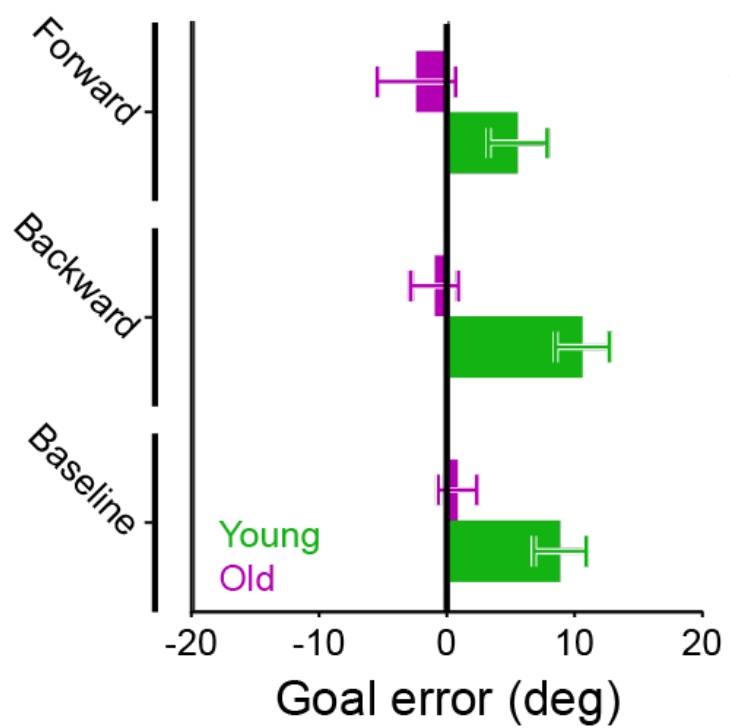


Aging behavioral study

- 9 young rats
- 8 aged rats



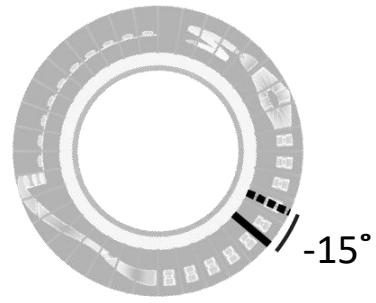
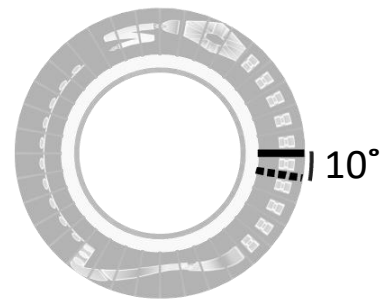
Results: goal navigation accuracy



Pre-rotation

Post-rotation

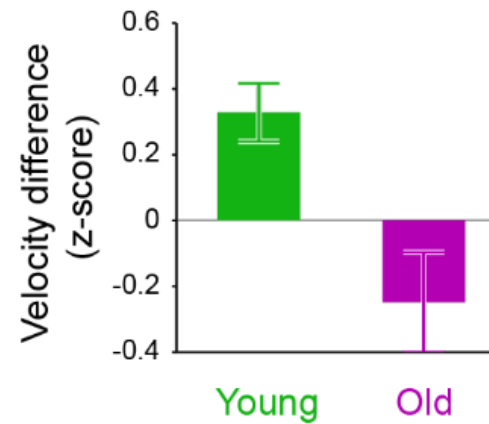
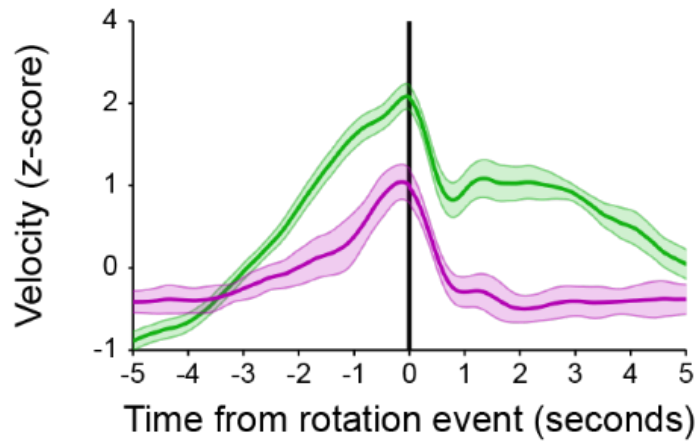
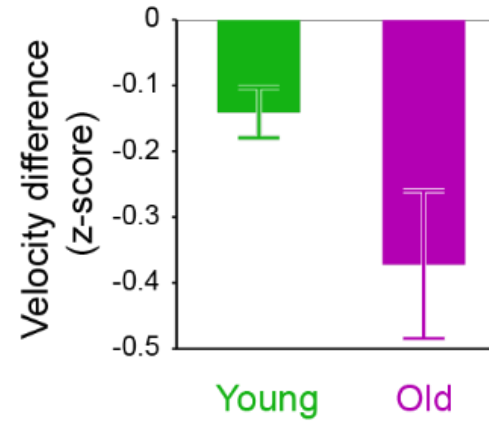
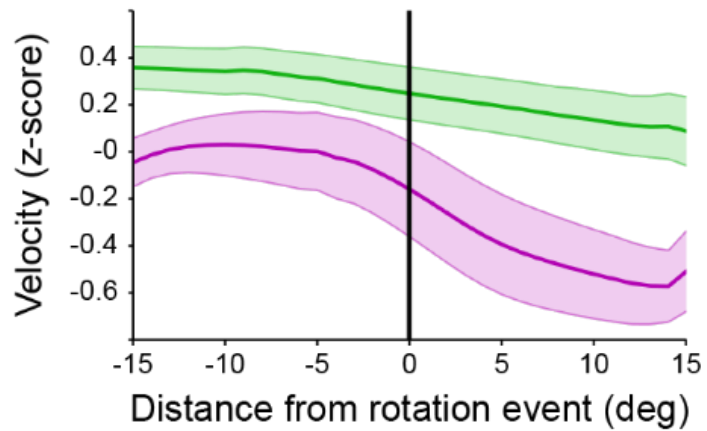
- Goal center
- ⋯ Actual stopping position



$-15^\circ - 10^\circ = -25^\circ$



Results: rotation-related behavior



Contrary to what was expected, aged animals showed:

- More accurate overall goal navigation performance
- Stronger allocentric strategy use
- More evident changes in behavior in response to cue rotation

Younger animals, in contrast, showed:

- Less accurate overall goal navigation
- A tendency to underrotate relative to the cues

These findings could be explained by:

- Age-related vestibular impairments that may, under these task conditions, discourage the use of self-motion-dependent (egocentric) strategies
- Aged rats being more risk averse compared to young, encouraging more accuracy in older animals because of larger rewards at the center of the goal
- Young, but not aged, rats mixing egocentric and allocentric strategies for ICR task solution

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