When a robot teaches humans: Automated feedback selection accelerates motor learning

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 4508448
Author(s) Rauter, Georg; Gerig, Nicolas; Sigrist, Roland; Riener, Robert; Wolf, Peter
Author(s) at UniBasel Rauter, Georg ; Gerig, Nicolas ;
Year 2019
Title When a robot teaches humans: Automated feedback selection accelerates motor learning
Journal Science robotics
Volume 4
Number 27
Pages / **Article-Number** eaav1560
Mesh terms Science & TechnologyTechnologyRoboticsRobotics
A multitude of robotic systems have been developed to foster motor learning. Some of these robotic systems featured augmented visual or haptic feedback, which was automatically adjusted to the trainee's performance. However, selecting the type of feedback to achieve the training goal usually remained up to a human trainer. We automated this feedback selection within a robotic rowing simulator: Four spatial errors and one velocity error were considered, all related to trunk-arm sweep rowing set as the training goal to be learned. In an alternating sequence of assessments without augmented feedback and training sessions with augmented, concurrent feedback, the experimental group received feedback, thus addressing the main shortcoming of the previous assessment. With this approach, each participant of the experimental group received an individual sequence of 10 training sessions with feedback. The training sequences from participants in the experimental group were consecutively applied for participants in the control group. Both groups were able to reduce spatial and velocity errors due to training. The learning rate of the requested velocity profile was significantly higher for the experimental group compared with the control group. Thus, our robotic rowing simulator accelerated motor learning by automated feedback selection. This demonstration of a working, closed-loop selection of types of feedback, i.e., training conditions, could serve as the basis for other robotic trainers incorporating further human expertise and artificial intelligence.
Publisher American Association for the Advancement of Science
ISSN/ISBN 2470-9476
URL https://robotics.sciencemag.org/content/4/27/eaav1560
edoc-URL https://edoc.unibas.ch/71085/
Full Text on edoc No;
Digital Object Identifier DOI 10.1126/scirobotics.aav1560
ISI-Number 000461061800003
Document type (ISI) Article