

Introduction & Rationale

- The mammalian brain is capable of naturally **merging information from multiple sensory modalities** (e.g., visual & auditory) in order to establish complete sensory perception (Binder, 2015)
- The ability to merge information from our different senses is dependent on the strength of the stimuli, their spatial location as well as the timing of the stimuli (Stein and Meredith, 1993)
- Audiovisual perception** can be studied in the lab using perceptual judgment tasks, such as the audiovisual **temporal order judgment (TOJ)** task (Keetels & Vroomen, 2012)
- Previous studies have shown that one's ability to accurately bind audiovisual information is dependent on the task parameters such as the features of the stimuli (e.g., stimulus duration) (Stevenson et al., 2014)
- A study in humans has shown that altering stimulus duration leads to a stabilization in audiovisual perception within a temporal-order judgement (Boenke, Deliano & Ohl, 2009), however, we don't have a proper understanding of the effect of stimulus duration on audiovisual temporal perception in our rodent model

Objective & Hypothesis

- Objective:** To investigate the effect of stimulus duration on perceived temporal order judgement in Long Evans rats
- Hypothesis:** Based on prior literature (Boenke, Deliano & Ohl, 2009), it is hypothesized that an increase in stimulus duration will lead to a stabilization of perception, such that there is lesser variability between the data, but no shift in the TOJ curve

Methods

Behavioural Training

- Using two-alternative forced-choice operant conditioning rats were trained to judge whether an auditory stimulus or visual stimulus was presented first by choosing a particular feeder
- The left feeder trough corresponded with the auditory-first stimuli, and the right feeder trough corresponded with the visual-first stimuli
- All training was done at a stimulus onset asynchrony (SOA) of 400 ms

