

TECHNICAL & TACTICAL ISSUES

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Application of conflict algebra in the analysis of fencing and tactical preparation methods

Submission: 18.11.2018; acceptance: 10.01.2019

Key words: conflict algebra, combat sport, fencing, tactical preparation

Abstract

The problem and Aim. The article presents selected issues concerning the theory of fencing. To consider the directions and importance of each component in the selection of training methods, forms of training means in the sport, determined by the following factors: the structure of discipline, the importance of mobility, movement habits, content and essence of tactics. A description is made of the “algebra of conflict” and its tactical use in combat fencing. In a conflict game using white weapons, the mobility of contestants, their technical skills, resources of sensory-motor habits, their quality of perception and manifestations of reaction, tactical skills, emotions, speed of thinking and decision-making, mental strength and the mutual opposing desire to hit the enemy and win the fencing bout, come together on a broad front. The fight takes place in rapidly changing tactical situations, with limited time required to understand the intentions of the enemy. A fencing duel takes place against the background of two major, demanding, changing positions which divide attention between tactical tasks – anticipation and deception to avoid hits and to hit the opponent. To achieve those objectives, in the modern sport, fencing coaches use long-term development of technical skills in conjunction with teaching and improvement of tactical fighting. At every level of sports training, the choice of teaching tactics methods helps to achieve outstanding sports results.

Method. The study is based on observations and reflections that are available in the literature (content analysis of literature).

Results and conclusions. The most important skills in a fencing bout are: the ability to transfer habits from training lessons to tournament bouts and a comprehensive synthesis (combining together technique, signs of reaction, agility, tactical skills and psychological processes). In addition, in training, a large variety of fencing actions are recommended, combined with skilful directing of one's emotions, shaping resistance to emergency states and adaptation to fighting with opponents. The presented elements of tactics raise its importance in the training of a fencer. In a fencer's training, it is very important to use tactics by formation of self-reliance, initiative, and the ability to master one's emotions, speedy and accurate assessment of the tactical situation and the ability to take immediate decisions.

*Every fencer learns from his master,
and every master learns from his fencers.*

Smith J. 2003

Introduction

Fencing is an open skilled combat sport, in which two athletes fight indirectly, through their weapons. In 1896, fencing as a sporting activity was admitted to the first modern Olympic Games in Athens. It is mainly practised indoors, with weapons: the epee, the foil, and the sabre. The aim of science is to enable the understanding of the world and accumulating knowledge about it. The tool

which serves this purpose is the theory, which answers the question, why a certain phenomenon exists and how it works [Gracz 1998]. Scientific theories have certain characteristic features, which separate them from other ways of explaining the world, such as religion, political dogmas, and personal judgements. Science utilizes sociology when making use of theories with the aim to describe the reality of a community, as well as when relating these theories to really existing events. Thanks to the development of theories and their verifying, we enrich our knowledge about the reality of the community we live in. Conflict is the basic feature of living in a community, its potential existence can be seen everywhere. In interpersonal relations between men and women, in interactions

with other groups which are often marked with tension, as also an aversion to authority, parents, teachers, and employers. It also appears in physical fitness.

Modern science has at its disposal many objective methods, which allow studying the preparation of sportsmen. Scientific theories about fencing, where looked into in their books and articles by: Barth and Barth [2007], Borysiuk [2006; Borysiuk, Sadowski 2007; Borysiuk, Waskiewicz 2008], Czajkowski [2001; 2005], Kalina and Stusinski [2004], Smith [2003], Kogler [2004], Morehouse [2012], Evangelista [2000], Tyszler [2007]. Cynarski has written about martial arts a number of times [2006; 2009].

In this article, the mathematical analysis outline of tactical thinking in a fencing sport fights was shown, which was published by Szafranski [1971]. Theoretical issues were supplemented by tactical preparation methods of fencers. In order to prepare the material, the quality analysis method of source texts was utilized.

