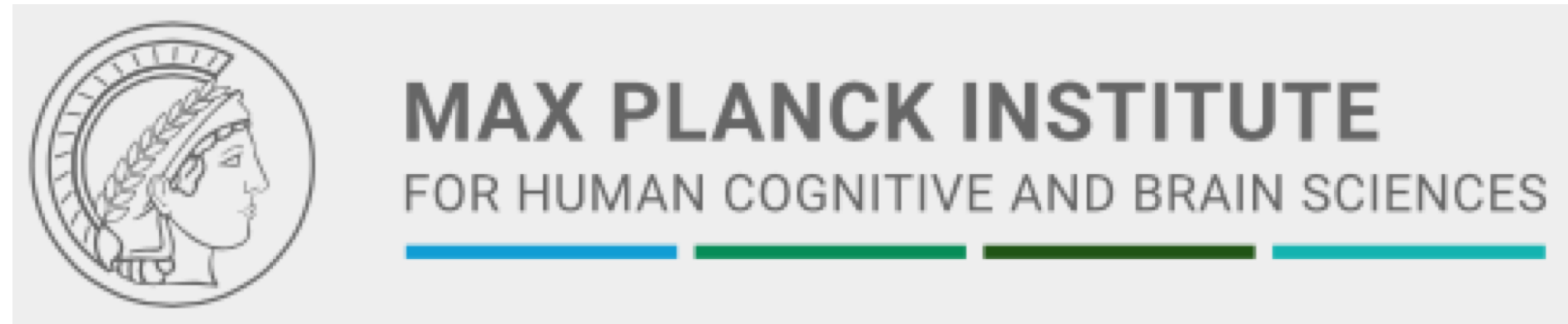


Individual Differences in the Modulation of Visual Search Performance by Auditory Concurrent Stimulation in Very Young Children