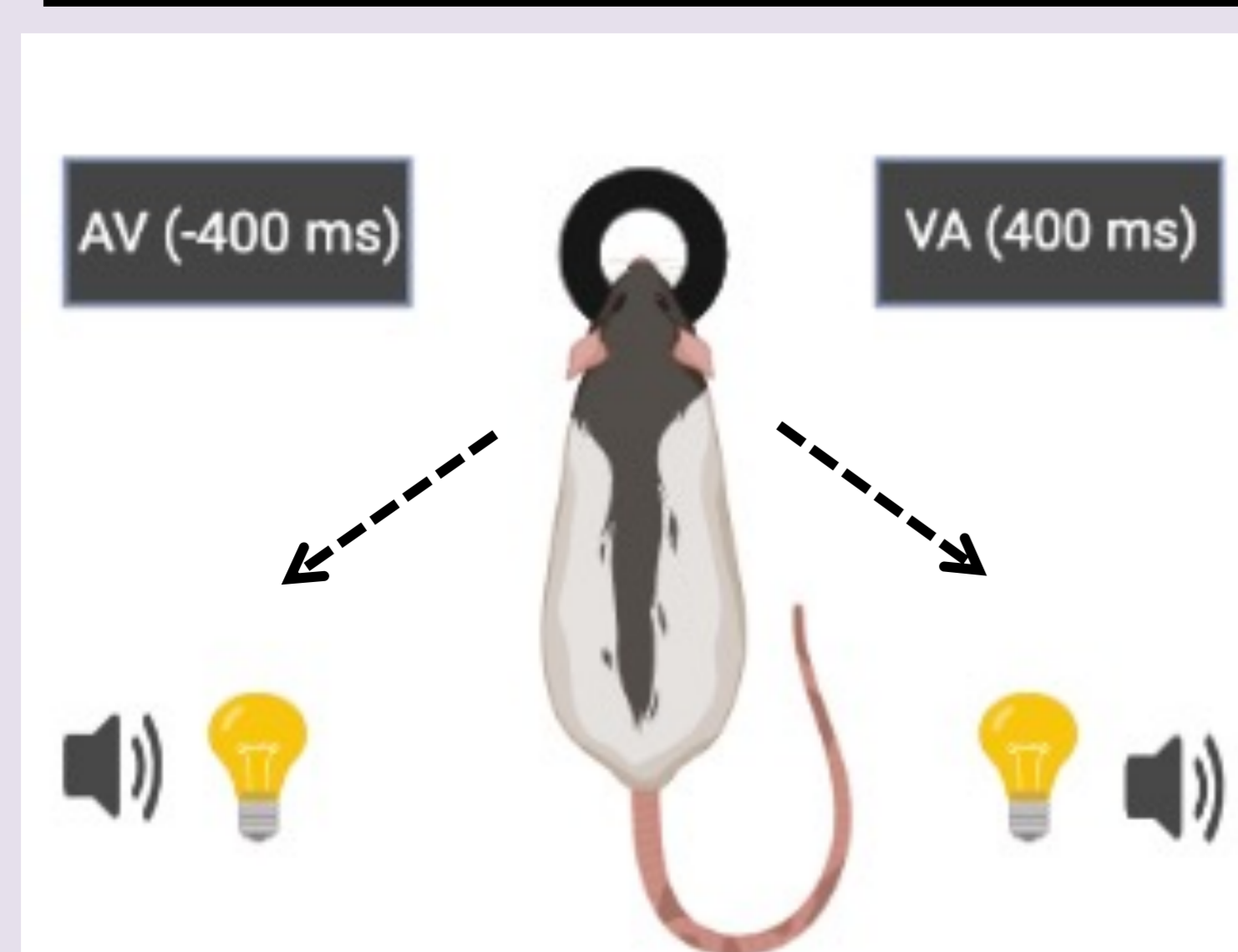
Behavioural Testing

- Rats performed behavioural testing which involved the presentation of audiovisual stimuli at a range of SOAs ($\pm 400, 300, 200, 100, 0$ ms)
- Each rat was tested on 3 different stimulus durations: 20 ms, 50 ms, 100 ms in a counterbalanced manner

