

The different ways to get on and off a bicycle for young and old

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ABSTRACT

In the Netherlands, each year 12000 elderly cyclists require medical attention due to a single-cycling accident, a cycling accident where no other party is directly involved [1]. Most of these accidents occur at low cycling velocities and 20% occur during (dis-)mounting the bicycle [2,3]. Little is known about the strategies and corresponding kinematics of (dis-)mounting. This study aims to classify (dis-)mounting strategies of young and older cyclists and compare the strategies in terms of kinematics.

Thirteen young (18-40 years) and 31 elderly (65-82 years) cyclists participated. They were asked to get on the bicycle, cycle normally for about 400 m stop and wait, continue cycling for 400 m and get off the bicycle at a certain point. Bicycle and cyclist motions were recorded with 10 Inertial Measurement Units and by 2 video-cameras. FUSION software (LABVIEW) was used to assess kinematic parameters during the (dis-)mounting period. First, a qualitative analysis of the different methods of (dis-)mounting and 'waiting' was made from the videos. Then differences in kinematic parameters between the different (dis-)mounting categories and age groups were studied.

We identified 2 mounting, 3 dismounting and 2 waiting categories, which each consisted of 2 or 3 sub-types based on timing to get on or off saddle and swing leg through frame or over saddle. The categories can mainly be distinguished by the first foot that is lifted on or off the pedal and elderly cyclists prefer other strategies compared to the young: E.g. during mounting, 70% of the young cyclists lift their inside foot, the foot closest to the bicycle, and place it on the pedal, while 70% of the elderly lift their outside foot and put it on the pedal and start pushing off with their inside foot one or more times. Furthermore, among others, elderly cyclists have a higher cycling velocity when they start dismounting and higher maximum bicycle roll and sway angles compared to the young.

Keywords: cycling kinematics, elderly, getting on or off bicycle, mounting and dismounting

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