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Introduction

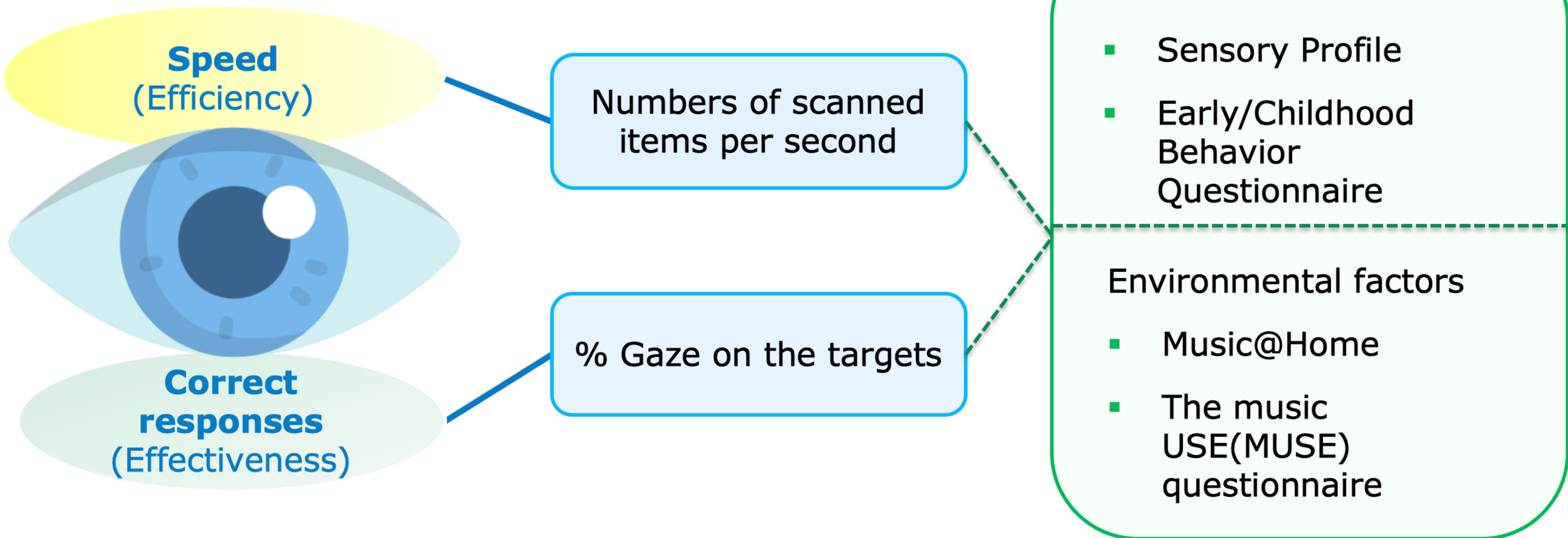
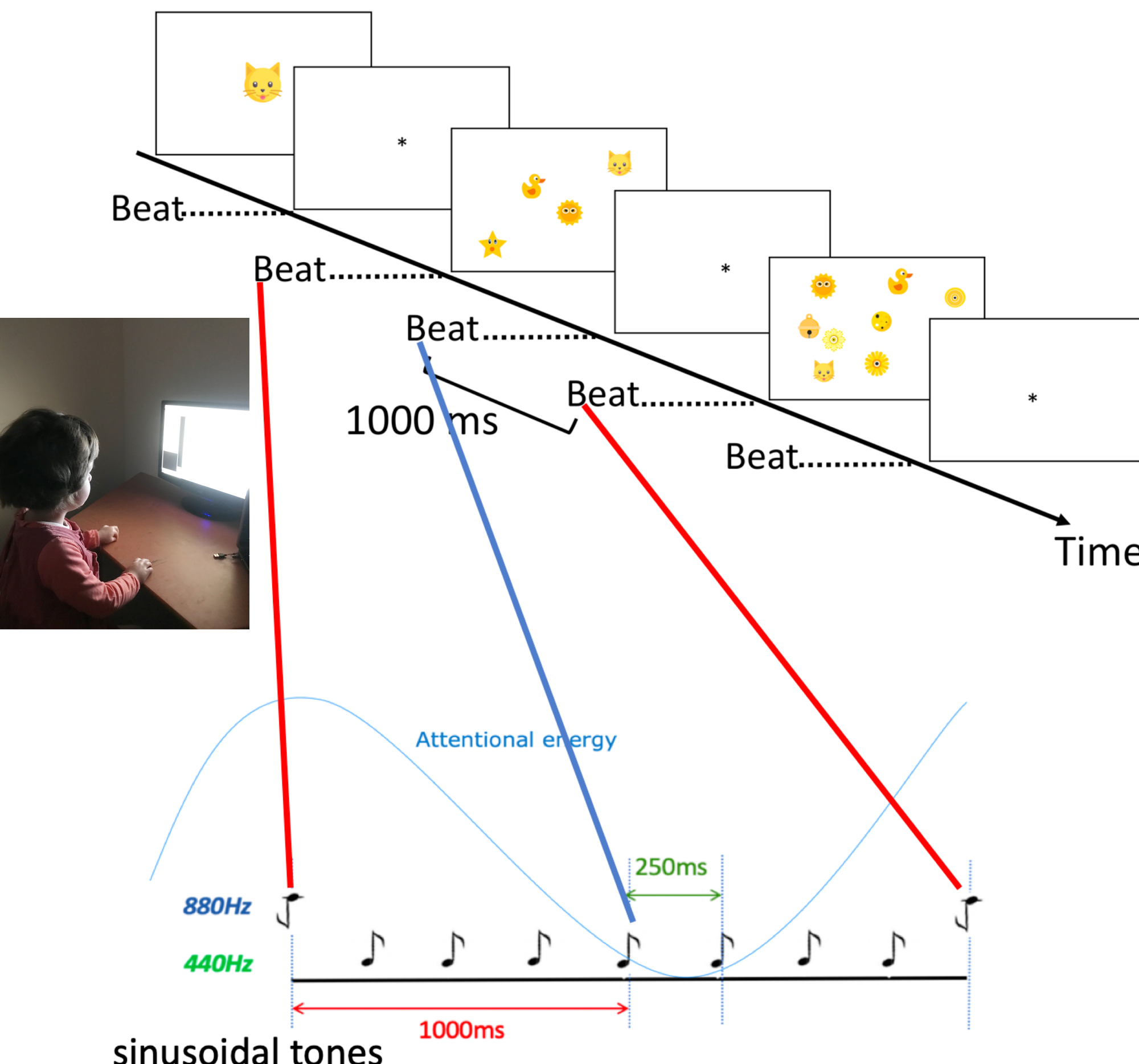
The attentional resource can be shared across modalities. This cross-modal effect on the enhancement of information processing can be both implicit and explicit. Infants learn to use the amodal properties, such as rhythm, tempo, etc. to guide perceptual and attentional learning¹. In the current study, we adopted the noninformative rhythmic auditory stimulations (4 Hz)² and compared visual search performance between single (**V-visual**) and dual (**AV-audiovisual**) modalities, including efficiency (speed) and effectiveness (accuracy) within individuals. Furthermore, given the fact that children usually experience different environmental sensory inputs and have their way to process in daily life, we examined internal^{3,4} and external^{5,6} factors using questionnaires and their relations to search performance.

