11.5 Optical Measurements of Psychomotor Interventions on Dysfunctional Knee Cycle: A Case Study.

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PAPER SUMMARY

In this paper we will describe a non-invasive optical system for a detailed analysis of the gait cycle and precise assessment of the impact of mental rehearsal interventions. It will be presented a case study related to the correction of a dysfunctional knee cycle.

This system is based on a personal desktop computer with dedicated software, a video camera and a video board. A schematic diagram of this system is shown on Figure 1. The system [1] was developed by a interdisciplinary team and tested in a unit of physical medicine and rehabilitation.

The results obtained for participants with normal gait cycle, Figure 2 - Series 1, are in agreement with the standard values described by Whittle [2].

The subject considered in this study was a young female put through a series of active mental rehearsal interventions, after surgical intervention for bilateral arthrodesis (calcaneous stop). As it can be seen in Figure 2 - Series 2, there was a small hyperextension in the heel contact phase and a delay in the beginning of the knee flexion at the toe off phase. It was also noted a loss of harmony in the swing phase of the cycle due to an abrupt transition between the flexion and extension of the knee as well as a reduction in the flexion amplitude. As shown in Figure 2 - Series 3 and 4, there was a real approximation to the standard values during the rehabilitation process.

This study shows a potential use of optical technologies in medical diagnostic and functional rehabilitation. The advantages of this system when compared with the traditional direct motion measurements systems, are the accuracy of the measurements, the non-interference with the patient gait performance and the friendliness of the measurement process.

REFERENCES

[1]- A. N. Pinto, J. Alvoeiro, J. L. Pinto, "A Simplified Optical Computerized System for Gait Analysis and Rehabilitation", (to be published) (1995).
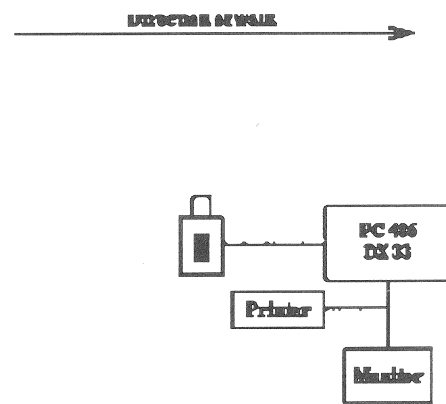*[2]-M. Whittle, "Gait analysis: An Introduction", Oxford: Butterworth-Heinemann (1991)*

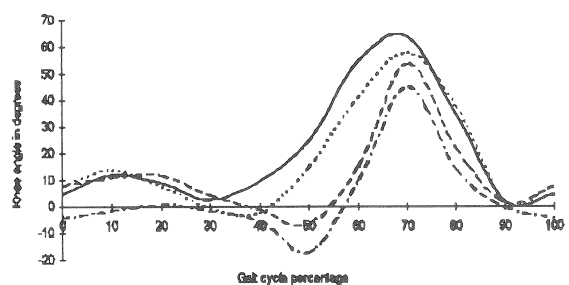Figure 1: *Schematic diagram of the gait analysis system*

Figure 2: *Knee angles during a single gait cycle. Series 1: standard gait cycle; Series 2: gait cycle of the patient; Series 3 and 4: gait cycles*