Behavioural Metrics

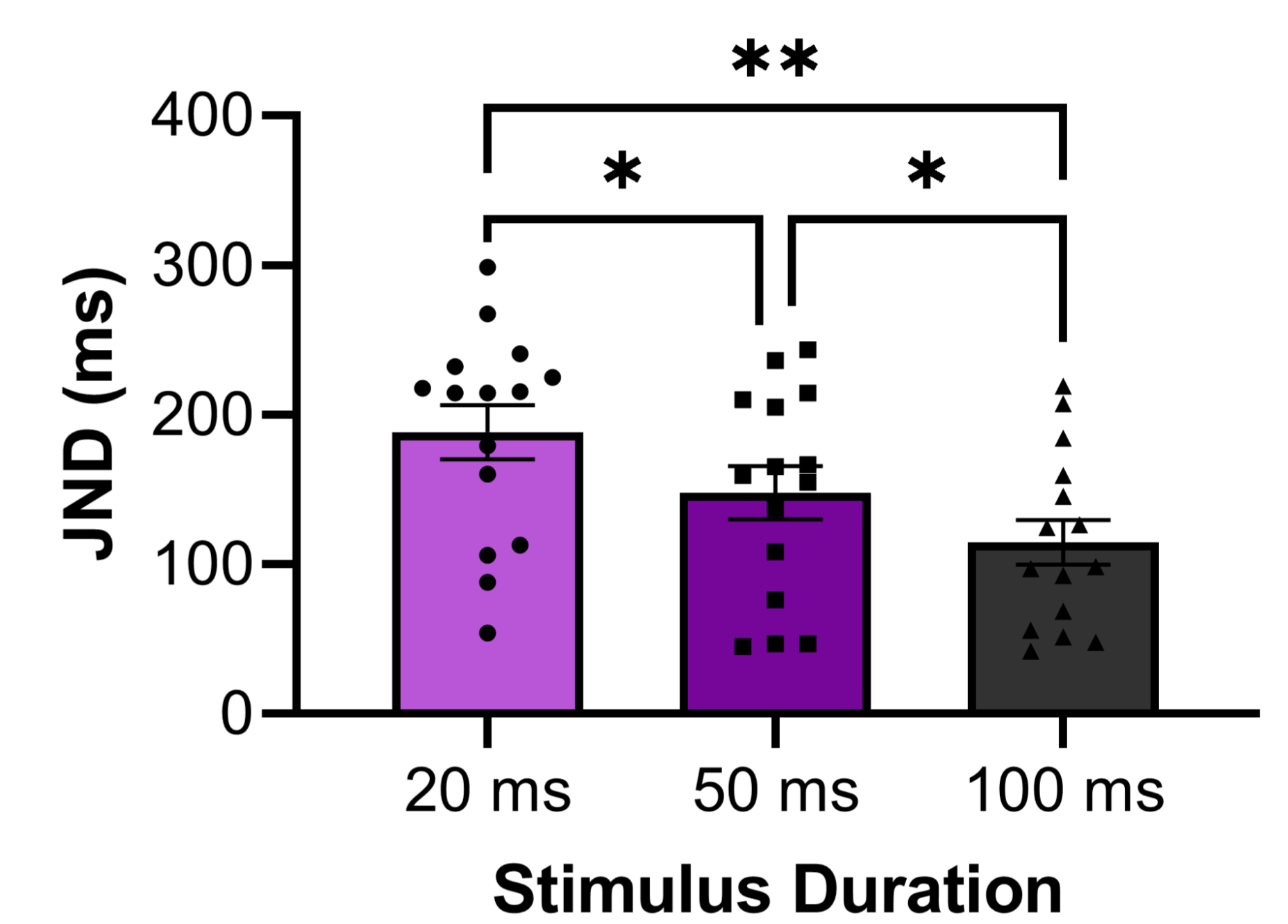
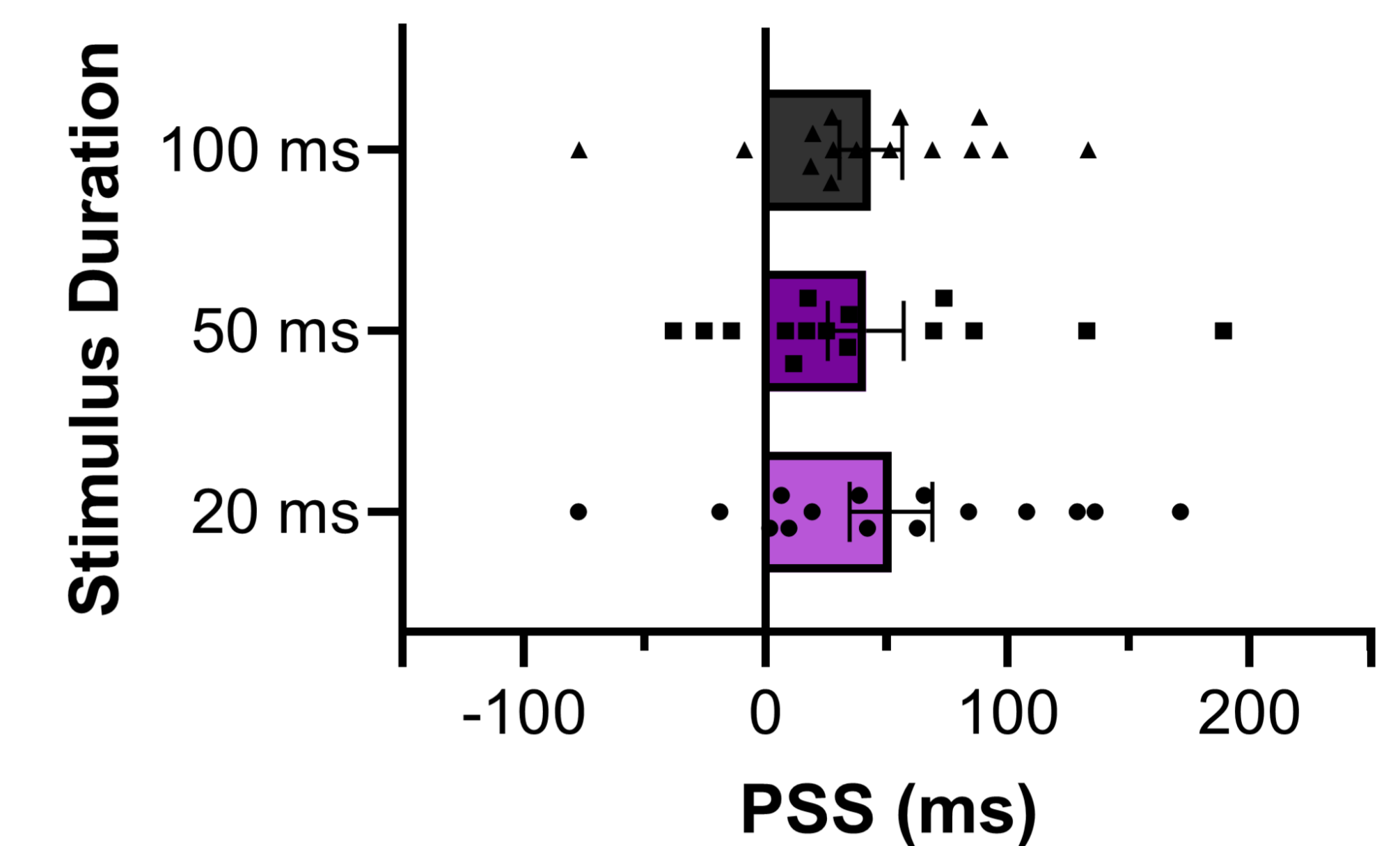
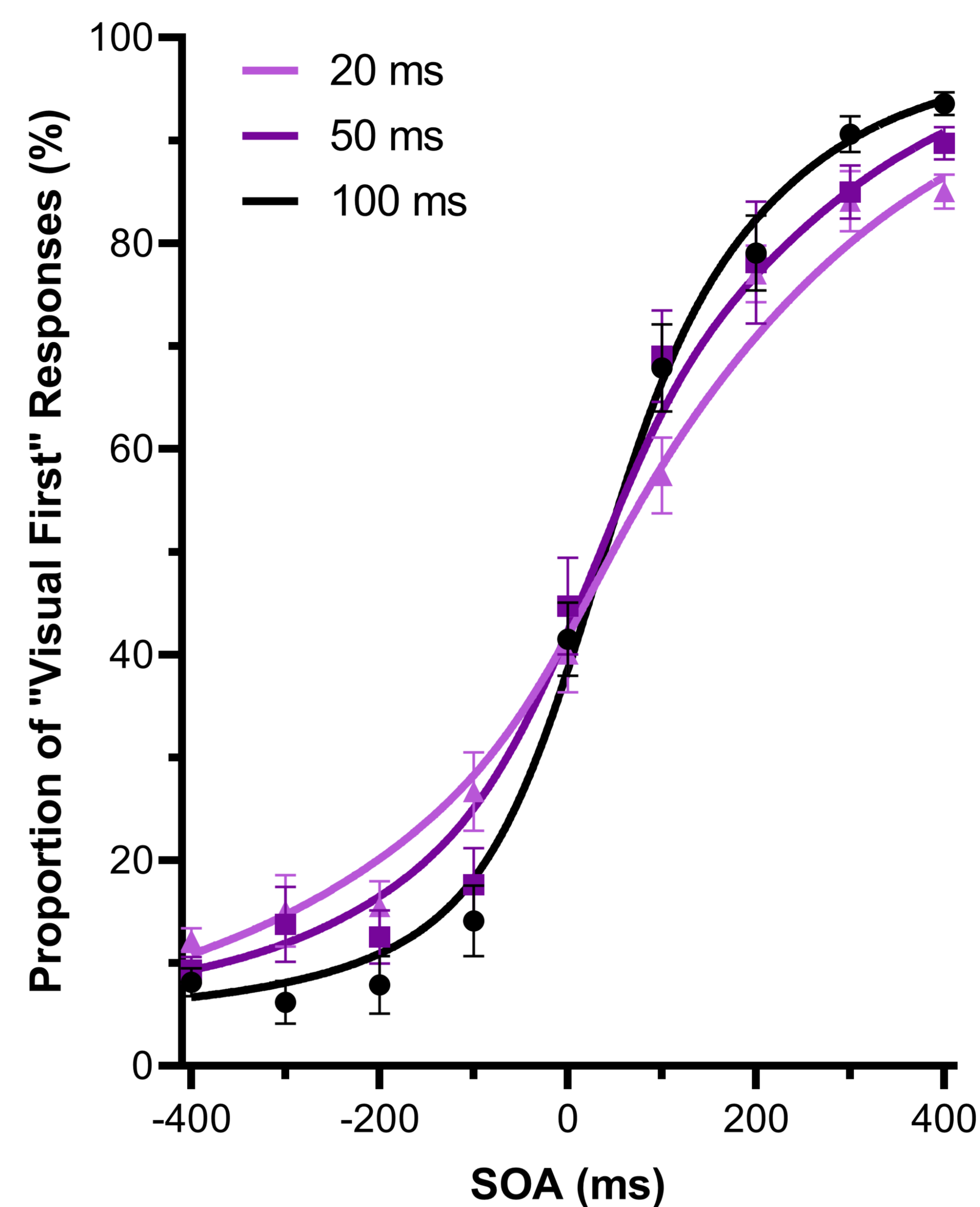
- The **point of subjective simultaneity (PSS)** is the specific timing of the audiovisual stimuli when the observer is most unsure of the temporal order (Schormans et al., 2017)
- The **just noticeable difference (JND)** is the smallest timing between the separate auditory and visual stimuli that can be detected reliably (Schormans et al., 2017)

TOJ BEHAVIOURAL PARADIGM



Results

STIMULUS DURATION INFLUENCES TEMPORAL SENSITIVITY



- There was no significant change in the **PSS** values as the stimulus duration was increased (20ms, 50ms, 100ms)
- There was a significant reduction in the **JND** values as the duration of the stimuli was increased (20ms, 50ms, 100ms)

Conclusions

- Consistent with previous research in humans (Boenke, Deliano & Ohl, 2009), a stabilization in PSS values was observed upon increasing PSS stimulus duration in rats
- The rats' audiovisual sensitivity (i.e. the JND) increased as the stimulus duration was increased
- The results show that the choice of various stimuli durations contributes to differences in temporal sensitivity
- Future studies should take into account the effect of stimulus duration when designing experiments

References

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