The Contribution of Biomechanics and of Tai Chi Exercises to the Psychological and Development of Training Actors

Ana-Cristina Lese

"The “George Enescu” Arts University, Iasi, Romania

Abstract

This paper centres on the practical and theoretical exploration of the training actor’s psychological and physical instruments by using the innovative revolutionary expressive methods in biomechanics established by Vsevolod Meyerhold, one of the greatest directors and actors of the 20th century, in his drama school, as well as by practising Tai Chi, a discipline which is less well known in Romania; this latter method has become a compulsory subject in the curriculum of the drama school at the “George Enescu” University of Arts of Iași beginning with the academic year 2012 – 2013.

By using the above mentioned methods, now practised by the training actors who are students at the Drama School in Iași, a unique approach to the actor’s qualities is sought for: coordination, balance, calm, focus, tenacity, good time-management, self control, the accuracy of movement.

The paper consists of an introductory part presenting important theoretical elements pertaining to the two areas: Biomechanics and Tai Chi; an applied part where the methods and means used in the actors’ training for the purpose of this paper are presented; a section containing data analysis and a final part on conclusions.

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Keywords: psychological and physical training; actor; biomechanics; Tai Chi

* Corresponding author. Tel.: 0744865428
E-mail address: analese2000@yahoo.com
1. Working hypothesis

The exercises in biomechanics for drama schools and the Tai Chi practice can influence considerably the psychological and motor potential of the training actors, maximizing it and consequently improving the quality of professional performance.

The topic under applied research; we attempt at providing practical elements that can be integrated in the students’ training routine in order to enhance their professional performance.

In the present paper we have employed:

A. General research methods: 1. the historic method; 2. the mathematical method; 3. the observation method; 4. the statistic method.

B. Investigation methods, procedures and techniques (particular methods): 1. the observation method; 2. the experimental method; the survey technique.

C. Data analysis and interpretation: 1. the logical method; the statistic method.

1.1. Topic and Research Objectives

In this applied research we have the following objectives:

I) expanding the stock of psychological and physical methods necessary for the training of drama students.

II) - obtaining improved result with the 1st year student the experiment was conducted on, in comparison with the 3rd year students used as a control group. The research was done on a group of students at the Drama Faculty within the “George Enescu” Arts University of Iaşi, Romania. We have introduced a program of psychological and physical training consisting of Biomechanics exercises as part of the compulsory practical courses of Physical Education and of Tai Chi in the curriculum of the higher education institution. We shall see that the Tai Chi elements follow the same principles as those in Meyerhold’s biomechanics and thus enhance the expected result following the training sessions.

The research was conducted on the group of 1st year students in Acting (12 students) in the academic year 2012 – 2013. The control group was made of 3rd year students in Acting, whose curriculum did not include Tai Chi as a discipline. Our aim is to show the value of Tai Chi and of biomechanics exercises in the young actors’ training.

The Drama School of Iaşi is the only one in Romania that has introduced Tai Chi as a discipline in the curriculum; it was introduced in the academic year 2012 – 2013. On the other hand, Biomechanics does not exist as a separate discipline in our institution. The purpose of this research follows two lines: 1) the implementation of biomechanics exercises adapted for the drama students to all the student in our institution; if it cannot be implemented as a separate discipline, it is at least desirable that biomechanics exercises should be periodically included in the various programs of the movement disciplines in the curriculum of drama schools; 2) the implementation of the practical course in Tai Chi in the curriculum of each of the years of the undergraduate program, not only in the curriculum of the 1st year (undergraduate studies).

1.2. Review of Literature

The technique of Biomechanics in theatre was developed by Vsevolod Meyerhold at the beginning of the 20th century as a synthesis of the traditions of Europe and of the Far East in theatre. It is physically strenuous and it contributes to the development of coordination and balance abilities, of rhythm and orientation in time and on the stage and is extremely useful for the actor, helping him to carry out very closely the director’s requirements and indications and perform certain basic elements in the actor’s dramatic language.

Meyerhold’s innovative concept in theatre training is that the actor is similar to a machine. The artist who works with his body is a machine operator who knows the mechanisms through which movement is performed (Elvin, B, 1973). At first sight, Biomechanics exercises seem strange decompositions of certain simple actions. We are not normally aware of our movements and due to innate or acquired reflex arcs we perform more or less ample movements without much premeditation or reflection. In Meyerhold’s view, however, on stage any gesture equals to a cue; if we are used to paying less attention to gestures in everyday life, on stage a cue that is added or missed
cannot possibly be ignored. Therefore, by applying the principles of human biomechanics and anatomy, the training system developed by Meyerhold aims at awakening the actor’s awareness of the gesture.

