

# The Importance of the Flocculonodular Lobe of Cerebellum in Predicting Time Perception Performance

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## Introduction

- ❖ Interval timing requires cognitive resources such as attention, long-term memory, and working memory. Unfortunately, these functions deteriorate with aging.
  - ❖ Changes in time perception are reported in healthy aging with conflicting outcomes.
- AIM:** The investigation of the relationship between time perception and brain tissue characteristics.

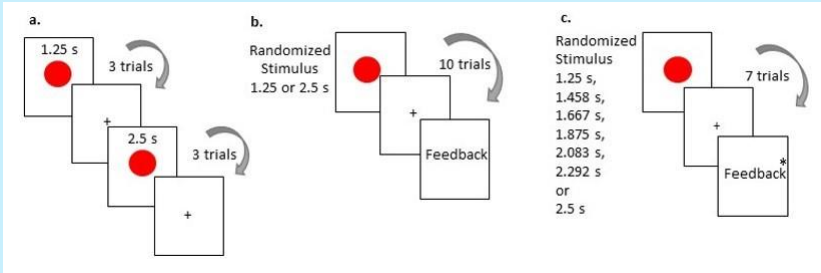
## Methods

### Participants

30 young (mean age = 26.36 years) and 30 old (mean age = 67.46 years) individuals participated in this study.

### Data Collection

#### 1. Time Bisection Task



A red circle appeared on screen with varying durations and the participants were asked to classify them as long or short.

**Figure 1.** Temporal Bisection Task Design. a. Pre-training Phase: 1 block, b. Training Phase: 2 blocks, c. Testing Phase: 10 blocks.

#### 2. Brain Imaging

- ❖ The participants were administered a whole brain MRI scan in which multi-spectral FLASH images were collected with 4 different flip angles.
- ❖ The spin lattice relaxation times (T1) were solved in a voxel-based fashion for the whole brain and analysis is performed separately for 218 ROIS derived from the CA\_N27\_ML atlas.
- ❖ Finally, the relationship between the T1 tissue characteristics within each ROI and behavioral time perception metrics such as bisection point (BP), Weber ratio and difference limen (DL) was examined through regression analyses.

## Results & Conclusion

- ❖ A stepwise multiple regression analysis revealed that BP could be predicted by the T1 tissue values of certain subcortical brain areas such as hippocampus and putamen, as well as cerebellum.
- ❖ Principal component analyses indicated that among all ROIS, the T1 measured inside the flocculonodular lobe of the cerebellum predicted the BP most prominently: 20% of the variance could be explained by this ROI exclusively.
- ❖ This is the first study investigating the relationship between time perception and brain tissue characteristics.
- ❖ Overall, our findings shed new light on the role of the cerebellum in time perception.

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