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MOVEMENT IN ULTRA SLOW MOTION, A MARK FOR
MENTAL TONE

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Abstract

Introduction: Simple tests require the participants, at the first attempts, to systematically see themselves, to see their value, with or without awareness of this. With different tests, different particularities can be highlighted in complex evaluations for work expertise, coordination abilities, stress tolerance, motor performance. Based on preliminary studies, the movement in ultra slow motion (USM) is a predictor of one's ability to dedicate to the outside world, as a premise for reaching the state of "being into the zone". Purpose: A more detailed analysis of the correlations between USM, anaerobic-alactacid phase, anaerobic-lactacid phase and the clear perception of reality, the good ability to dedicate to the world, the clarity and stability in forming personal judgments and making one's decisions, the commitment and responsibility in personal life (Existential Scale, ESK). Material and method: Two groups of volunteers (N1=10, N2=10) were selected from a sample of 74 subjects (N01=50, N02=24) and evaluated in order to make a comparison between the characteristics of mental tone, dominated by balance and maturity, on the one hand (N1), and those of motor performance, dominated by performance in sports, on the other hand (N2). Results: All 20 volunteers participated in a psychological evaluation with KinectX Pro (testing under USM conditions), with anaerobic alactacid and lactacid stress, without previous USM or other similar training. Conclusions: The conducted study confirms the preliminary research hypothesis and supports new correlations between mental component and precision in motor coordination for the studied subgroups.

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Keywords: Ultra slow motion, precision in coordination.



1. Introduction

Performing a test in different forms, no matter how simple it would be, triggers at the first attempt, by its component of novelty, of unknown and starting from one's motivation, a series of psychosomatic manifestations, a primary emotion and a primary impulse (Längle, 2003). All the more, a competition, which also has an impact on the image of one's value in the eyes of others and the own eyes (a phenomenon of which the person is aware or not), gives birth to this primary emotion. Emotions are born and always have a value (Längle, 2000). We cannot stop them from being born. All we can do is to learn their value and manage the situation as such. The psycho-physiological stress response prior to and during competition can affect the performance outcome (De Pero et al., 2016). Emotions regulate the excitability of sensory systems and allow coping with the situation (Domanguez-Borra et al., 2017). Ignoring them, not being aware of them may lead to transitory or persistent mental blocks, to wasting one's potential. For sports performance, this differentiation and understanding of emotions is an opportunity used by elite athletes, who may have a reduced sensitivity, reactivity to unpleasant stimuli and effective adaptation to the task (Costanzo et al., 2017). Fear in competition may have a negative impact on performance (Judge et al., 2016). The pressure, stress and the way of managing it (actually, managing various fears) during competition are frequently influenced by important people around (Kerdijk, van der Kamp, & Polman 2016), such as teammates, family, friends.

Fine, precise motor coordination is most likely to reveal the fear of not making mistakes, not doing wrong something that is important for the subject. According to preliminary studies, the movement in ultra slow motion (USM) is an indicator of inner emotional balance, and secondary, of the ability to dedicate to the world, to engage in the world, as a premise for reaching the state of "being into the zone" (Rădescu, Teodorescu, & Urzeală, 2016). The evaluation of motor coordination in ultra slow conditions seems to capture these complex aspects of the psychomotor dynamics.

With these premises in the foreground, a precise and detailed follow-up of correlations between the movement in ultra slow motion (USM), under anaerobic alactacid and lactacid conditions, and the clear perception of one's emotionality and reality, the dedication to the outside world, the clarity and stability in making personal decisions, the commitment and responsibility in personal life (issues followed by the Existential Scale, ESK) for target groups selected on the basis of mental aspects, could provide conclusive data for guiding the psychological training of performance athletes, with a clear focus on the recognition and enhancement of their emotional, affective-sentimental component. Secondary, a question remains: can the improvement of precision in motor coordination and its persistence, achieved using the ultra slow motion intelligent training (USMIT) (Rădescu, Teodorescu, & Băbălău, 2017), be correlated, on the mental plane, with a decrease in impulsivity and a better management of one's own affectivity?

2. Problem Statement

Simple tests require the participants, at the first attempts, to systematically see themselves, to see their value, with or without awareness of this. With different tests, different particularities can be highlighted in complex evaluations for work expertise, coordination abilities, stress tolerance, motor

performance. Behind these differences, apart from those related to individual motor abilities, there is the emotional component, usually the fear and the way of managing it. Based on preliminary studies, we can state that the movement in ultra slow motion (USM) is a predictor for one's ability to dedicate to the outside world, as a premise for reaching state of "being into the zone". Ultra slow motion (USM) can provide a clear, objective evaluation of the psychological component involved in motor expression.

3. Research Questions

Admitting that a psychotherapist is a person with well-trained mental abilities and an athlete is a person with well-trained motor abilities, and taking into account that in persistent, repetitive demands the motor coordination centre gets tired first and only then the peripheral neuromotor component (Tergau et al., 2000), the question that arises is which of these two typologies can achieve higher precision in motor coordination, a test performed using the KinectX Pro system.

