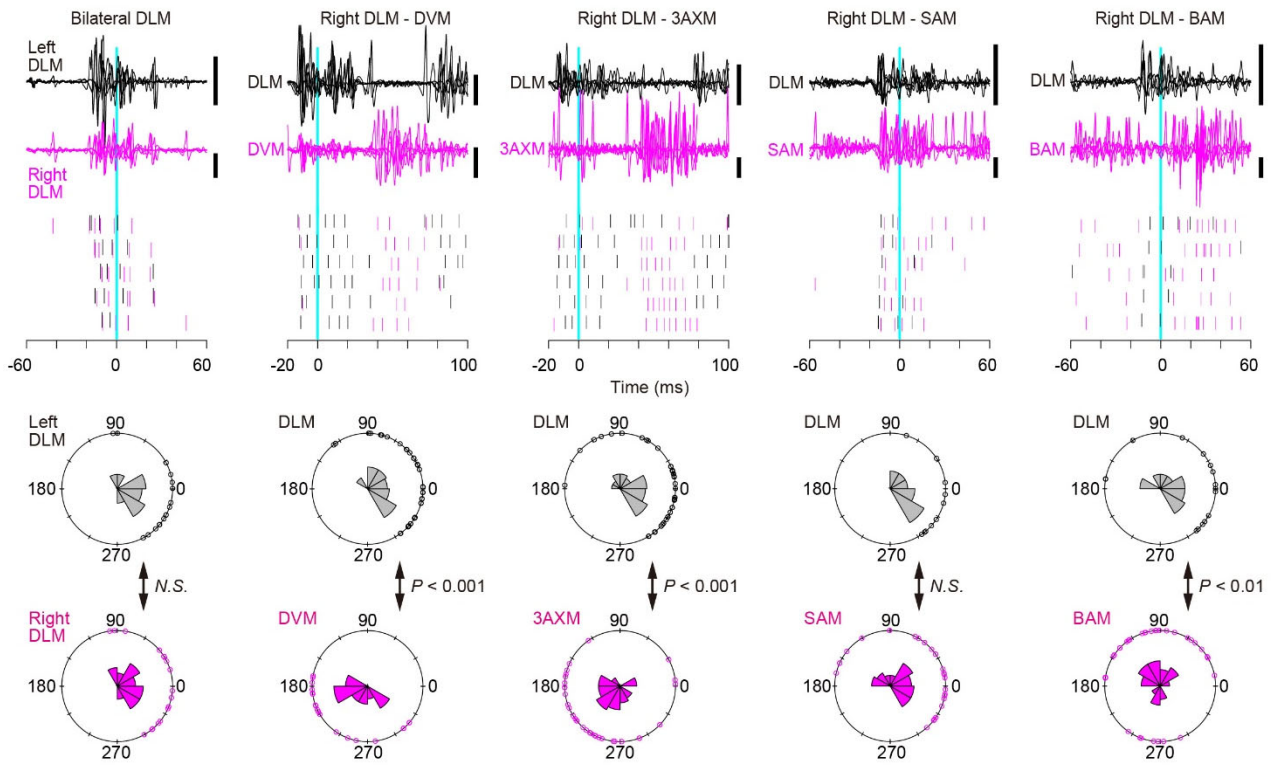
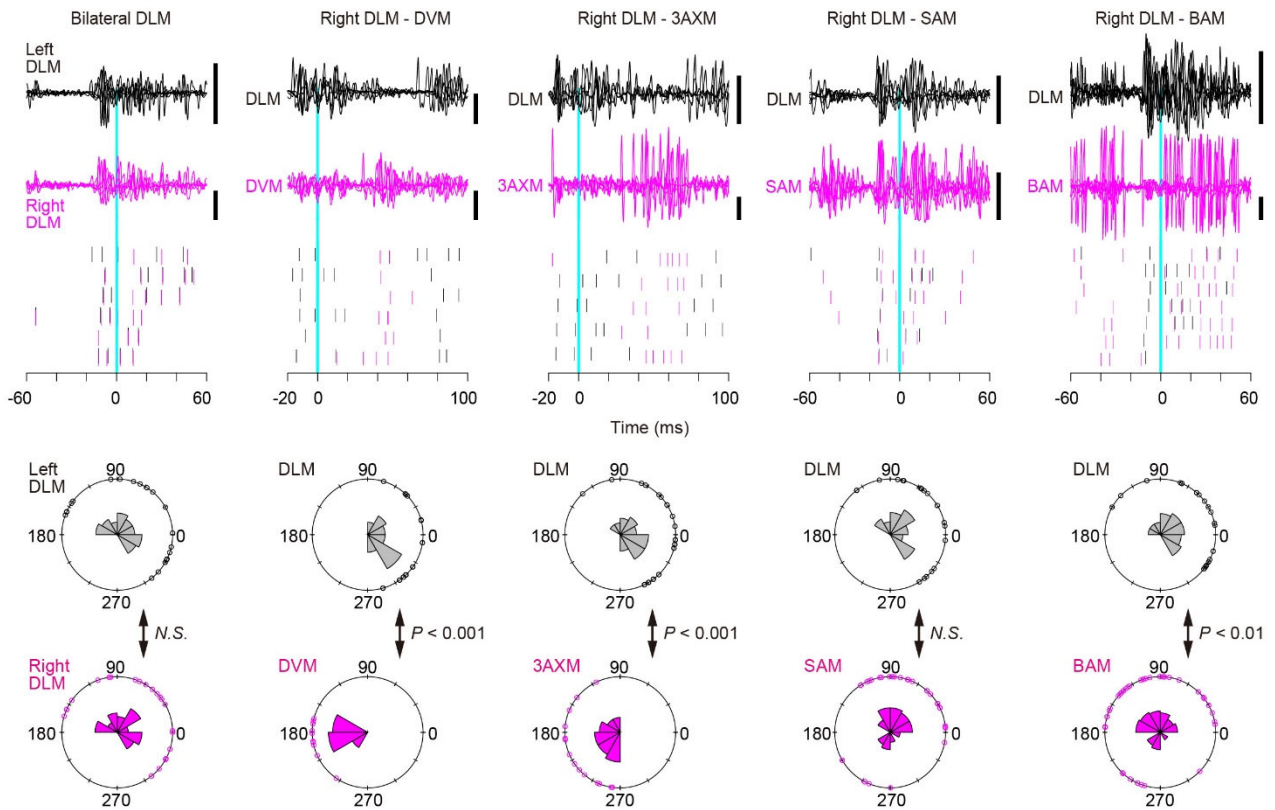