His method studies the various manners of movement, the forces that produce movement, the interaction between these forces and the forces that oppose movement. Biomechanics is interested, therefore, not only in the analysis of the mechanics of the movement, but also in their effects on the manner in which the organs that perform the movement are structured.

The exercises in the training program followed the three rules in Biomechanics:

I) The law of inertia: an object either remains at rest or moves at a constant velocity, unless acted upon by an external force (Nenciu G. 2012);

II) The law of acceleration: the value of the force on an object is equal to the mass of that object multiplied by the acceleration of the object. (Nenciu G. 2012);

III) The law of interaction: when one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body. (Nenciu G. 2012)

It is important to remember that Mayerhold as a theatre professional conceived various movements such as bowing, twisting, bending, flexion, extension, jumps, balance of the entire body and of parts of the body, and relying on knowledge of Biomechanics, he mainly aimed at acquiring control over the barycentre, balance, the ability to hold certain positions of the body. The exercises were endlessly repeated until the actor was mentally and physically in control of how to direct his own (muscle and energetic) forces.

Meyerhold’s system included exercises in acrobatics, stretching and dance. The Stanislavski system recommends the concentration on the inner self of the individual, while Meyerhold’s biomechanics directs the attention towards the outer world (Stanislavski, 1951).

The same principles presented so far in the theoretical part describing the Biomechanics of theatre are also the underlying principles of the Chinese practice of Tai Chi. Many of the concepts in this discipline are similar to those presented in the section above, so we shall offer only a brief presentation of this practice, emphasizing the elements that assist the actor’s physical and psychological training.

The Tai Chi system includes elements of balancing, equipoise and flexibility. Also called an energetic dance, the technique per se consists of connected movements performed at a slow pace, gently with the person, in good keep with the breath. Movement is continuous and harmonious, thus the individual accumulates a large amount of energy and it also constitutes a form of meditation which is beneficial for the development of attention, memory and generally all mental and spiritual faculties. The systematic practice of these exercises results in balance, inner and outer harmony, coordination and persistence. The method as such implies learning and performing the movements fluently, as they harmoniously run from one into the next in a continuous flow. Body weight moves alternately from the left foot to the right, while the balance is always kept by concentrating on abdominal muscles. This is equally an aspect of Biomechanics for theatre.

The benefits of Tai Chi are especially in the area of the body and the mind. Thus, at the level of the organism, the articulations become more elastic, the muscle are no longer tensed. The whole body is strengthened and it becomes suppler and more agile.

To sum up, the benefits of this discipline are:

- it stimulates the nervous system;
- it improves posture and balance;
- it strengthens the tendons which can thus generate more force than the muscles, while they retain their elasticity;
- it improves breathing.

We have thus identified so far what we aim at in training drama students using specific Tai Chi and Biomechanics exercises.

1.3. The innovating element

In the present paper, we promote the discipline of Tai Chi, recently introduced in the academic curriculum in the Drama School in Iaşi and we consider it is greatly useful in the training of the actors-in-the-make. We shall also
present physical exercises inspired from a film where the master Genadi Bogdanov (1996) demonstrates movements in Biomechanics. Thus, at the practical course in Physical Education, besides the exercises specified in the curriculum of this discipline, our drama students performed a set of Biomechanics exercises. A professor in Physical education who has extensive knowledge of human biomechanics and of physical movement in general could initiate sets of Biomechanics exercises that can be extremely useful in training the actors-in-the-make.

2. Experiment

The experiment we have suggested, namely the introduction of specific exercises inspired from biomechanics for drama schools and from Tai Chi in the training actors’ routine, is aimed at testing the hypothesised relation. It is a natural experiment used to test the hypothesis “at the same time retaining the natural qualities of the activity” (Epuran, 1995).

The experiment was implemented during one academic year (2012 – 2013) and it involved a group of 1st year students in Acting who took part in two two-hour training sessions per week (on Monday and Thursday). The practical course in Tai Chi was held on Monday; separate exercises were practised as well as the entire set of 18 exercises (in the curriculum) in Tai Chi to specific music. The practical course in Physical education was held on Thursday, where we introduced a set of exercises inspired from films of the movements in V. Meyerhold’s Biomechanics (to be found on the Internet), especially after Genadi Bogdanov (1996). The control group consisted of 3rd year students; they attended only the practical course in Physical education, with no additional Biomechanics exercises for the theatre. They did not attend the Tai Chi training sessions either, as Tai Chi was not included in the curriculum for the 3rd year.