The consciousness of man in the process of thinking in a conflict situation can be modified. A psychologist and mathematician Lefewr [1968] and a sociologist Smolian were preoccupied with these issues, and presented interesting analyses of the topic in their book "*Conflict algebra*" Keller [1977]. The description concerned sportsmen, conflict participants as people taking part in a "mirror game". The term "mirror" means that the contestants taking part in the clash, competition, match, imagine the possible plans of the opponent for the upcoming fencing with themselves. The decisions of each fencer in the time of the conflict are based on the conjectures of the opponent's probable ways of action. In a bout the fencer, after defining the character of technical-tactical actions, makes conjectures of the possible reactions of his opponent and prepares his plan of tactical action.

According to the authors, a model of a fencing fight can be illustrated by the means of "conflict algebra", marking one fencer as X and the other as Y. If contestant X predicts what actions contestant Y will do / in record $Y^{\circ} X^{\circ}$, (contestant X predicts what actions contestant Y will do), X° means that contestant X thinks. These thoughts can be extended to the left, whereas the first symbol on the right side indicates the potential winner of the monitored fencing bout.

An example in a fencing sport is the knowledge of fencer X that the opponent Y will do a counter-attack in response to a feint hit from the distance, which Y shows as a feint intention of defence and instead of guard his planning to do a stop hit. Fencer X plans a similar course of action imagining in his consciousness fencer Y's guidelines and adjusts this tactical intention in combat and the technical way to execute an effective fencing action. It can be observed, that evaluation of contestants in the action is made in view of real possibilities in the article will be specified as (base P). In the extent of the base for fencing sport, many factors come into play determining the conditions, situations, and course during the tour-

namment, principles of leading the skirmish, its effective time, experience and technical -tactical characteristic. The indicators presented above can have a positive and negative influence on the course of the bouts. That is why the base dictates the character of the fencer's behaviour during the bout; the direction of his tactical intentions and actions, as well as it determines the selection of means and methods of the training process.

The base is formed in the consciousness of a fencer based on the (S pattern). The pattern is a subjective reflection of attitude in the sportsmen's consciousness. Practically, the compliance of the pattern S with base P cannot be achieved. In majority, the patterns are simplified and in the bouts, the fencer does not notice all of the possibilities and facts available for an effective and fast analysis. However, if in fencing bouts the S pattern is closer to the base P, than the contestant will in a fuller way utilize the possibilities of tactical thoughts and effective fencing actions.

From many elements specifying the base P combat situations during a tournament a fencer strive to utilize those, which will influence the outcome of the bouts. The fencer's ability to reflect the base in the most correct patterns indicates big experience of the contestant, swiftness and a high level of tactical thinking. By the creation of a pattern follows the reflection of actual data, as well as evaluation of their significance for the fencer and a specific opponent.

An example is a high and fast fencer. In fencing sports, data about similar features as height and swiftness of the other contestant can be of minor importance and could be omitted in the pattern.

However, for a contestant of a small height and not too fast the above data will be crucial and taking them into consideration in the pattern, he has a chance to win the duel because combat without analysis of these predispositions can lead to defeat.

The full pattern should reflect the physical, psychological and emotional state of the opponent, his readiness and attitude towards combat and include reliable evaluations of his base. However the base and the elements building it change during combat, tournament, the situations viewing at complicating the creation of patterns by opponents change. Each fencer in sports combat has a defined goal (in record Cx), during a fencing tournament, competing, he prevails in bouts of different difficulty levels. Striving to achieve planned and wanted results, he solves tactical and technical tasks. However, achieving the final goal is possible as an end of an episodic process of the fencing fights.

The goal, which a fencer sets for himself and his hopes, which influences the course of his bout, in large amount influences the actions and behaviour, because from the assigned tasks comes the evaluation of the anticipated difficulty and adjustment of the means to overcome the obstacle.