By hypothesis, it was predicted that temporally regular and redundant audiovisual signals would afford higher search accuracy and efficiency than those contexts where no such audiovisual correspondences exist. Furthermore, we expected the individual difference in search performance was associated with their sensory processing profiles and exposure to the musical environment.

Our preliminary results show that visual search performance is modulated by noninformative and concurrent rhythmic auditory beats. This modulation is loosely linked to several subscales of the questionnaires.

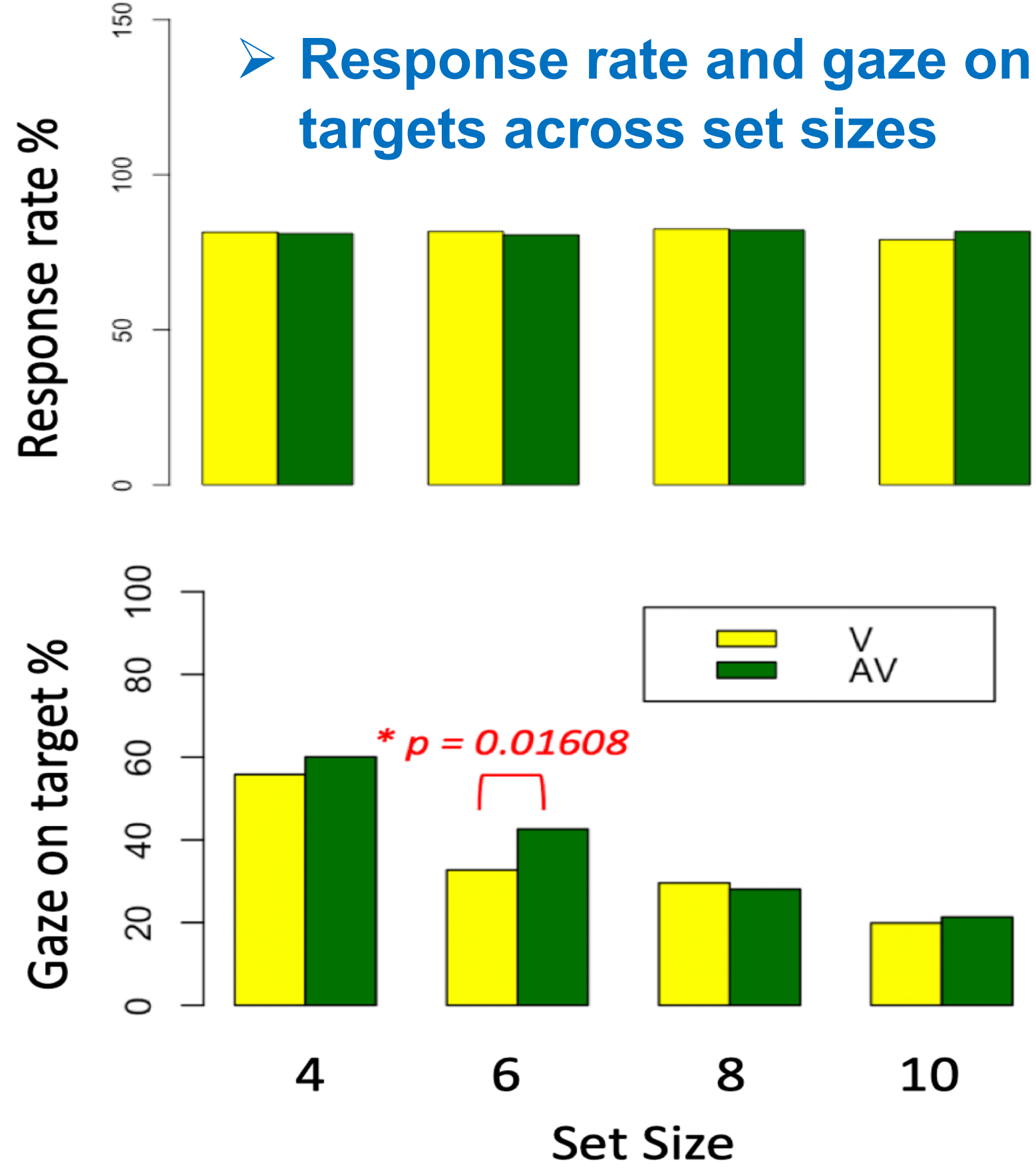
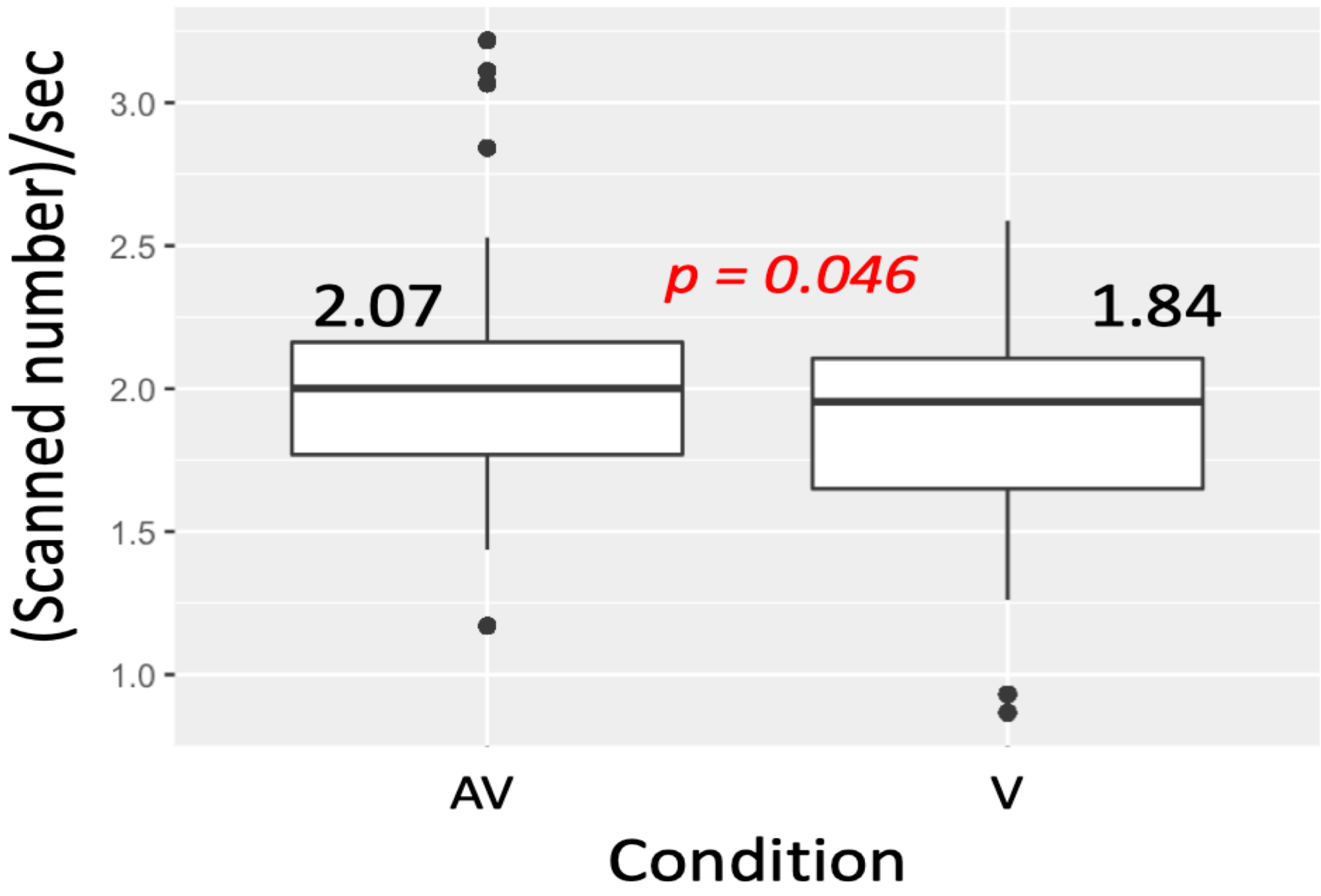
Methods

- Participants: N = 29**
- All subjects completed both V and AV conditions (within-subjects design)
 - Subjects were between 16 and 48 months of age
- Visual stimuli:**
- Set sizes were 4, 6, 8, and 10
 - 64 experimental trials with inter onset interval (IOI) of 2000ms
- Auditory stimuli:**
- An 8-tone synchronous metrical stream with IOI of 250ms (4 Hz)
- Apparatus:**
- X2-60 eye tracker with a sampling rate of 60 Hz



