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## Study Regarding the Manifestation of Motor Qualities Related to Specific Speed in Beginner Fencers

Gabriela Dințică<sup>a\*</sup>

\* Corresponding author: Gabriela Dințică, [dintica.gabriela@gmail.com](mailto:dintica.gabriela@gmail.com)

<sup>a</sup>National University of Physical Education and Sports, 140 Constantin Noica Street, Bucharest, Romania

### Abstract

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The objective of this study is to determine the initial level of motor qualities related to general and specific speed of children for the three weapons used in fencing: epee, sabre and foil. Research subjects: The study was performed on a sample of 36 children (6 boys and 6 girls for each weapon: foil, epee and sabre) aged between 8 and 10 years and having an experience of 2-3 years in fencing. During the investigations, the following 6 tasks and tests were used to measure motor qualities related to general and specific speed: 30m run with start in a standing position, the ruler drop test, foot tapping, 28m movement with forward and backward steps, mannequin's glove catching and mannequin lunge kicks. For the movement speed test, 30m run with standing start, the central tendency for foil is 6.6 seconds, for sabre the median is 7.11 seconds and for epee the median is 6.69 seconds. For the 28m movement (specific movement speed), the median was 17.56 seconds for sabre, 21 seconds for most epee fencers, while the foil children obtained an average of 22 seconds. Conclusions: There are significant differences regarding the speed-related motor qualities between the three fencing weapons (foil, epee and sabre).

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### 1. Introduction

The practice of fencing competitions has differentiated between three types of weapons: foil, epee and sabre. There are small technical, tactical, effort and bio movement differences between these three weapons. The level of bio movement qualities (and general movement skills) has a direct impact on obtaining superior competitive results. Individual capacities - technical, tactical, physical - are insufficient in competition, a solid base constructed on motor qualities like speed, strength, endurance, dexterity, suppleness and mobility being also required.



Speed is considered to be the ratio between the distance covered by a segment of the body or by the entire body of the duellist in order to perform an act or a motor action in the shortest time possible under given circumstances. Deliu (2008) describes three speed manifestations in combat sports:

- latent motor reaction time;
- execution speed;
- repetition speed.

*Latent motor reaction time* represents a valuable landmark in the diagnosis and prognosis of future performances, through its implications in determining superior feats and results. From a cybernetic point of view, the nervous system is the source of processes that give latency to motor reactions and the place where, in fact, these can be improved through a very severe action of filtering the specific information in relation to the performed discipline; as a result, the reaction time can be improved through both specific training in conditions of optimal excitement of the central nervous system and the specialization of the receivers involved in detecting stimuli with the greatest significance for combat.

The analysis of certain overall aspects of the reaction time has led to the conclusion that it is hardly perfectible for simple stimuli and easier to improve in relation to complex stimuli like the ones used in all combat sports.

*Execution speed* refers to the length of a singular movement and is characteristic to combat sports, where a movement must be executed with maximum efficiency and minimum effort in the shortest time. Execution speed of the technical procedures represents one of the basic conditions of success in combat sports, where an attack is performed in several tenths of a second, a length similar to the time needed to perform the defence techniques.

*Repetition speed* is the capacity to execute a number of identical (cyclical) movements in the shortest time, without the onset of fatigue (5-10s).

Borysiuk (2006: 51) considers that reaction time (RT) and movement time (MT) are the basic measures (ms) of the speed of information processes. RT can be defined as an interval between the appearance of a stimulus (e.g. visual stimulus) and the first bioelectrical muscle activity. MT is an interval between the registered muscle activity and the completed movement.

Czajkowski and Hardman (cited by Borysiuk, 2006: 51) have stated that people practicing sport have shorter reaction times than non-athletes. Similarly, athletes with long sport experience display better simple reaction times than beginners.

In fencing, Szabo (1977) and Czajkowski (2001) (cited by Borysiuk, 2006: 51) consider that footwork training is based on the feeling of rhythm relative to the concept of fencing pace. Losing the proper rhythm during offensive actions in the use of conventional weapons (sabre, foil) usually ends in giving up the right way and exposes fencers to defeat in particular bouts.

A more recent study developed by Borysiuk (2006: 51) underlines the fundamental role of speed, and thus the necessity of paying maximal attention to this issue, especially considering that this motor quality is the most difficult to influence. This theoretical aspect, along with the lack of Romanian studies on this topic specifically made on beginner athletes, are the premises of this research regarding the manifestation of this motor quality at a professional level.

