

## Measuring a “spot”: a methodological approach to developing and defining dance-specific measures

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Turns of ballet are rooted in complex perceptual and motor skills. Dancers commonly perform pirouettes of one to three rotations, while the most challenging turns, fouettés, can be performed with countless rotations, with grand-scale ballets culminating in the performance of 32 consecutive fouetté turns. Central to such rotation is spotting a dance-specific gaze technique. As the body rotates, the head and gaze remain fixed to one spot. When the fixation can no longer be sustained, the head quickly rotates, overtaking the body to return to the same spot. Although crucial to every turn, there is a lack of scientific insight to why dancers spot or what characterizes a successful spot. In preparation for a study investigating spotting in pirouettes and fouettés of professional dancers in May of 2017, we have analyzed a pilot study with intermediate dancers to find dance-specific measures for spotting and postural stability during rotations about the vertical axis. Sixteen dancers' whole-body motion was measured with a three-dimensional motion capture system (Vicon-T20) as they performed double pirouettes to the right and left sides, and then as many fouettés as possible ( $n=5 \pm 2$ ) on the preferred side. The participants performed the pirouettes and fouettés in the following randomized visual conditions: a dim room with no reference points, with an illuminated dot at eye-level, with a grid of dots, and with four dots in the periphery.

In addressing our main inquiry of the role of spotting, the larger question arises – how do we measure a “spot”? We will present several measures, which allow for the analysis of postural stability and spotting in the highly complex and dynamic whole body movement of pirouettes and fouettés. Furthermore, we will discuss the advantages and disadvantages of each measure that led us to determine our optimal measure. Valid, dance-specific measures are crucial to allow for the comparison and progress of studies in the field of dance science and further, to advance the understanding of the role of spotting in whole body rotations. This research brings novel insights to the methods for quantifying dance technique and ultimately, to improve dance training and technique.