Elucidating neuromusculoskeletal mechanisms underlying gait deviations in children with cerebral palsy

Veerkamp, Kirsten

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Cerebral palsy (CP) is a common disorder that results in neural, muscular, and skeletal impairments. These impairments cause walking limitations, but the precise relationships are complex, making treatment selection challenging. Novel predictive neuromusculoskeletal simulations can be used to better understand how such impairments affect walking. However, common approaches lack personalisation and validation. Therefore, our aim was to personalise and validate neuromusculoskeletal simulations of walking for CP.

Methods were developed to further personalise the model's geometry, musculotendon behaviour and neural control. These methods were shown to be very relevant for children with CP. Furthermore, after developing simulations predicting healthy walking, the effects of specific impairments were evaluated. These included calf muscle weakness, calf muscle shortening, and spasticity of various muscles. These personalised simulations were successfully validated with pathology-specific experimental data. Next steps will focus on the modelling of interventions, to enable further optimisation of treatment for children with CP, aiming for better walking.

Amsterdam Movement Sciences

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Amsterdam Movement Sciences conducts scientific research to optimize physical performance in health and disease based on a fundamental understanding of human movement in order to contribute to the fulfillment of a meaningful life.

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Kirsten Veerkamp

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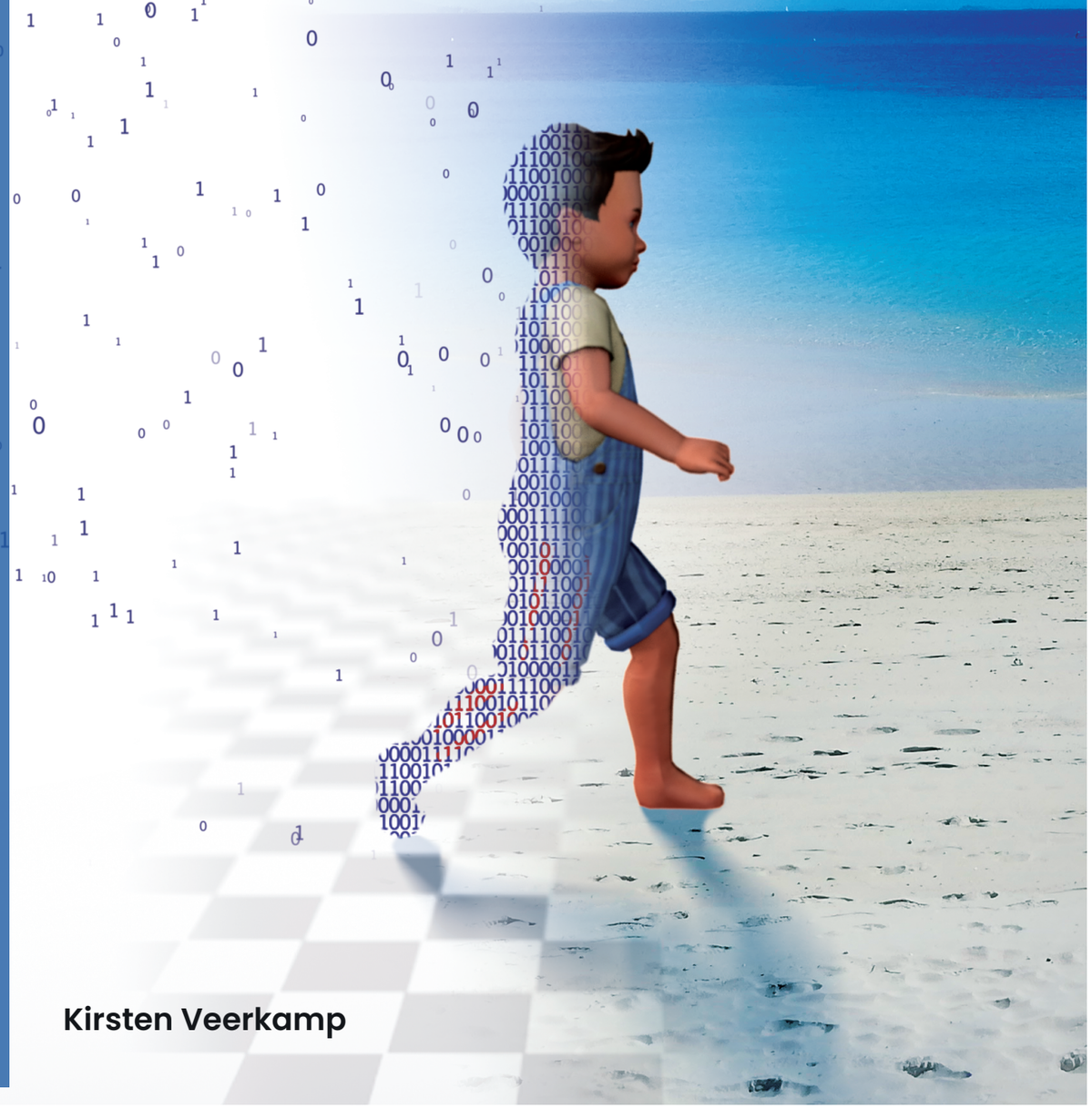
The power of computer simulations



Kirsten Veerkamp