Czajkowski (2011) has demonstrated in his studies that speed, accuracy and success of a fencing action depend not only on the execution period, but also – and to a large extent – on the preparatory and latent periods of sensory-motor responses. A very accurate, fast and well-chosen fencing action is not good and effective if it is started too late (bad perception, long latent period of sensory-motor response). A fast and accurate movement started early, but inappropriately chosen, is also to no avail. A well-chosen and early started action – even if it is slightly slow – may be successful (fast reaction – short period of latent period).

The success of a fencer during the assault mostly depends on the action speed and promptness, and on the capacity of knowing when to change the speed of movement.

The regular practice of fencing requires a superior level of speed under all its forms of manifestation, along with the other motor qualities. The threatening moments that appear unexpectedly during combat develop a flashing thinking speed in athletes, a very good motor reaction. It is well known that fencers are among the best athletes as regards the compound speed reaction. The shooter also needs to possess movement, execution and decision speed in combat to overcome his/her opponent in both offence and defence. Orientation speed is necessary if the athlete wants to overcome his/her opponent in critical situations that occur during the assault, to foresee his/her intentions and counteract them.

## 2. Materials and methods

During the study, in order to raise its qualitative level, we used the following research methods: the study of relevant literature; observation; experiment; tests; statistical and mathematical methods and the matrix method.

Throughout the investigation, six tests measuring the motor quality - speed (general and specific to fencing) were performed. For each form of manifestation investigated, a test was applied: for general movement speed – 30m run with standing start, for reaction speed – the ruler drop test, for repetition speed – foot tapping (with both the right and left foot) (Cosma, Rusu, & Păunescu, 2013), for specific movement speed – steps forward and backward on a 28m distance, for specific reaction speed – mannequin's glove catching with a still weapon, and for repetition speed – mannequin lunge kicks.

Several specific tests were applied as follows:

I. *28m movement with forward and backward steps*. The specific speed movement is measured: 14m movement with forward steps, 14m movement with backward steps. This is performed on the entire length of the fencing board. The data were recorded with the help of a timer and were expressed in seconds. Two tests were performed and the best time was taken into consideration.

II. *Mannequin's glove catching* – 10 attempts. The reaction speed and precision of the armed hand were evaluated. The performer, standing in a guard position, at a small distance from the mannequin, with the top of the weapon placed at a higher distance than 5cm from the glove placed on mannequin by the examiner, has to stop the glove from falling through a rapid arm stretch, when the examiner gives the start. The success rate from 10 attempts is measured.

III. *Mannequin lunges*. Repetition speed is evaluated: 10 mannequin lunge kicks (with a stab) are executed. Two repetitions are allowed and the best time expressed in seconds is recorded. Only the

correct executions, which have reached the target, are counted. It can be mentioned that the tests were applied to all weapons under the same conditions, after a short general training. This way, we avoided the onset of fatigue, which might have led to false results.

### 2.1. Purpose of the paper

Speed is a quality that is strongly conditioned by genetics, but it can still be improved through training (to a lesser degree compared to strength or endurance). The little speed gained can be sometimes essential for actions that, when performed timely, may lead to winning the combat. Speed is by far the most important motor quality in fencing.

The purpose of this study is to determine the initial level of motor qualities related to general and specific speed in fencing for all three weapons: foil, epee and sabre, and to measure the observed differences.

### 2.2. Study subjects

The study was performed on a number of 36 athletes (6 boys and 6 girls for each weapon: foil, epee and sabre). The age of the investigated subjects was between 8 and 10 years, they having an experience of 2-3 years in fencing. It is to mention that working sheets were used in order to record individual values for all athletes who were part of the study, without omissions and without eliminating extreme values.

## 3. Results

The results of the study were statistically processed with the help of Microsoft Excel program, by calculating the mean result for each test. After test performing, the study has generated the following results:

**Table 1.** Mean results for unspecific tests

	Weapon	30m speed run	Ruler test	Tapping	
				Right foot	Left foot
1	FOIL	6.61''	23.64	20.66	20.5
2	SABRE	7.11''	15.33	22.75	20.75
3	EPEE	6.69''	14.08	18.58	17.58

Although the 30m speed run does not represent a specific effort for fencing, we consider this test as relevant for testing the movement speed level. The speed test is significant because it is directly related to this motor quality and does not imply the use of sport-specific techniques (e.g. the start) or the use of coordination techniques. Central tendency (the median) for *30m speed* in foil is 6.6 seconds, for sabre 7.11 seconds, while for epee the median is around the value of 6.69 seconds (Table 1).

For *the ruler test*, central tendency (the median) is 23.6cm in foil, 15.33cm in sabre, while for epee the median is 14.08cm (Table 1).

