

Effect of walking surface and late-cueing on turn strategy preferences in older adults.

Dixon PC^{1,2}, Smith T³, Taylor MJD⁴, Jacobs JV², Dennerlein JT^{1,5}, Schiffman JM²

1. Department of Environmental Health, Harvard T.H. Chan School of Public Health. Boston, USA.
2. Liberty Mutual Research Institute for Safety. Hopkinton, USA.
3. Faculty of Education, Health & Wellbeing, University of Wolverhampton, Walsall, UK.
4. School of Sport, Rehabilitation and Exercise Sciences, University of Essex, Colchester, UK
5. Bouvé College of Health Sciences, Northeastern University. Boston, USA.

Introduction: Turning while walking (online turn) accounts for 50% of daily steps [1]. Two biomechanically different turning strategies have been identified: step (turning away from the outside limb) and spin (turning toward the inside limb) [2]. When negotiating an environment, pedestrians often perform turns over irregular surfaces and in response to external stimuli. Understanding strategy preference in older adults may be relevant in the context of falls risk. The aim of this study was to determine how turn strategy preference in healthy older adults during online turns are modified by surface features and cueing time.

Methods: Seventeen healthy older adults (71.5 ± 4.2 years, 67.6 ± 12.6 kg) participated. Ninety degree online turns for two surfaces (flat, uneven) and two cue conditions (pre-planned, late-cue) were captured using a motion capture system. Turning strategy was identified from marker data [3]. Turning bias indices (number of step turns / total number of turns x 100) were computed. A generalised linear (logistic) regression mixed-effects model was used to examine surface features and cueing time. Turn type (step versus spin) was identified as the outcome variable, and surface (uneven versus flat) and condition (pre-planned versus late-cue) as the predictor variables. Odds ratios were calculated for predictor variables.

Results: Turning bias indices are summarized in Figure 1. Step turns were more likely on the flat surface ($p = 0.041$) and in the pre-planned condition ($p < 0.001$). When turning on a flat surface, the odds of performing a step turn are 1.67 times greater than the odds of performing a step turn when walking on an uneven surface. When the condition is pre-planned, the odds of performing a step turn are 2.35 times greater than the odds of performing a step turn when the condition is late-cue.

Discussion: This study revealed differences in turn strategy preference across surfaces and conditions in healthy older adults. Despite the increased fall risk and balance challenge brought by closer foot-to-foot distance [4], spin turns were preferred on uneven surfaces and during late-cue turns. Spin turns may represent a risky, but convenient strategy to rotate the body in challenging situations. Further work is required to determine if older adults select task goal over balance issues and whether selection is based on physiological characteristics of ageing.

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References:

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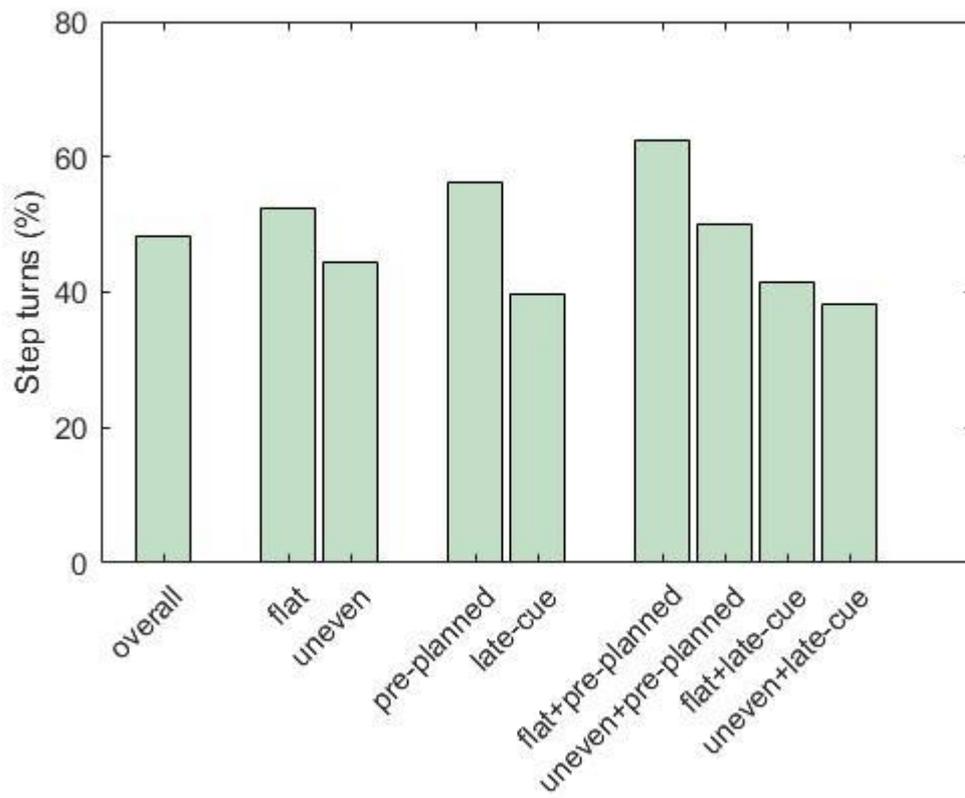


Fig. 1: Turning bias indices.

