

The “survival multidisciplinary competition” psychomotor competence test as a synthetic tool for modern defence education

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- ☑ **A** Study Design
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Andrzej Tomczak 

Polish Scientific Physical Education Association, Military Section, Warsaw, Poland

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Abstract

It poses a challenge for researchers to diagnose psychomotor competencies of soldiers and officers from other uniformed services in a proper and scientifically based manner. This task is particularly difficult with regard to specific situations, such as a fight for survival (in micro scale).

The objective of this study is recommendation a psychomotor competency test called a “survival multidisciplinary competition” (SMC) as a tool for modern defence education.

This attractive tool SMC (on the one hand, a modern test, on the other – the possibility of sports competition) is dedicated precisely from the perspective of wide application in defence education focused on survival. This research and educational proposal, in the face of a real threat of an escalation of Russian aggression, can be widely used in extracurricular physical activity of young people.

The test consists of three competitions: No. (1) 800 m run ending with shooting; No. (2) paintball battle; No. (3) hand-to-hand fight based on a modified sumo fighting system (“testing fights in a vertical posture”). The optimal test group (or sport competition) is a team of five with similar body weight. In the case of sports formula involving more teams, the criterion of body weight similarity does not apply, as the lightest in a given group fights with the lightest in each of the following competition groups etc.

The SMC reflects the realization of tasks of II category by soldiers of military survival school, which is defined as knowledge and psychomotor competencies associated with the necessity to engage in a fight for survival against forces that aim at capturing or taking one's life. The principles of evaluating the SMC are described in two different dimensions. The first dimension, being a defence sports, SMC can be promoted as a utilitarian activity among pupils, teenagers, and students at military universities. The second dimension of the SMC is a psychomotor competency test to fight for survival (in micro scale). Competences are evaluated with the use of eight indicators.

Based on these indicators, survival probability factors can be assessed. Such an analysis of SMC indicators serves as a useful tool for commanders (task force leaders) since it provides detailed information about the preparation level of a soldier/team for fight on a micro scale. It also helps to modify a training for soldiers. This test can be conducted among soldiers and officers from other uniformed services, who perform tasks on a micro scale and are exposed to conducting operations in isolation.

Keywords: hand-to-hand fighting • innovative agonology • operations in isolation • paintball battle • sumo

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Author's address:

Andrzej Tomczak, Warsaw, Poland; e-mail: biuro.at@onet.pl

Defence sports – such disciplines and competitions whose movement structure, acceptable behaviour and tools used in sports combat (e.g. a carbine, pistol, etc.) can be used in a real defensive fight: winter biathlon, modern pentathlon, rugby, combat sports, shooting [51]

1st prototype of TFVP

– was applied and published in 2000 [52, 53]: four judo fights according to a simplified formula, in the system of "everybody with everybody else" as part of "defence biathlon" – as the second task (the first task being 800 m run ended with shooting a pistol, 5 shots, to an immovable target at a distance of 25 m); 5-person test (competition) groups of similar body mass are subject to evaluation [54].

2nd prototype TFVP (non-

apparatus test) – was applied and published in 2000 [55]: four sumo fights according to the simplified formula, in the system of "everybody with everybody else" as part of "defence biathlon: 1st didactic version" (DB:1stDV); as the second task (the first task being a zigzag run and 20 m run followed by 4 dart throws at a dartboard located at a distance of 2 m); 5-person test (competition) groups are subject to evaluation [54].

Simunition FX weapons and ammunition

– non-lethal training ammunition; the article uses the name of the company as a symbol of technological possibilities related to the use of weapons and ammunition [56].

Non-apparatus test – that motoric test (exercise endurance test) of the required reliability (accurate and reliable), which use does not require even the simplest instruments [57].

