In Shotokan karate, the performance of most techniques is made with flexed lower limbs. Consequently, the movement lowers the Center of Mass (COM) that should remain at the same level during all the performance. In the current study, COM movements were analyzed during the performance of a sequence of different karate techniques.

Two 5th, one 4th and one 2nd dan black belt male karateka were filmed while performing a sequence of techniques: two forward attacks (*oi-tsuki, gyaku-tsuki*), one backward blocking technique (*uchi-uke*) with two backward punches (*kizami-tsuki, gyaku-tsuki*), a forward kick (*tsugi-ashi mae-ashi mawashi-geri*) followed by a punch (*gyaku-tsuki*). Each karateka repeated this sequence ten times. On each karateka, the 3D coordinates of 13 body landmarks (nasion; right and left: lateral malleolus, fibular head, greater trochanter, acromion, olecranon, styloid process of the radio) were recorded by an optoelectronic motion analyzer, and a 3D reconstruction of the movement was performed. Using anthropometric data and biomechanical calculations (Manarini Merri, 1999; NASA), COM position was estimated on each karateka. Data were filtered, interpolated and normalized to standing height, and COM variations on the vertical plane during the sequence of karate techniques were calculated relative to the starting position (*zenkutsu-dachi, ghedanbarai*). Moreover, the velocity and the length's movement of COM were calculated.

COM variations resulted homogeneous (coefficients of variation between 17 and 24%), and ranged from 14 to 20% of the subject's height. During the execution of *gyaku-tsuki*, the COM reached its minimum height relative to the starting position, ranging from 0.1% (M3, 4° Dan) to 2.5% (M1, 5° Dan) of standing height. During the execution of the kick technique (*mawashi-geri*), COM raised from 11% (M1) to 16% (M4, 2° Dan) relative to starting position. In conclusion, the system permitted to measure COM variations during the execution of basic karate techniques. The method could support masters and coaches in finding out those movements that need to be mostly improved.

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Mental inducement of cognitive and motor tasks in a multiple-sender multiple-receiver design

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Introduction

Mental inducement between two human beings has been widely explored in psychological tasks, like card guessing, mind-machine interaction, etc. (e.g., Honorton

1985). The aim of the available study was to develop an automated procedure testing mental inducement between two subjects in cognitive *and* motor tasks to explore a feasible advantage in sports application. In addition, characteristics for positive inducement shall be extracted indicating if special coach-athlete relationships could benefit mental inducement.

Methods

17 voluntary female sender-receiver pairs participated in the study. In sum, 30 experimental series were absolved. Subjects were placed in separated rooms excluding sensory transmission between them after completing a questionnaire concerning their relationship. Receivers absolved two tasks including colour-guessing and a coordinative motor task which was arranged as 2-factorial design (1. 'Sending' and 2. 'Receiver's expectation of Sending'). Receivers got procedural information by head-phones and additional notification if the sender will influence him (or her) by mental transmission or not. Note, 'placebo-conditions' were attached meaning that receivers were 'blind' to the real condition. The procedure was accomplished automatically by LabVIEW 7.1 randomising the conditions of the motor tasks, the sequence of the repetitions in one task and the recreation time between the repetitions after being started by a 'blind' experiment leader. 'External' (goniometer-time-series) and 'internal' (EMG) parameters were analysed. According to Winer (1971) data was analysed by a three-way variance analysis (Subject * Sending * Receiver's expectation of Sending) including repeated measures on the last two factors. Significance level was set to $p < 0.05$.

Results and Conclusion

Colour-guessing results could not confirm previous studies which describe direct hit rates of 33% while 25% (e.g., Honorton 1985) means chance expectation. Concerning the motor task, goniometer parameters showed a significant main effect on 'Receiver's expectation' and a significant interaction between 'Receiver's expectation' and 'Subject'. In contrast, the area of EMG rectification showed a significant main effect on 'Sending'. This shows that the distinction between internal and external parameters may be important. In addition, 'friendship' has influence on the factor 'Sending' and the interaction between 'Sending' and 'Receiver's expectation' while 'success in colour-guessing' has not.

Further research is needed to consider the replicability and to include coach-athlete-relationships as sender-receiver pairs.

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Effects of spatial and temporal constraints on the dynamics of rhythmical aiming

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