

## Author's Accepted Manuscript

Overcoming the limitations of the Harmonic Ratio  
for the reliable assessment of gait symmetry

Ilaria Pasciuto, Elena Bergamini, Marco Iosa,  
Giuseppe Vannozzi, Aurelio Cappozzo



PII: S0021-9290(17)30006-4  
DOI: <http://dx.doi.org/10.1016/j.jbiomech.2017.01.005>  
Reference: BM8077

To appear in: *Journal of Biomechanics*  
Accepted date: 2 January 2017

Cite this article as: Ilaria Pasciuto, Elena Bergamini, Marco Iosa, Giuseppe Vannozzi and Aurelio Cappozzo, Overcoming the limitations of the Harmonic Ratio for the reliable assessment of gait symmetry, *Journal of Biomechanics* <http://dx.doi.org/10.1016/j.jbiomech.2017.01.005>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Overcoming the limitations of the Harmonic Ratio for the reliable assessment of gait symmetry

Ilaria Pasciuto<sup>1</sup>, Elena Bergamini<sup>1</sup>, Marco Iosa<sup>2</sup>, Giuseppe Vannozzi<sup>1</sup>, Aurelio Cappozzo<sup>1</sup>

<sup>1</sup>Interuniversity Centre of Bioengineering of the Human Neuromusculoskeletal System (BOHNES), Department of Movement, Human and Health Sciences, University of Rome “Foro Italico”, Rome, Italy

<sup>2</sup>Santa Lucia Foundation, IRCCS, Rome, Italy

\*Corresponding author: Giuseppe Vannozzi, Interuniversity Centre of Bioengineering of the Human Neuromusculoskeletal System, University of Rome “Foro Italico” Piazza Lauro de Bosis 15, 00135 Rome – Italy. Tel.: +39 06 36733 522; fax : +39 06 36733 517. giuseppe.vannozzi@uniroma4.it

## Abstract

The Harmonic Ratio (HR) is an index based on the spectral analysis of lower trunk accelerations that is commonly used to assess the quality of gait. However, it presents several issues concerning reliability and interpretability. As a consequence, the literature provides very different values albeit corresponding to the same populations. In the present work, an improved harmonic ratio (iHR) was defined, relating the power of the intrinsic harmonics (i.e. associated with the symmetric component of gait) to the total power of the signal for each stride, leading to a normalised index ranging from 0 to 100%. The effect of the considered number of harmonics and strides on the estimate of both HR and iHR was assessed. The gait of three groups of volunteers was investigated: young healthy adults, elderly women and male trans-femoral amputees. Both HR and iHR were able to discriminate gait deviations from the gait of young healthy adults. Moreover, iHR proved to be

Download English Version:

<https://daneshyari.com/en/article/5032195>

Download Persian Version:

<https://daneshyari.com/article/5032195>

[Daneshyari.com](https://daneshyari.com)