

Balance control in pirouettes – what role does spotting play?

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Rotations around the vertical axis are among the most often-performed dance movements. Especially in ballet, pirouettes take a prominent place in the movement vocabulary. However, evidence on balance control and coordination during pirouettes is scarce. So far, no studies have addressed the influence of the fundamental spotting technique on balance in pirouettes. Therefore, the aim of this presentation is to summarise findings from two different studies on balance control and the coordination of spotting in pirouettes and continuous rotations. Study A tested 24 intermediate ballet dancers for postural stability after turning 14 consecutive rotations either actively or passively on a rotating chair. In both conditions, participants turned once while adopting the spotting technique and once without spotting. Before and after the rotations, Centre-of-Pressure (COP) displacement in quiet stance was measured on a force plate and perception of vertigo after-effect was measured by self-assessment (Keshavarz & Hecht, 2011). Conditions were compared with repeated-measures ANOVA.

Study B was conducted with eight intermediate dancers who performed double pirouettes with and without the spotting technique. Whole-body movement was measured with a three-dimensional motion capture system and COP displacement with a force plate. The following balance measures were calculated: topple angle, instantaneous axis, and displacement of the foot marker. The following spotting measures were calculated: duration of head towards front, and head-trunk dissociation.

Study A showed that balance after turning with the spotting technique was better than turning without spotting ($p=.047$). It thus seems that spotting helps balance control after rotations. In study B, we could show that spotting also helps balance control during rotations (topple angle with spotting is smaller ($M=5.8^\circ$, $SD=1.1^\circ$) than while turning without spotting ($M=7.1^\circ$, $SD=1.2^\circ$; $p>.001$).

Besides discussing the results of our studies in more detail, we will present the advantages and disadvantages of different performance measure in pirouettes. 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 the complex movements of dance, ultimately to improve dance training and technique.

Reference

Keshavarz, B., & Hecht, H. (2011). Validating an efficient method to quantify motion sickness. *Human factors*, 53(4), 415–426.

Kurzbiografie des ersten Autors: Andrea Schärli (PhD in human movement science, MSc in physical education, B.A. in dance) worked as a lecturer for anatomy, dance training, and biomechanics at the Amsterdam University of the Arts and at Trinity Laban in London. Andrea has been a lecturer for dance at the Institute of Sports Science at the University of Bern since 2013. Besides lecturing, she is conducting research in the area of dance science and is leading the MAS programme in Dance Science at the University of Bern.