4. Purpose of the Study

A more detailed analysis of the correlations between USM, anaerobic-alactacid phase, anaerobic-lactacid phase and the clear perception of reality, the good ability to dedicate to the world, the clarity and stability in forming personal judgments and making one's decisions, the commitment and responsibility in personal life (Existential Scale, ESK).

5. Research Methods

5.1. Procedures

Framing the UMS testing. Classification

We used a classification system describing ultra slow motions (USM) as motions performed with a speed of 5-20 mm/s and correlated with a multiple-rhythm breathing/motion (Rădescu, Teodorescu, & Urzeală, 2016). Variations in the classification, with the definition of ultra slow motions (USM) as motions performed with a speed of 10-25 mm/s, were taken into consideration (Rădescu et al., 2016), and establishing a classification with target speeds of 10-20 mm/s was thought to be the most appropriate.

Characteristics of the Cartesian motion evaluation using the KinectX Pro system

The KinectX Pro system involves the motion analysis for the intervals $\Delta t_1=0-15s$, $\Delta t_2=21-50s$, $\Delta t_3=0-50s$ and an interval $\Delta t=0.11\pm 2s$ to calculate average speed in the mode. The established error correction involves the removal of outliers or extreme values (10% of total determinations per motion). Taking into account the evolution of data homogeneity during training, as measured by the USMIT system (Rădescu, Teodorescu, & Băbălău, 2017), the lack of this type of training for the tested subjects and the outcomes of previous studies (Rădescu et al., 2016), it was established the median quartile for average speed values in the mode, as an indicator of coordination precision.

General testing algorithm. It was established together with the General Data Questionnaire (GDQ). The participants' free, subjective appraisal regarding the evaluation system was tracked using both the KinectX Pro system and assessment scales.

Subject selection

The general sample was aimed at subjects with a high educational level (university studies) and was divided into two significant subgroups, one for highly trained mental balance and the other for highly trained motor abilities. Subject participation was done on a voluntary basis, according to the declaration of Helsinki (WHO, 2011).

5.2. Participants and evaluation

Participants

The general sample (GS) included a group of 74 subjects with a different sporting history (athletics, tennis, fencing, football, martial arts, swimming, dancesport, artistic gymnastics, mountaineering, leisure sports, volleyball, handball, former athletes, non-athletes), aged between 23 and 66 years (32.3 ± 9.7), master students at UNEFS Bucharest (MG, N=24) and certified psychotherapists with training in existential analytical psychotherapy (PG, N=50).

From the group of master students (MG), a subgroup (MG10) of 10 subjects aged 23-36 years (26.5 ± 4.1), with a different sporting history (athletics, tennis, fencing, football, martial arts, swimming, dancesport, artistic gymnastics, mountaineering, leisure sports), a resting pulse within normal limits (68.24 ± 15.83) and various competitive results, were selected based on the best results achieved at the evaluation of coordination precision (KinectX Pro 1.0).

From the group of psychotherapists (PG), a subgroup (PG10) of 10 subjects aged 32-66 years (40.7 ± 9.8) were selected relying on the maximum number of individual personal development hours (minimum 50 hours) and group personal development hours (over 245 hours), and their access to professional training based on an existential attitude model validated through the international recognition of trainers (certified by GLE International, Vienna).

General evaluation (GE). The program for selecting the target group (TG, N=74) was organized in two stages. The first stage (September 2016) aimed to select a subgroup of psychotherapists relying on the maximum number of individual and group personal development hours, and their access to professional training based on a model of strengthened attitude-feelings, finally arriving at PG10 (N=10) out of a target group made up of 50 subjects (the maximum number of psychotherapists with existential analytical training certified in Romania, at the time of evaluation). The second stage was organized in two sessions, between April 2016 and October 2016. A session was organized for the group of psychotherapists (ST1) and a testing session was organized for the students admitted to the Sports performance master program in September 2015, students in the 2nd year (ST2). The tests for both groups were conducted between 14h00 and 15h00, on Fridays. The General Data Questionnaire (GDQ), the Existential Scale (ESK; Orgler, 2000) and the Well-Being Scale (WBS) (Roșeanu & Rășcanu, 2008) were used for all participants.

Evaluation of coordination precision (ECP). It was conducted in two stages, as a continuation of ST1 and ST2, between 15h00 and 16h00, using the same algorithm for the presentation of testing and the testing itself. Evaluation was focused on the subjects' ability to perform an ultra slow action of the arms, their stretching forward and upward (from the position described above) with a constant speed, with a range of motion of 30 ± 5 cm, tracking the palm oscillations, followed by a downward motion to regain

initial position, with visual aid and computerized feedback, for the intervals: I1 (0-15s), I2 (21-50s) and I3 (0-50s) from the testing duration of 1 minute.