The technical-tactical characteristic of the means of a contestant combined with a subjective consideration of positive and negative features of oneself and the opponent expresses itself in the combat concept (Kx).

This concept specifies the character of the reflection of the goal in each pattern, which in turn determines a fencer's attitude to solve specific tasks in a fight, combat, and tournament. A direct sign of a combat concept is a fixed behaviour and methods of accomplishing the basic tasks, intentions and most suitable actions leading to prevailing in a bout, combat, and tournament, from the fencer's point of view. Each sportsman possesses a large stock of technical-tactical experience, but in combat utilizes only a small fraction of those, which bring him efficient action in fencing.

The problem, which has to be solved, is the choice of such a technical-tactical model and style of fighting, to achieve a high effectiveness of hits in a sports fencing bout. In perspective concepts of training, the coach and contestant choose and improve mainly those fencing actions; tactical means and methods, which will allow efficient combat with a certain weapon and at the same time are adjusted to the contestant's personality.

A major part of technical elements permanently thought and improved, makes up a fencer's repertoire and is the base to his general concept of combat, as well as defines the possibilities of changes and choice of other concepts in bouts. It is worth underlining, that the contestant's general concept of a bout is created gradually during years of training and increase of his fencing experience.

On the base of a fighting style elaborated in fencing bouts, the contestant chooses the most suitable method of action, in combat with each opponent. The concept for the fencer is narrowed down and when it is possible, it changes on the base of new data (an example is a fight, in which the opponent leads with a couple of hits and there is only 1 minute left to the end of the bout, the losing contestant speeds up the pace of the attacks, increases the amount of provoking actions, while decreasing the usage of preparation actions, although it is not typical for his style of fencing bouts).

The goal can also have an influence on the concept of a fencing bout. An inexperienced contestant, who for the first time fights in the final and has already achieved his important personal goal, will often fight boldly, applying varied technical actions in the final. He could not allow himself to do so in the elimination matches of this tournament, being under the constant pressure of responsibility and large psychological burden.

The general concept of leading a bout is characteristic for each type of weapon and it will always change in a smaller or larger degree with the change of the rules of rivalry, specifics of judging, the occurrence of contestant fighting differently and coaches developing new concepts of training. Decision making of a fencer in a fight result (Rx), is illustrated by the pattern below Szafirowski [1971].

1. The realistic situation in the actions is being implemented in pattern Sx.

2. Goal assigned to the chosen pattern:

$$\frac{SxSx}{CxCx}$$

3. Choosing of suitable assets to the situation in the bouts with the assigned goal:

$$\frac{Cx}{Sx} \frac{Cx}{Sx} Kx$$

4. The result of the executed thought process is a decision, ensuring the achievement of the desired result, which is also connected with the chosen pattern:

$$\frac{CxCx}{SxSx} \frac{RxRx}{SxSx} Kx$$

Each fencer represents with oneself a sum of actual base and pattern Sx, goal Cx, Concept Kx, result Rx reflected in his consciousness: $X = P + (Sx \cdot Cx \cdot Kx \cdot Rx)$

The base P can be presented in the model's record as M considering, that it will be reflected in the consciousness of the participant of the conflict, then $P = M$.

The above theoretical, tactical thinking mechanism is conventional; however, it is useful in showing mutual relationships between many indicators, which have an influence on the contestant's result. In sport fencing, tactical preparation can be assisted by the usage of tactical preparation methods. Forming of fencer's tactics is based on two processes: gradual introduction and improvement of his own concept of combat, counteracting general and individual combat concepts of his opponents, mastering the way to fight them and observation of contestants with which a bout is predicted. Additionally, tactics are being realised by introducing different means into combat, utilization of methods in the tactical preparation of fencers, selecting contestants for fights, setting training tasks, content, and direction of analysis of past opponents, training and tournaments. Tactics of contestants can be formed by a large number of training skirmishes and participation in tournaments. Tactical preparation is improved with the aid of specially focused tasks in individual lessons and practice in pairs. It is also the choice of partners for the particular bout and setting training tasks, content and direction of analysis of past opponents, training and tournaments. Creating varied situations during individual lessons and training, a fencer is being prepared to counteract many different combat concepts.