INTRODUCTION

In the most general terms, survival school means the ability to cope in difficult conditions. In the army, a survival school training is one of the blocks of SERE (Survival, Escape, Resistance, Evasion) training. The training is divided into three levels (A, B, C levels). A level covers the entire personnel of soldiers, B level applies to personnel assigned to missions outside of a country, whereas C level involves personnel at a substantial risk of isolation. The aim of the training is to prepare soldiers for performing operations in isolation, reduce personnel losses, improve safety of soldiers and risk-taking readiness, and to boost morale [1]. At the turn of the 20th and 21st centuries, the topic of military survival school was studied by a plethora of researchers [2-8]. In Poland, this topic was intensively researched in particular at the Military Institute of Aviation Medicine [9-15]. A definition of military survival school was established in the course of multidimensional research work. It is defined as knowledge and psychomotor competences pertaining to the ability to deal with situations of enforced isolation in an area occupied by enemy forces. Because of the complexity of this phenomenon, survival school topics were divided into two following categories:

I category – knowledge and psychomotor competences pertaining to the necessity to maintain one's life, while being unable to use one's forces and being cut off from other individuals and groups.

II category – knowledge and psychomotor competences pertaining to the necessity to fight for survival against various forces which aim at capturing or taking away one's life [14].

This study is concentrated on II category of tasks performed by soldiers in survival school. This category is related to a micro fight scale, special skills of soldiers [task No. 2 and No. 3 of the

psychomotor competency test "survival multidisciplinary competition" (SMC)] and on targeted physical fitness (task No. 1). In the majority of armies around the world, diagnosing psychomotor competencies of soldiers is primarily carried out with the use of analytical tests. Most frequently, it concerns the overall physical fitness of soldiers (e.g., 3 km run, 10x10 m run, 5x3 m run, sit-ups, pull-ups on a bar, and push-ups). Exceptions include the use of synthetic tests, for instance the test developed by Wochoński called the Aviation-Synthetic Fitness Test, which is used at the Polish Air Force Academy [16]. Such a test consists of exercises that reflect fitness and coordination requirements for a military pilot. Another synthetic test, which has been in use in the Polish Army, is the 200-meter obstacle course at the Physical Fitness Center.

The main advantage of synthetic tests over analytical ones stems from the fact that they give a possibility to provide comprehensive assessment of physical efforts, coordination skills, and mental health conditions, and they demonstrate resemblance of functioning in real-world conditions. Considering a military training, it is important to take into account not only physical fitness, but also shooting skills. The ability to use firearms is a core competency of every soldier. However, only effective shooting after several types of physical exercises is seen as a full assessment of potential capabilities of a soldier (psychomotor competences).

Diagnosing psychomotor competencies connected with survival school can be difficult due to a large number of possible activities/tasks, ranging from I category tasks, for example water purification, to II category tasks, for example entering into a fight with weapons. It is beneficial to differentiate survival school tasks and diagnose them according to accepted definitions of categories (that is I and II categories of survival school). Diagnosing competencies of a significant number

of people, in accordance with research categories, with regard to the realization of I category of survival school tasks is apparently only possible in an indirect way (in the form of a questionnaire). Simulating various extreme situations for a large number of people is a challenging and expensive undertaking. The results from I category of survival school tasks were published, among others, in the works of Kalina et al. [10].

In the author's point of view, an accurate method of verifying the II degree of soldier's preparation for a fight for survival are sports competitions that include “survival” tasks. It allows for a comprehensive assessment of physical efforts, coordination skills, and mental health conditions. It is also believed that emotions associated with such a targeted sports fight reveal types of behaviour (favourable or negative) that are similar to a real-life threat to one's life, health, or freedom. Motor and psychological analytical tests do not meet this criterion. However, the disadvantage of such a method of obtaining empirical data is a limited number of people that can be examined with such a test (that is SMC).

