

Publication**First trial postural reactions to unexpected balance disturbances : a comparison with the acoustic startle reaction****JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)****ID** 1194417**Author(s)** Oude Nijhuis, Lars B; Allum, John H J; Valls-Solé, Josep; Overeem, Sebastiaan; Bloem, Bastiaan R**Author(s) at UniBasel** [Allum, John H.J.](#) ;**Year** 2010**Title** First trial postural reactions to unexpected balance disturbances : a comparison with the acoustic startle reaction**Journal** Journal of neurophysiology**Volume** 104**Number** 5**Pages / Article-Number** 2704-12

Unexpected support-surface movements delivered during stance elicit "first trial" postural reactions, which are larger and cause greater instability compared with habituated responses. The nature of this first trial reaction remains unknown. We hypothesized that first trial postural reactions consist of a generalized startle reaction, with a similar muscle synergy as the acoustic startle response, combined with an automatic postural reaction. Therefore we compared acoustic startle responses to first trial postural reactions. Eight healthy subjects stood on a support surface that unexpectedly rotated backwards 10 times, followed by 10 startling acoustic stimuli, or vice versa. Outcome measures included full body kinematics and surface EMG from muscles involved in startle reactions or postural control. Postural perturbations and startling acoustic stimuli both elicited a clear first trial reaction, as reflected by larger kinematic and EMG responses. The ensuing habituation rate to repeated identical stimuli was comparable for neck and trunk muscles in both conditions. Onset latencies in neck muscles occurred significantly later for first trial perturbations compared with startle responses, but earlier in trunk muscles. Our results show that platform tilting initially induces reactions larger than needed to maintain equilibrium. For neck and trunk muscles, these first trial postural reactions resembled acoustic startle reflexes. First trial postural reactions may be triggered by interaction of afferent volleys formed by somatosensory and vestibular inputs. Acoustic startle reactions may also be partially triggered by vestibular inputs. Similar muscle activation driven by vestibular inputs may be the common element of first trial postural responses and acoustic startle reactions.

Publisher American Physiological Society**ISSN/ISBN** 0022-3077**edoc-URL** <http://edoc.unibas.ch/dok/A6004635>**Full Text on edoc** No;**Digital Object Identifier DOI** 10.1152/jn.01080.2009**PubMed ID** <http://www.ncbi.nlm.nih.gov/pubmed/20810688>**Document type (ISI)** Journal Article