Conventionally, three directions can be specified, which influence the formation of new combat concepts in modern fencing: contestant's predispositions to utilize his physical features and physical preparation, contestant's predispositions to utilize certain fencing actions, tactical

direction during the sport fencing. Each of the directions above determines a wide range of combat concepts, an example of such are: contestants, who keep a set distance in combat, fight in a static way, fight with a lot of mobility, utilize attacks with large range of different speed, apply quick retreats, mainly apply attacks, most often apply counterattacks, utilize the defence coming from distance, cover, ducking, end the attack in the hit area, utilize the length of the upper limb in preparation actions in fighting with a sabre, apply ultimate actions and defensive actions with choice, active contestants fight with the usage of tactical action guidelines, use only defined tactical variants, they distinguish themselves by the liking for complex bouts, apply set patterns in tactical thinking.

The tactical concept of a fight, fencers mainly improve through learning during individual lessons, exercises in pairs and training skirmishes, they select with the coach, to a specific opponent and his individual features, suitable technical-tactical means.

In tournament preparation and during starts, a fencer searches for and improves ways to counteract specific concepts of his opponents; he works out a model of future fencing skirmishes Rogers [2003]. He should skilfully utilize individual combat manners in skirmishes against unknown opponents.

Preparation for each bout with a specific opponent demands information gathering about him, earlier tournament fencer analysis, comparison of combat concepts with the possessed information and consideration of goals and results. All of this information serves the purpose of creating a model of future competition. The above actions change with the current observation of the opponent and his actions, evaluating the results of each action and updating the pattern. A bout with an unknown opponent demands the choice of action concept during the bout and will be based on the ability of a contestant to quickly and correctly create patterns with the consideration of models, most suitable for his tactical intentions and actions.

Analysing the characteristics of a bout, the more important directions of fencer's tactical preparation can be determined Czajkowski [2011]:

1. Gaining tactical abilities through enlarging tactical knowledge, rules of combat and judging, characteristics of combat in three weapons, comparing the effectiveness of actions, combat style, variants of preparation actions, tactical advice, rational variants of tactical intentions and actions, way of utilizing individual physical and psychological features in techniques and tactics, information about opponents, tournaments, conclusions from one's own fight and from other contestants.

2. Mastering of ultimate and defensive tactical actions improving tactical tasks based on improving ultimate and defensive actions, teaching and increasing the amount of ultimate and defensive actions applied in certain actions.

3. Understanding of the essence of tactical preparation actions mastering of tactical tasks based on applying preparation actions, teaching and increasing of the amount of preparation means applied in certain bouts, purposefulness of ultimate and defensive preparation action selection.

4. The purposefulness of ultimate and defensive preparation action selection, in a fencing fight it is better to apply a few fencing actions of different tactical directions than many actions of just one tactical direction. An example is attack-parries-counterattack fencing actions, which are more effective in a bout than three types of counterattacks.

5. Mastering of tactics in different combat situations improves the correlation between goals and opponents concepts, a correct reflection of skirmish patterns in models, contains typical combat situations, most effective ways of behaviour, series of variants solving a tactical task.

6. Development of tactical thinking strengthens combat concept, the correlation between one's own goals and the opponents, facilitates reflection of patterns, tactical and strategic models of skirmishes and tournaments

7. Development of knowledge about fencing by making somebody aware of his own concept of combat and building of new models of fencing tactics. If a beginner fencer keeps a safe distance retreating before the opponent attacks or applies one of the parries and does an attack from a shorter distance than he already has a combat concept, which he realises in a skirmish with actions based on his own imagination of the skirmish. The process of synthesis of the mastered material with gained specific information goes on continuously. The biggest change takes place after participating in an important tournament because fighting in such tournaments puts the abilities of a fencer to the test. Understanding the purposefulness of showing resistance and applying sensible risk, applying warm up, psychological state regulation, discipline on tournaments and training.