The psychomotor competence test in the form of SMC (more precisely concerning II category of survival school tasks) is a part of innovative agonology, applied science in the field of promotion, prevention, and therapy of all spheres of health, and optimization of activities that enhance survival skills (from a micro to macro scale) [17]. In the recent years, this concept is due to the developing agonology (initiated by Tadeusz Kotarbiński in 1938 [18]) as such have gained a scientific “second life”. Agonology (innovative agonology) – to put it simply – is the science about the broadly understood fight from the micro to the macro scales [19-25]. The aspect of sports fight and micro scale fight is reflected in the described psychomotor SMC competence test. Contrary to appearances, the importance of research on the structure and dynamics of combat, as well as analyses of profiles of outstanding combat sport athletes (not only limited to their effectiveness) will increase [26-36]. This knowledge is essential for experts who will create modern defence education programs in the near future.

The aim of this study is recommendation a psychomotor competency test SMC as a tool for modern defence education.

MATERIAL AND METHODS

The structure and description of SMC.

Participants: teams of 4 persons.

Clothing and equipment: competition No. 1 – military uniform, military pistol – for soldiers (pneumatic or laser weapons – for other participants); competition No. 2 – military uniform, mask (goggles), paintball guns; competition No. 3 – military uniform (without a belt and shoes).

The method of conducting SMC

The competition lasts one day follows the order: 800 m run ending with shooting with a military pistol (competition No. 1); paintball battle (competition No. 2); hand-to-hand fight based on a modified sumo formula (competition No. 3).

The competition program

Competition No. 1 800 m run ending with shooting

It was established that competition No. 1 simulates the use of weapons in a direct fight. This competition represents targeted physical fitness (shooting at stationary targets).

The starting point is marked at a distance of 800 meters from an opening line of fire on a shooting range. The chosen area must be flat. Competing teams (two each) start running after hearing the “START” command (combined with the start of a stopwatch). Once they reach the opening line of fire, each competitor stands in an assigned position. There is a pistol in the designated area and a loaded clip (arranged on a stool) is located next to it. A competitor needs to stand in their most comfortable shooting position (it is allowed to hold a pistol in both hands during shooting). Then the competitor loads the pistol without a command and shoots five times. The end of shooting should be signalled by raising a hand, which is simultaneous with pausing the stopwatch when the shooting is completed by the last competitor of the team.

Competition No. 2 paintball battle

Special physical fitness diagnosed by this task resembled performance in several consecutive short fights in a direct fight with the use of weapons. It was established that high special fitness was indicated by a higher number of victorious fights.

The battle takes place on a 25 m x 50 m field. There are from six to eight obstacles that can be used for hiding on each half of the field. Teams of four engage in the battle, which is designed to be between “one team against another”. The time slot of each battle is limited to 10 minutes. Each participant has a paintball gun (provided by an organizer of the competition) and 16 pieces of ammunition for this weapon.

The aim of the battle is to cross an “opponent’s base” (a starting line of the opponent’s team), not allowing (using paintball guns) the opponent to accomplish this task themselves.

Rules:

1. A chief referee starts a game by shouting words “ATTENTION! START!” and then whistles. The game is ended by the chief referee by shouting words “END OF FIGHT!” and then a whistle.
2. If a dangerous situation occurs, a referee observing such a situation may give a signal to another referee to stop the game. Other referees shall immediately stop all actions on the battlefield. The battle is paused for the duration of this situation.
3. A competitor may be excluded from the battlefield: for any valid hits; due to surrender, or leaving the battlefield upon one’s own decision; for not following the rules of behaviour towards a member of one’s own team; for unsportsmanlike conduct.
4. The battle ends when: at least one player (member) of an opposing team crosses an “opponent’s base”; all competitors are eliminated; 10 minutes elapses since the start of a battle (any breaks are not included in the time of a battle).
5. Competitors are not allowed to bring tools or other prohibited items to the battlefield.
6. Competitors that are not eliminated may exchange markers among themselves.
7. An eliminated competitor must leave the battlefield with all equipment they had or were carrying at the time of elimination.
8. Competitors who are eliminated, immediately after their elimination, must leave the battlefield by the shortest route or by a route indicated by a referee.
9. All non-eliminated competitors at the end of every battle must appear in person at the exit from the battlefield to be checked by a referee for any hits. If any of them are found, a team loses the battle.
10. Situations in which paint control occurs: an area occupied by a competitor is attacked and it cannot be directly observed by a referee; a place where a ball can break is not visible for a referee; a referee is asked by another referee to inspect paint.
11. A referee should, if possible, check paint without declaring a player neutral. The referee who declares a player neutral should do so in a way that is clear to other players. They should stand over a player and loudly shout words “I AM CHECKING” and hold their hands above their head or wave them at the same time.
12. A competitor who is not neutral may be eliminated during a paint inspection.
13. A competitor is eliminated if they are hit by a competitor of an opposing team or their own team on any part of their body, including carried equipment. A ball has to crash onto the competitor. If the ball hits the player or their equipment but does not crash and does not leave a mark, that player cannot be eliminated.
14. A player who is eliminated from the game, without removing their eye protection raises an upright hand in the air, and then leaves the battlefield. They may not speak to other players or give them signs.
15. A player must be eliminated from the game if the following happens: being hit with a paintball marker which leaves a paint mark of about 1cm; declaring own exclusion from the battle, which once made cannot be revoked.
16. A competitor shall be eliminated if any part of their body or carried equipment extends beyond borders of the battlefield.

17. A player who “wipes paint” – that is, actively and deliberately removes traces of paint to avoid elimination or ignores calls from a referee – is immediately removed from the battle, while the team must be disqualified.
18. The minimum distance allowed for shooting is 5 meters.
19. Hand-to-hand fight is prohibited.

Competition No. 3 – *hand-to-hand fight based on a modified sumo formula system* (“testing fights in a vertical posture” – TFVP, see glossary). Special physical fitness determined by this task was related to performance effectiveness in several consecutive short fights in unarmed direct confrontation. The assumption was made that the optimal way to resolve a dangerous situation is to use only mild means of fight and avoid unjustified injury to a competitor.

Fights take place on a judo mat, within a circle with a radius of 180 cm. The aim of this fight is to push an opponent out of a field (circle), or to make them fall.

Scoring rules for the sports formula

Competition No. 1 800 m run ending with shooting

The end of shooting is signalled by raising a hand and is simultaneous with a stopwatch. The time when shooting by the last competitor occurs is counted as the team’s time. Even if only one competitor fails to complete the competition, a team gets 0 points. The score is determined by points calculated in the following way: the completion time of the task (by the last competitor) in seconds is converted into points, e.g. 200s = 200 points (the first variable). Then points are summed as follows: the number of hits is calculated (each hit equals to 1 point). Subsequently, points are added (the sum of points is the second variable).

The final result of the competition is the subtraction of the two variables. Thus: 200 points – 160 points = 40 points. In order to avoid mathematical complications and errors in determining the final result of the competition, the score of 0 points obtained in the first task is recorded as 0.99, and any negative result is multiplied first by 0.01 and then subtracted from the value of 0.99.

Competition No. 2 paintball battle

The aim of this battle is to cross an “opponent’s base” (starting line), not allowing (with the use of paintball guns) an opponent to accomplish this task themselves. If the battle is not resolved within 10 minutes, competitors remain in their places and run to the opponent’s “base” at a referee’s signal. A team whose player reaches the “opponent’s base” (starting line) first is the winner. Individual scoring is excluded. A draw is possible.

Competition No. 3 hand-to-hand fight based on a modified sumo formula

The following rules apply during the fight:

- each time an opponent is pushed out of a field (circle), or an opponent is pushed to touch the ground with a part of their body other than their foot 1 point is awarded,
- no penalties are applied for a defensive way of resolving fights,
- the fight ends when one of competitors obtains 3 points,
- competitors fight “against one another” within pairs of teams; i.e., the lightest player of A team fights the lightest player of B team, etc.

The result of fights is determined by the number of points obtained. The winner is the team whose players: won more individual fights; in the event of a draw, overtime takes place between the selected pair of players. Overtime shall be conducted according to the same rules, i.e. until 3 points are scored.