Starting from these elements, we have created exercises to be used in the training the actor for effective acting. Here are the practical exercises used in the additional training sessions with the experimental 1st year group of students in Acting:

- juggling with objects: clubs, balls, skipping ropes;
- high jump on toes, with a relaxed body, stretching in the air, the hands bent from the elbows, palms facing each other, followed by a 45° rotation in mid air, cushioned landing in crouching position, the body bends, looking downwards, hands remain in initial position;
- from a start position (in the sprint race) – the body slightly bent forward, held for 5 seconds, gradual increase of the holding time, resume standing position;
- from the same position, after 5 seconds, start running with small steps in a circle and imitating a train moving, stop in initial position on the completion of the circle (start position in the sprint race);
- running in a circle 3 metres in diameter with very fast small steps, sudden stop in a slightly bent position on the completion of a full circle;
- ditto, with stop on a sound signal;
- ditto, with stop on a visual cue;
- body balancing in all directions similar to a drunken man, with constant control of the balance and of the movements;
- running in a circle 2 metres in diameter with fast small steps, simulating the holding of a plate on one palm, with control of the hand holding the plate;
- imitating a 4 kilo weight throw and sudden stop after throw, in an attempt at not overstepping the take-off circle;
- walking backwards in criss-crossing steps for 10 metres, with slightly bent knees, looking ahead, arms stretched sideways;
- walking forwards with criss-crossing steps, the knees bent, the body slightly bent forwards with hands across the chest, changing the crossing position of the hands with each step for 10 metres;
- walking forwards with slightly bent knees, the body slightly bent (the sats position: in Eugenio Barba’s theatre, 2003, this is called the sats position, while in sports it is known as the basic position) with criss-crossing steps: the right leg goes over the left leg, the right hand across the chest, the left hand slanting upwards and to the left, for 10 metres;
jumping on toes, knees bent, the body slightly leaning forward, arms bent and held at a distance from the body; execute five jumps then stop with the knees still slightly bent (the sat position). This apparently prepares the body to stop any movement at any moment, for in a static position the muscles are still working; it is, in Barba’s terms, motion in immobility;

- free falls, an imitation of fainting, with a slow impact with the ground, with balance control and control of the body and its parts at any moment of the fall;
- rising from the ground as if pressing against a wall;
- rising from the ground as if somebody helped by someone who is pulling your hand;
- free falls backwards, on the mattress, the body stretched and the muscles tense, the first contact with the mattress with the upper third of the thighs and the buttocks to cushion the fall; the head comes last on the mattress without this difference in the landing to be visible (the exercise is executed with help at the beginning).

These exercises were graded in terms of number of repeats and sets, customized by sex; they are done with help from the instructor at first, then with supervision and help from peers and ends up as individual work. The training sessions were one hour long, twice a week, with one hour on Monday and another hour on Wednesday, in addition to the compulsory classes of Physical education and Tai Chi.

It should be added that the tests we have used in order to increase efficiency are carefully chosen to emphasize the potential needs of the future actors in their stage performance.

The first set of exercises (Initial test) was applied at the beginning of the academic year 2012 – 2013, October, to the 1st year students in Acting and the 3rd year students in Acting.

For clearer evidence and a common element in the recorded data, we will transform certain results consisting of time data (minutes, seconds) into scores.

2.1. The tests applied

Testing the efficiency of the exercises introduced in the routine is done using tests specific of these activities applied to the two groups involved in the experiment.

Test 1: juggling with a club. Three 1.5 m clubs are used. The test consists of skillfully handling a club on a vertical and a horizontal plane with the dominant hand, without moving the body for 2 minutes. Dropping the club, moving the body by stepping or bowing are penalized. The test is expressed by scores: VG (very good, no mistakes), G (good – one move of the body and drop of the club); S (satisfactory – two moves of the body or drops of the club) and I (Insufficient – three or more moves of the body and three or more drops of the club).

Test 2: walking on wooden cubes for 5 metres. From a start line where there are three wooden cubes with the sides measuring 10 cm, the students starts walking with their feet on two of the three cubes, while the third is left free and should be moved forward using the hands. The student walks on two cubes while shifting the cube left behind. Two falls are accepted as penalties. The student passes the test if he manages to advance for all the 5 metres in a minute. The scores are: VG under 60 seconds; G between 60 and 70 seconds, S between 70 and 80 seconds and I over 80 seconds.