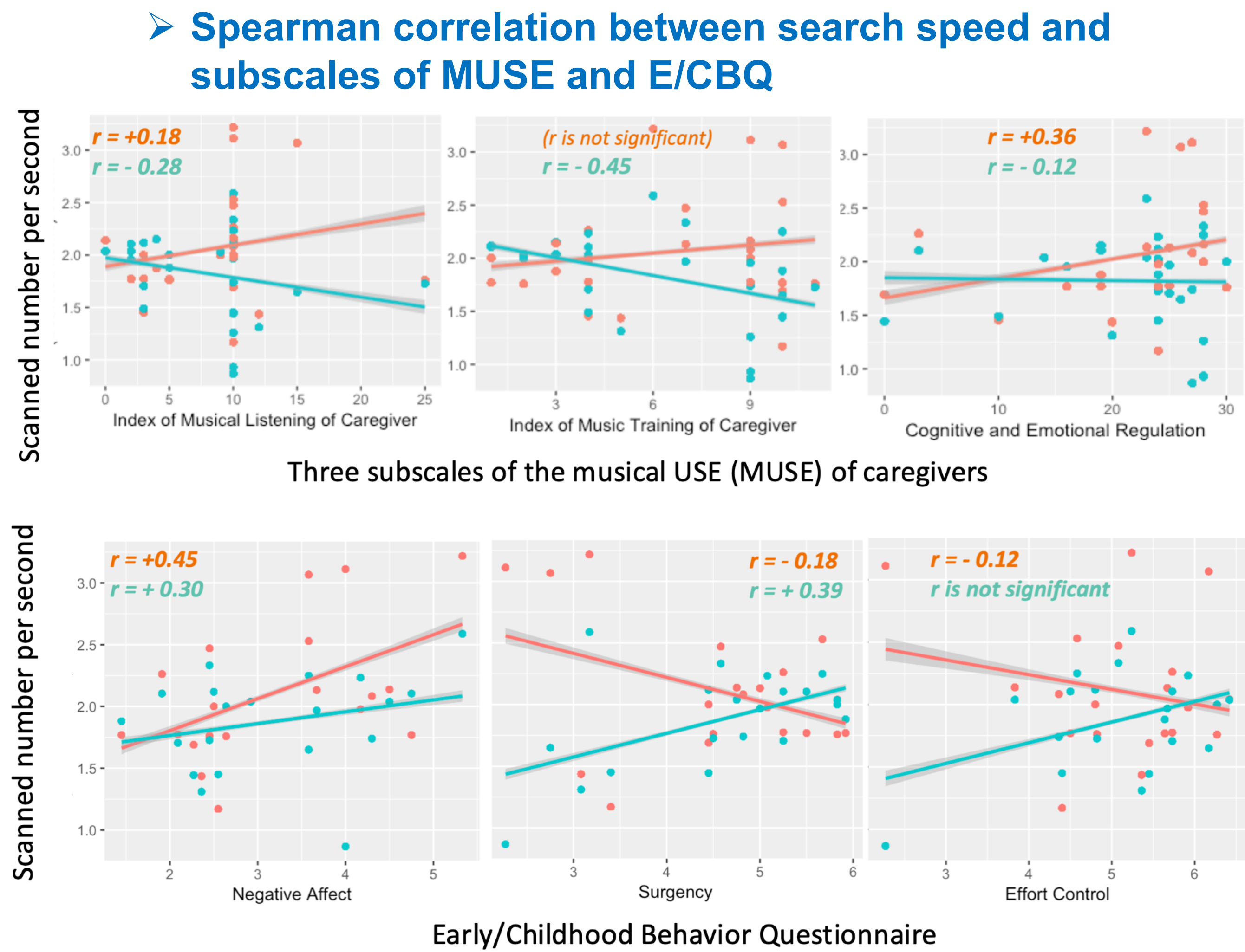
Results

Search speed in two conditions

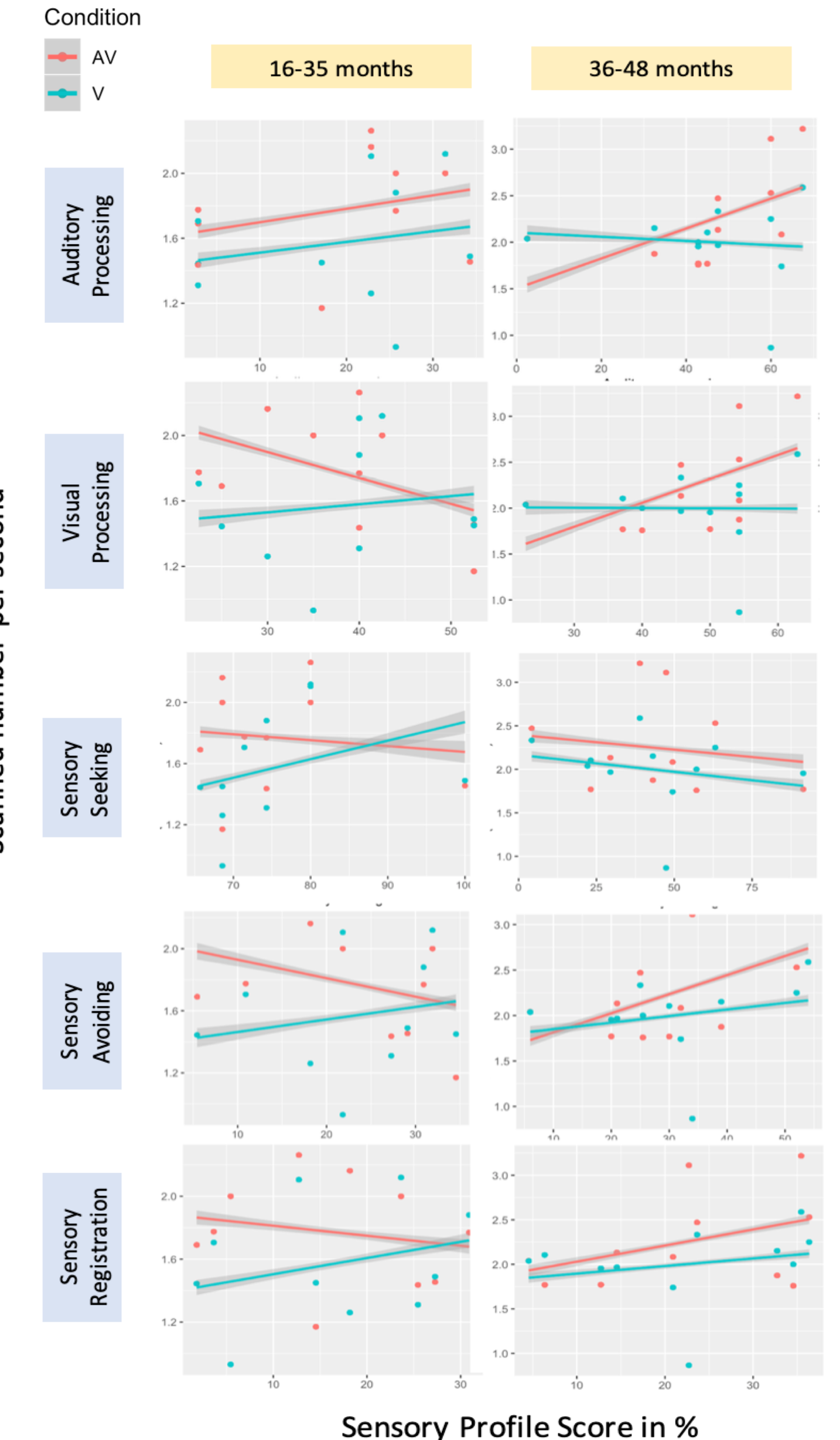


Preliminary findings:

- Efficiency of visual search is higher in AV than V.
- Low correlation is observed between search speed and subscales of MUSE, SP, and E/CBQ. The individual difference shows the potential impact on different task conditions.
- There is no correlation between Music@Home and search performance.



Spearman correlation between search speed and sensory profile subscale in two age groups



Discussion

Preliminary results here show that the presence of synchronously presented audiovisual stimulation enhanced search efficiency compared to the no-sound condition. This enhancement might be associated with various psychometric assessment items.

However, merely compared between V and AV can not exclude the modulation that possibly results from increased arousal or motivation. It remains unclear whether young children employ redundant information implicitly in search tasks. Furthermore, due to a wide age range and a small sample size, only exploratory observations can't conclude the internal and external factors that influence the cross-modal effect.

Further exploration with a more systematic and complete design, such as varying AV regularity and/or synchronicity will provide more insight into the observed AV effects.

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