Results for the tapping test reveal an optimal repetition speed, with little differences between the right and left foot. For *the right foot tapping*, the mean of successful touches is 20.6 repeats, for sabre the median is 22.7 repeats, and for epee, 18.5 repeats within 10 seconds. For *the left foot tapping*, foil athletes obtained a mean of 20.7 repeats, for sabre the median was 20.7 repeats, and for epee, 17.5 repeats within 10 seconds (Table 1). Cosma (2013: 145), in his study performed on junior athletes – epee, obtained an average of 22.3 repeats for the right foot tapping and an average of 22.1 repeats for the left foot tapping. An improvement in the manifestation of repetition speed could be noted for the experienced athletes.

**Table 2.** Mean results for specific tests

	Weapon	28m speed run	Glove catching	Mannequin kicks
1	FOIL	22,07''	5.67	14.45
2	SABRE	17,56''	6.58	11.60
3	EPEE	21''	7	19.7

In relation to specific tests, it can be observed that most athletes who practice foil have performed the 28m movement in 22.07 seconds; most athletes who practice sabre have performed the test in 17.5 seconds; in epee, most athletes have obtained a result of 21 seconds (Table 2). This large difference between the three weapons can be explained by the fact that for sabre the movement speed is more important than for the other two weapons, therefore it has an essential role during combat.

Central tendency (the median) for glove catching was 5.6 hits in foil, 6.5 hits in sabre and 7 successful hits in epee. Cosma (2013: 145) obtained in his study an average of 13 glove catches for junior athletes (Table 2). The same average was obtained in our study for senior athletes (Ravai, 2009: 174). The relatively high difference between junior and beginner athletes, 6 catches, can be explained by the higher experience of older athletes and the positive influence of specific training.

Central tendency (the median) for mannequin hitting in foil is 14.4 hits, in sabre 11.6 hits, and in epee, most fencers have succeeded in making 19.7 hits (Table 2). The lower number of hits in sabre can be explained by the fact that most hits for this weapon are made with the edge or the counter edge, but during the tests, the athletes were required to hit in a similar manner to the other weapons – through stabbing.

#### 4. Discussions and conclusions

In high performance fencing, the basis for obtaining good results is constructed in the childhood and junior periods. Unlike other sports, where technique is cyclical, fencing, no matter which weapon is used, has a variety of technical, tactical, physical and psychological requirements. Considered as one of the most complex sports, performance fencing requires various abilities and skills which can be gained in a relatively long period of time (6-8 years), a time in which the shooter develops a high mastery.

In order to correctly interpret the obtained data after test performing, we must take into consideration the specificity of each weapon. For sabre, the athletes' movement is very rapid, points are scored very quickly and the assault finishes after a time between 30s and 1 minute, so that the

movement speed is of major importance, while the exploration of the opponent is almost absent. In sabre, the touch surface is from the waist up and the top of the weapon, so the edge or the counter edge is used to hit. The epee is a tactical weapon in which the duration of an assault almost always reaches the maximum time of three minutes (and the 5 touches may not even be made), the exploration of the opponent being consistent and the movement speed low. For epee, the hits are made only with the top of the weapon, on all the body's surface. The foil is a combination of the other two weapons, where the movement speed is higher than in epee. In foil, the hits are made by poking with the top of the weapon, while the hit surface is the chest, back and inguinal areas. In all three weapons, the reaction speed has the same importance because it is needed in both offence and defence moments, when the athlete has to react quickly.

It can be observed that sabre fencers have obtained the best results in the tests measuring specific movement speed. It is surprising that foil fencers have obtained lower results than the ones who practice epee. This can be due to the fact that foil fencers have less experience than the others.

The specific reaction speed of foil fencers has proven to be the fastest, followed by sabre fencers and epee fencers. The differences prove that specific training has influenced the improvement of this form of manifestation, especially if we take into consideration that, in the unspecific tests, foil fencers had the worst results.

For the repetition speed, sabre fencers had again the best results, followed by foil fencers and epee fencers.

There are differences in speed manifestation for the three weapons in fencing even at the beginner level. The exception to this is the reaction speed, where the values are almost identical. The differences between specific weapons lead to the conclusion that specific training in fencing has an influence over the manifestation of speed. Another factor that could explain these differences is the number of athletes with higher experience in fencing for the sabre fencers, which leads to the conclusion that the specific training performed over a long period of time can lead to an improvement of specific speed.

We consider that this study is not completed and this is the reason why we have proposed that these tests could be performed again after a period of time in order to observe the evolution of speed manifestation in the three weapons.

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