Title: Eye responses reflect spatial congruency and perceptual bias in audiovisual interaction.

Recent studies have reported that increased pupil dilation and reduced microsaccades are associated with perceptual task enhancement in the bisensory over unisensory conditions. However, little is known about the impacts of bimodal stimulus congruency on those eye responses. We adopted the spatial ventriloquist paradigm to investigate whether spatial congruency of audiovisual stimuli and differences in perceptual experience influence eye responses accompanied by behavioral responses. A simple beep sound and a single disk were used as auditory and visual stimuli respectively. We manipulated spatial congruency of audiovisual stimuli by presenting a visual stimulus on the left or right side of a monitor with an auditory stimulus from the left, right, or center of the monitor. 15 participants performed a sound localization task by clicking their perceived location of the auditory stimulus on the monitor. Participants maintained fixation on a small dot at the center of the monitor with their heads fixed on a chin rest, while their eye responses were recorded using an eye tracker (Eyelink-1000, SR Research). To examine differential perceptual experience in the audiovisual congruence conditions, we classified all responses of audiovisual trials into two groups based on whether the perceived location of the auditory stimulus biased toward the visual stimulus. We found greater pupil dilation accompanied by a greater ventriloquist effect (VE) in the spatially incongruent condition compared to the congruent condition. In addition, a decrease in the number of microsaccades was associated with the auditory perceptual bias towards visual stimuli in the spatially incongruent condition. Our results showed that both spatial congruency and perceptual bias modulate the VE. Results from eye responses suggest that pupillometry is a reliable marker for spatial congruency whereas microsaccades reflect the perceptual bias.