Test no 3: the lathe. A lathe 2.5 in width elevated at 6 cm from the ground is used; the student stands on the lathe with one leg bent, hands away from the body, the eyes closed. The time is recorded of how long the student can retain this posture until he touches the ground with the free leg. The scores are: VG over 30 seconds, G between 20 and 30 seconds, S between 20 and 10 seconds and I under 10 seconds.

Test no 4: coordination and dynamic balance Hexagon test. This test is inspired by the test used in the USA for tennis players. Agility, force, balance and the velocity of the jump are tested. A hexagon is drawn with the sides of 50 cm and 120 degrees angles. The student stands in the middle of the hexagon and on the start command he jumps outside the contour of the hexagon, then returns to the centre. He continues to jump over the next side of the hexagon (moving to the left or to the right) until moving round the hexagon three times. Touching the contour is penalized by 0.5 seconds. The scores are: VG under 28 seconds, G between 28 and 35 seconds, S between 35 and 40 seconds and I over 40 seconds.

Test no 5: questionnaire for data. The questionnaire has the role of extracting certain general data about the actors
(behavior in the applied disciplines, the degree of fatigue that the student can stand, the degree of concentration for a role). The questionnaire was completed by the professors teaching stage movement, fencing, dance and the actor’s art in December 2012, two months after the academic year had started. The response was expressed in scores. The average for each student was done by us, relying on the questionnaires collected from the professors teaching the other practical disciplines.

The questionnaire consists of questions addressing: a) the degree of difficulty of the elements used in the exercises in fencing/dance/ stage movement/the actor’s art; b) the effort involved in the practical activity in the course in question; c) whether the exercise involved collaboration with a partner; d) performing elements that had a high degree of difficulty. The students’ answers were represented using scores; where appropriate, the method of correspondence was used to convert the answers into scores. The questionnaire also includes the teachers’ feedback based on observation of behaviour during the respective activity.

2.2. Results

For a clear record of the data obtained, we used the analogy method to convert the results (scores). In each test, a correspondence conversion was operated from the results expressed in numbers to results expressed in scores.

The results are presented in table form. There is one file for each 1st year student containing all the data regarding the effort in the biomechanics and Tai Chi training sessions, while the 3rd years are monitored during their Physical education classes. We will present only the results in the two tests – initial and final – of the two groups participating in the experiment: the trial group – 1st year students in Acting – and the control group – 3rd year students in Acting. Poorer results are given in red.

### Initial testing – table 1

<table>
<thead>
<tr>
<th>1st year Acting</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nr. crt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>VG</td>
<td>2</td>
<td>VG</td>
<td>2</td>
<td>VG</td>
</tr>
<tr>
<td>2</td>
<td>S</td>
<td>3</td>
<td>S</td>
<td>4</td>
<td>I</td>
</tr>
<tr>
<td>3</td>
<td>G</td>
<td>4</td>
<td>G</td>
<td>5</td>
<td>G</td>
</tr>
<tr>
<td>6</td>
<td>I</td>
<td>0</td>
<td>I</td>
<td>2</td>
<td>I</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The 3rd year Acting</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nr. crt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>VG</td>
<td>5</td>
<td>VG</td>
<td>3</td>
<td>VG</td>
</tr>
<tr>
<td>2</td>
<td>S</td>
<td>3</td>
<td>S</td>
<td>2</td>
<td>I</td>
</tr>
<tr>
<td>4</td>
<td>G</td>
<td>4</td>
<td>G</td>
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<tr>
<td>6</td>
<td>I</td>
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<td>I</td>
<td>2</td>
<td>I</td>
</tr>
</tbody>
</table>

### Final testing table no. 2

<table>
<thead>
<tr>
<th>1st year Acting</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>VG</td>
<td>7</td>
<td>VG</td>
<td>6</td>
<td>VG</td>
</tr>
<tr>
<td>2</td>
<td>S</td>
<td>0</td>
<td>S</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td>3</td>
<td>G</td>
<td>5</td>
<td>G</td>
<td>5</td>
<td>G</td>
</tr>
<tr>
<td>4</td>
<td>I</td>
<td>0</td>
<td>I</td>
<td>2</td>
<td>I</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd year Acting</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nr. crt.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1</td>
<td>VG</td>
<td>4</td>
<td>VG</td>
<td>4</td>
<td>VG</td>
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<tr>
<td>2</td>
<td>S</td>
<td>2</td>
<td>S</td>
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<td>G</td>
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<td>6</td>
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<tr>
<td>4</td>
<td>I</td>
<td>0</td>
<td>I</td>
<td>2</td>
<td>I</td>
</tr>
</tbody>
</table>

