Title: Cybernetic-training for sports skill learning.

Abstract:
Explicit instruction by verbal communication for sports skill coaching is the conventional method. But this method does not guarantee that the learner can physically execute the skill. If the learner doesn't understand how to move in accordance with the instruction, this instruction leads to confusion rather than enhancement. In contrast, implicit learning contains no formal instruction about how to perform the skill. We developed a training aid system for the hammer throw to have effective training using implicit coaching. In this system we put a miniaturized sensor module on the hammer wire and this measured information was transmitted by a wireless system and given as auditory feedback through a controller. This is one kind of monitoring system, which detects and gives the information that human cannot sense and it works as "sixth sense". To be effectively used in hammer throw training, we analyzed the hammer movement using mathematical analysis based on parametrically excited oscillation and clarified the acceleration mechanism of hammer and applied this principle to the bio-feedback training system. We would like to put the scientific instruction behind this controller. In this short presentation, I will present the mathematical analysis and application for hammer training aid system using auditory feedback as the Cybernetic-training.