May 20th, 12:30 PM

Visually Guided Inter-limb Adaptation During Walking In Children And Adults

Julia T. Choi  
*University of Massachusetts Amherst*

Peter Jensen  
*University of Copenhagen*

Jens Bo Nielsen  
*University of Copenhagen*

Follow this and additional works at: [https://escholarship.umassmed.edu/cts_retreat](https://escholarship.umassmed.edu/cts_retreat)

Part of the [Biomechanics Commons](https://escholarship.umassmed.edu/cts_retreat), [Exercise Physiology Commons](https://escholarship.umassmed.edu/cts_retreat), [Medical Physiology Commons](https://escholarship.umassmed.edu/cts_retreat), and the [Translational Medical Research Commons](https://escholarship.umassmed.edu/cts_retreat).

This work is licensed under a [Creative Commons Attribution-Noncommercial-Share Alike 3.0 License](https://creativecommons.org/licenses/by-nc-sa/3.0/).

Choi, Julia T.; Jensen, Peter; and Nielsen, Jens Bo, “Visually Guided Inter-limb Adaptation During Walking In Children And Adults” (2014). *UMass Center for Clinical and Translational Science Research Retreat*. 30.  
[https://escholarship.umassmed.edu/cts_retreat/2014/posters/30](https://escholarship.umassmed.edu/cts_retreat/2014/posters/30)

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in UMass Center for Clinical and Translational Science Research Retreat by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.
Visually Guided Inter-limb Adaptation During Walking In Children And Adults

Julia T Choi $^{1,2}$, Peter Jensen $^2$, and Jens Bo Nielsen $^2$

$^1$University of Massachusetts, Amherst, MA USA; $^2$University of Copenhagen, Denmark
Email: jtchoi@kin.umass.edu

Voluntary visually guided movements must be constantly adapted to maintain accuracy. Here we applied principles of visuomotor adaptation to drive inter-limb adaptation of joint kinematics during voluntary, visually guided walking. We tested whether step length symmetry could be adapted and stored after training with mismatched visual feedback on two legs.

17 healthy children (9M/8F, 6-15 yrs) and 8 healthy adults (7M/1F, 26±6 yrs) were tested. We created a computer task where subjects modified step length trial-by-trial to hit virtual targets while walking on a treadmill. The relationship between screen-space and treadmill-space was defined by a visuomotor gain for each leg. Each test consisted of a baseline period (same gain on both legs), an adaptation period (one high gain, one low gain) and a post-adaptation period (same gain). The ‘fast leg’ and ‘slow leg’ refers to the leg adapted with the higher and lower gain, respectively. During the adaptation period, the leg adapted with the higher gain appeared to move fast, and the other leg appeared to move slowly on display.

All healthy children and adults tested could rescale step length to maintain endpoint accuracy during visually guided walking. Step length gradually became more asymmetric during adaptation. The fast leg shortened step length (to correct overshoot), and the slow leg lengthened step length (to correct undershoot). In the post-adaptation period, step length asymmetry persisted (after-effect) despite the fact that the gains have returned to normal. The presence of an after-effect indicates storage of a new inter-limb visuomotor calibration. The after-effect was partially washed out after one minute of post-adaptation walking.

This study suggests that visually guided inter-limb adaptation can alter step length, a major determinant of gait stability and energetic costs. This may open up new opportunities to correct abnormal, asymmetric walking patterns in children and adults with neurological damage.