2.3. Interpreting the results

In the following tables (table no. 3 and table no. 4) we shall present the difference between the initial and the final test in each part of the test on analyzing the trial group (1st year students) and the control group (3rd year group students).
The differences between the two groups in the initial test.

Initial testing – Table no. 3

<table>
<thead>
<tr>
<th>1st year Compared to 3rd year</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>VG</td>
<td>-3</td>
<td>VG</td>
<td>-1</td>
<td>VG</td>
</tr>
<tr>
<td>0</td>
<td>G</td>
<td>0</td>
<td>G</td>
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<td>G</td>
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<tr>
<td>+1</td>
<td>S</td>
<td>0</td>
<td>S</td>
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<td>S</td>
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<tr>
<td>0</td>
<td>1</td>
<td>+3</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

In the initial testing, the trial group (1st year students) had the following results:

- **Event no 1 (E 1)** → in the control group 3 more students handled the club very well and scored VG than in the trial group; an equal number (0, no difference) of students handled the club well (score G); in the trial group one more student scored S than in the control group; an equal number of students (0) handled the club badly and scored I.

- **Event no. 2 (E 2)** → in the control group 3 more students scored VG than in the trial group; an equal number of students scored G (0); an equal number of students scored S (0);

Results are similarly interpreted for the other three events (T3, T4, T5) according to the data in the table.

Final testing

Table no. 4

<table>
<thead>
<tr>
<th>1st year Compared to 3rd year</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
<td>+1</td>
<td>VG</td>
<td>+3</td>
<td>VG</td>
<td>+2</td>
<td>VG</td>
</tr>
<tr>
<td>-2</td>
<td>G</td>
<td>-1</td>
<td>G</td>
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<tr>
<td>+1</td>
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<tr>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

The final testing indicates a significant progress in the 1st year students compared to 3rd year students, as it can be seen in the following:

- one more student (+1) scores VG in T1;
- three more students (+3) score VG in T2 compared to 3rd year;
- two more (+2) students score VG in T3;
- four more students (+4) score VG in T4;
- 0 ~ no difference between the two groups scoring VG in the evaluation of the teachers who teach other practical courses in movement.

The score S (sufficient) and I (insufficient) on the average the 1st year had one student less than the 3rd year (-1) compared to 3rd year, which indicates progress in their psychological-motive behavior.

3. Conclusions and recommendations

- Initial testing indicates that the students enrolled in the 1st year following the entrance examination in Acting have motive background and abilities adequate to the intense physical training necessary for an adequate body fitness. The control group consisting of 3rd year students does better than the 1st year students and the results of their training in the previous two years can be seen;
- The final testing reverts the results in favour of the 1st year students who were the members of the trial group, which is one the objectives aimed at. The seven months’ training using exercises based on Meyerhold’s biomechanics exercises and the practice of Tai Chi left their mark on the psychological and physical capacities of the 1st year students. They improved in terms of force, balance, spatial orientation, body control in various ways.
The efficiency of their physical and psychological behaviour has also increased in all the movement disciplines, thus making their teachers’ work easier and more efficient.

- The final results confirm the hypothesis that specific exercises inspired from biomechanics for drama schools and from Tai Chi influence the psychological and motor potential of the training students;
- The exercises were interesting to the students and proved to be attractive, consequently they were used in other movement disciplines as well; which is one of the objectives that this experiment had aimed at.
- We strongly recommend the use of biomechanics exercises in all the movement disciplines in the curriculum of the Drama Schools. Even a shorter 15 – 20 minutes’ program can be very effective. Such exercises can be introduced as warm-up exercises to facilitate more strenuous activities.
- We also recommend Tai Chi exercises in all the undergraduate years and even in the MA program with the Drama Schools. The effects of this program are significantly more beneficial than we were able to present in this experiment.

Acknowledgements

We extend our special thanks to all the students and teachers who participated in this experiment to demonstrate the importance of psychological and physical training by means of exercises in theatre biomechanics and Tai Chi practice.

References