**Visual Timing Sensitivity in a World Class Drum Corps**

**Nestor Matthews1, Leslie Welch2 & Elena Festa2**

1 Department of Psychology, Denison University

2 Cognitive, Linguistic & Psychological Sciences, Brown University

**Introduction:** Recent experiments with a world class drum corps revealed modest but reliable visual speed sensitivity differences between color guard experts and low-brass experts (Matthews et al., 2017). Those experiments evaluated speed sensitivity to radial and rotational motion, which register in the human Medial Superior Temporal region (MST) (Smith et al., 2006; Strong et al., 2017). Here we psychophysically investigated whether these two MST-mediated motion types also generate group-specific differences on another temporal vision task –temporal order judgments (TOJs). One might predict the finest radially- or rotationally-defined TOJs among color guard members, given their expertise in visually rotating flags synchronously or at precisely specified asynchronies. Alternatively, one might predict the finest TOJs among percussionists, who auditorily divide tempos into precisely specified time intervals, e.g., 32nd notes at 180 beats per minute correspond to ~42 msec periods.

**Method:** Twenty-five percussionists, 67 brass players, and 29 color guard from Drum Corps International’s 2016 World Champion “Bluecoats” drum corps viewed bilaterally presented plaids that either radiated or rotated before changing direction asynchronously. Participants indicated whether the direction changed first on the left or right –a temporal order judgment (TOJ). To promote reproducibility, the Open Science Framework (https://osf.io/n7gtj/) contains the complete data set and all software necessary for replicating the study.

**Results:** Percussionists exhibited significantly lower TOJ thresholds than did brass players, who exhibited significantly lower TOJ thresholds than did color guard. Across groups and stimulus conditions, TOJ thresholds spanned an order of magnitude, ranging between 29 milliseconds (percussion; opposite rotational directions) and 290 milliseconds (color guard; opposite radial directions). Additionally, percussionists exhibited significantly faster reactions times than did brass players, who exhibited significantly faster reaction times than did color guard.

**Conclusion:** Visual timing sensitivity may be refined more precisely by percussionists’ auditory training than by color guard’s visual (rotational and radial motion) training.

**Word Count:** 300