8. Creating a combat style most effectively exploiting the fencer's abilities it reflects the surplus features of physical development, individual reaction signs, a fencer's concept finds its fullest reflection in his combat style, which depends on the "base" and combat goals, abilities to create precise patterns of fencing skills.

Developing of the "base" and improving a fencer's combat concept

a) Exercises of actions applied to solve one tactical action

During a bout often different types of defence are applied in one same tactical situation. Before attacking a contestant may defend with a direct and circle parries, before the opponent's reposts, he does a parry or stop hit, on attacks he counteracts with parries, repost, stop hit or with a counterattack. A large stock of ultimate actions and defensive actions possible to apply, allow a

fencer differentiate his choice in combat, strengthens his "base", makes surprising the opponent easier, increases the efficiency of applied actions. In teaching, ultimate actions should interlard with defensive actions with the goal of forming the durability of tactical habits, memory strengthening, concentration, thinking speed, the ability to reflect the "base" in the pattern.

b) Exercises of actions applied in different fencing bout situations

With the majority of fencing actions, one or a couple of tactical actions can be solved. Attacks with action on the blade of the opponent or a single feint attack can be used to fight with a defending opponent or doing a counterattack, but the complexity of applying these actions in varied situations is different. Through technical training, the range of fencing actions and the resulting from them tactical solutions should be increased.

c) Exercises of actions which supplement each other after preparation actions.

The variety of preparation actions of a fencer are an essential condition of achieving high results in modern sport development. The same preparation action is a base to execute different fencing actions with the opponent. The contestant in executing preparation actions for shortening the distance choosing ultimate actions has the possibility of utilising defensive actions. It is dependent on the tactics of the opponent, creating patterns, choosing the proper combat concept and applying counteractions.

d) Exercises of different preparation actions in choosing proper actions

Applying one and the same way of preparing a chosen action a few times, in a skirmish with an unknown opponent, loses the element of surprise, makes pattern creating easier for the opponent and choosing combat concepts, makes prevailing more difficult as fencers meet many times in one season. Repeatable bouts between these opponents can occur during one tournament. Contestants similarly prepare proper actions decreasing their efficiency; make it easier for the opponent to recognise their true intentions and actions. It is necessary to differentiate their application in a competition. The results of fencing fights are dependent on a rational choice of the ways of combat. The possibility of an effective usage of means of the "base" and choice of the way of combat, efficiency of tactical thinking, a proper choice of concept, realistic goal setting leads to prevailing in combat in large amount depending on the level of reflection of the combats pattern (one's own and the opponents) and rational building of the fight model.

Conclusion

Fencing is a modern sport, requiring, like any other sport, commitment to physical endeavour, dedication

to the necessary skills training, and the application of tactics. The three T's are the passport of today's fencer – Technique, Tactics, and Timing. It is the unique combination of these three elements at any one moment that decides the success or failure of the fencer Smith [2003]; Kriventsova *et al.* [2017]; Evangeilsta [2000]; Barth [2007]; Tyszler [2007]; Borysiuk, Waskiewicz [2008]; Tomczak [2010]; Czajkowski [2011]; Morehouse [2012]; Zadorozhna *et al.* [2018], were preoccupied with the issue of dynamics in a fencing bouts. According to these authors, who analysed the fencing bouts of extraordinary fencers, tactical preparation is a potential possibility of achieving significant sport results.

It can be forecasted that the creation of a full concept of the methodical teaching of tactics in fencing competition and the ability of right perception and reflection in one's consciousness of the patterns model, concept, goal, and result is a modern tactical development tendency of this discipline.

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