A Butterfly 2



B Butterfly 3



Supplementary Figure S2. EMGs of the five flight muscles during free-flight. Overlaid spike waveforms of EMGs with raster plots of spikes and rose diagrams of activation phases of muscles recorded from two butterflies are shown in **(A)** and **(B)**, respectively. A reference electrode was inserted into the midline of the thorax. All signals were filtered with a bandpass of 100–3000 Hz. EMGs from bilateral DLMs and right DLM (black) and four muscles (DVM, 3AXM, SAM, and BAM; magenta) are displayed. The black and magenta symbols in the raster plots indicate spikes of the upper and lower channels, respectively. The timing of 0 ms indicates dorsal stroke reversal at each wing stroke (vertical cyan bar). Rose diagram indicates the phases of EMG spikes of the corresponding muscle pair. The phase of 0° indicates the dorsal stroke reversal (see symbols of wing positions). The radii of the sectors are equal to the square root of the relative number of spikes in a bin of 30°. Plots on a circle indicate the phase of each spike. The number of strokes of two butterflies (butterfly 2 and butterfly 3) were four and five for the bilateral DLMs, five and five for the DVM, five and four for the 3AXM, five and five for SAM, and four and six for the BAM, respectively. *P*-values of the Watson-Wheeler test are shown. *N.S.*, not significant.