Jumping Spiders Perform Head Saccades During Prey Tracking

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Jumping spiders, the largest family of spiders, perform body saccades -- or turning toward stimuli in a series of brief, rapid turns rather than a continuous motion -- when tracking moving objects such as prey to maximize depth perception and minimize motion blur. However, the motion of the head during saccades and the potential for independent head saccades, which would make their vision even more efficient, have not previously been examined. Adult Phidippus regius were filmed while performing saccade sequences to track live crickets, and head and body movements during these saccades were tracked and analyzed. P. regius was found to perform head saccades, quantifiably more subtle in magnitude and velocity than body saccades, and widely variable. Whether this variability was affected by the angle of the head immediately before a saccade and the spiders' natural range of motion was tested next. A significant inverse correlation was found between the initial head angle and the magnitude of the subsequent head saccade: larger initial head angles tended to be followed by smaller saccades and vice versa. These findings support two concepts: first, that jumping spiders, or salticids, perform head saccades in addition to body saccades; and second, that the angular magnitude of head saccades decreases as the spiders approach the limit of their range of motion. Finally, comparison with invertebrates such as blowflies suggests salticids execute a different mechanism of saccadic behavior as well: Head saccades are not merely head movements, but the driving force behind their strategy in tracking prey.

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