6. Findings

6.1. General evaluation and evaluation of coordination precision (GE, ECP, N=20)

Results from the evaluation of the psychological component (ESK) showed statistically significant differences between the two groups (MG and PG) for three ESK parameters: ESK-SD (27.19±6.45 vs. 31.94±6.09, $p=0.020$), ESKST (58.94±8.52 vs. 63.56±3.16, $p=0.027$), ESKSF (43.81±4.89 vs. 44.13±5.69), ESKR (54.06±9.93 vs. 55.88±7.50), ESKScP (86.13±12.62 vs. 95.50±7.63, $p=0.0087$), ESKScE (97.88±13.92 vs. 100.00±12.68), ESKScG (184.00±23.54 vs. 195.50±18.65), highlighting a better self-distancing ability, a richer emotional inner world and greater openness to the world.

Average values for all ESK parameters, in the case of MG, were below the average scores obtained in the calibration with the Romanian population, important differences being noted for ESKSD (27.19 vs. 35.5), ESKST (58.94 vs. 73) and ESKScP (86.13 vs. 109). The achieved results indicated low ability to self-distance (to see oneself) in a situation and low commitment, openness to the world, but also an unexplored potential for performance.

Results from the evaluation of coordination precision (ECP) confirmed the outcomes of previous studies (Rădescu et al., 2016). A first general result showed that none of the assessed subjects ($GS=20$) succeeded in achieving a harmonious continuous motion with a constant speed of 10mm/s even for the shortest time interval (precision in the analysis of spatial position for Kinect 2.0 is 1 mm, at a distance of 1.5±0.5 m).

Regarding the flow of motion, although in the group of athletes none of the subjects managed to perform a homogeneous motion either with the right or left hand, in the group of psychotherapists two people managed to achieve homogeneous motions ($CV<0.35$) with both the right and left hands, for the anaerobic-alactacid ($\Delta t=0-15s$) and anaerobic-lactacid ($\Delta t=20-50s$) effort zones. The two results are close to the best results achieved following the USMIT training (Rădescu, Teodorescu, & Băbălău, 2017): CVR: 0.19 vs. 0.20, CVL: 0.23 vs. 0.15 for the anaerobic-alactacid interval, and considerably different for the anaerobic-lactacid interval: CVR: 0.28 vs. 0.20, CVL: 0.27 vs. 0.02.

Results from testing the ability to perform an ultra slow motion with a constant speed, after analysing the average speed of median quartile in the mode ($\Delta t=0.11s$) for the left and right hands (MQL and MQR), indicate a statistically significant difference between the two groups, MG10 and PG10 (MQL: 6.18±2.35 vs. 5.35±1.77, $p=0.014$, MQR: 5.83±1.87 vs. 5.25±1.79, $p=0.028$) for the anaerobic-alactacid spectrum ($\Delta t=0-15s$). Although without significant differences between the two groups for the anaerobic-lactacid interval (MQL: 6.65±2.17 vs. 5.85±1.90, MQR: 6.70±1.83 vs. 5.95±2.04), general evaluation for the interval $\Delta t=0-50s$ maintains a statistically significant difference for the left hand (MQL: 6.75±2.17 vs. 5.65±1.74, $p=0.046$, MQR: 6.60±1.91 vs. 5.80±1.78).

The difficulty of this evaluation was again highlighted for all subjects participating in the ECP by their inability to perform the proposed task, confirming thus the previous results (Rădescu, Teodorescu, & Urzeală, 2016).

6.2. Discussion

1. Phenomenological observations made during the tests were confirmed by processing the obtained data with the KinectX Pro evaluation system, which can be considered a valid instrument for measuring precision in motor coordination.

2. Evaluation of precision in motor coordination for the interval 0-15s in ultra slow conditions, using the KinectX Pro Cartesian system, can be investigated as an indicator for the psychological ability of managing the primary emotions and primary impulse. A secondary research direction can reinforce these preliminary observations.

3. Mental balance and a better knowledge, understanding and management of one's own emotionality allow performing precision tasks with higher efficiency.

4. Given the mental ability of finite processing (Kunkel et al., 2014) of the central nervous system, good training of the mental component is a way of facilitating better precision in motor coordination, possibly through better resistance to the motor cortex fatigue syndrome (Tergau et al., 2000).

5. The Existential Scale (ESK), an instrument to assess personal meaning in life and fulfilment (Längle, Orgler, & Kundi, 2003), the KinectX Pro Cartesian motion analysis system and the ultra slow motions (USM) prove to be valid means for measuring different aspects of the complex phenomenon of coordination precision and open the way to multi-axial (psychomotor) research on this fundamental issue, particularly in sports games (tennis, volleyball, basketball, billiards, football, etc.).

7. Conclusion

A better knowledge, understanding and management of one's own emotionality, as well as a balanced and mature mental tone, are predictive factors for achieving higher precision in coordination and reaching in a shorter time the state of "being into the zone", the "tunnel state" (Bennett, 2004), as a determinant of performance.

The obtained results confirm once again the impact of the mental (temperamental or impulsive) component on the coordination precision during an anaerobic-alactacid effort ("start emotions").

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