For the aims of this competition, the following scoring criteria for teams shall be used: 3 points means victory; 0 points means loss.

Final scoring rules

The results of SMC reflect a number of tasks in a simulated action in a isolated environment consisting of a short escape (chase), the use of firearms immediately after a run, the use of weapons in direct confrontation with several opponents, and participating in several consecutive fights in direct confrontation without the use of weapons. The score from individual competitions and the overall test is demonstrated in the form of points. The overall score of the multidisciplinary competition is the sum of points obtained in these three tasks.

The final score:

Team's victory in SMC is determined by the sum of "big" points gained in three competitions.

For each competition, the last team gets 0 points, each subsequent (higher ranked) 1 point more, and the winning team gets an additional 1 point.

In the event of a draw, the result of a direct fight in competition No. 3 determines the place of a team in the final classification.

Rules of assessing psychomotor competences of soldiers in a micro scale fight

The criterion of psychomotor competence in effective fighting for survival is identified with the help of evaluation of the quality of performance of several tasks in a simulated action in isolation, consisting of the use of firearms after a run, engaging in a battle on a paintball battlefield, and in several consecutive short fights in a direct fight.

Performance effectiveness of competition No. 1 (800 m run ending with shooting) was assessed by four indicators: the running time ended with shooting, proportion of hits on the target, accuracy of hitting the target. Performance effectiveness of competition No. 2 (paintball battle) was assessed by three indicators: proportion of eliminated opponents by a group from a battle (competitors that are hit with air guns with collared ammunition), proportion of evaded hits; victories achieved by a group. Performance effectiveness of competition No. 3 (hand-to-hand fight based on a modified sumo formula) was assessed by two indicators: proportion of victories and proportion of effective actions of fighting parties. The arithmetic average of each indicator (eight in total) determined the conventional survival probability ratio.

Specific indicators of effectiveness of the implemented tasks of SMC were defined and calculated as follows:

Competition No. 1 800 m run ending with shooting

The running time and shooting of each competitor are proportion (in percentage points) of the best score, that is, the ratio of that time to the shortest time that a specific competitor needed to hit

the target with at least two bullets. For example, if the best score is 250 seconds, the "proportion of the best score" for a competitor who did the run and shoot in 500 seconds is 0 percentage points. 50 percentage points are calculated for an individual who completed the run and fired five shots in 375 seconds.

Proportion of hits on the target is the ratio (in percentage points) of the number of bullet hits on the target by the tested individual to the number of possible hits (in the described test the number is five). For example, five hits on the target meant that a tested competitor documented an efficiency level of 100 percentage points. In the case of hitting the target with two bullets, the ratio is 40 percentage points.

Accuracy of hits is measured by proportion (in percentage points) of the sum of points that is assigned to individual shots, to the possible sum of points in the case of hitting all the bullets in the area of the target combined with the most valuable result.

Competition No. 2 paintball battle

Proportion of eliminated opponents (by a group) is the ratio (expressed in percentage points) of the number of eliminated opponents in all battles to the number of opponents that can, theoretically, be eliminated in each battle. In the case of the described test, this number is 20. Eliminating 10 opponents means an indicator value is equal to 50 percentage points.

Proportion of evaded hits is an indicator (expressed in percentage points) calculated individually for each competitor. In the case of engaging in (as in the described test) five team battles, the result of a competitor who avoided elimination is estimated at 100 percentage points. The evaded hit efficiency of a competitor who was eliminated in two battles is equal to 60 percentage points.

Proportion of (group) victories is the ratio (in percentage points) of the number of paintball battles won by a group against groups participating in the competition, to the number of battles (in the described test the number is five). For example, five victorious battles meant that the tested team documented efficiency of 100 percentage points. In the case of winning two battles, the ratio is equal to 40 percentage points.

Competition No. 3 – *hand-to-hand fight based on a modified sumo formula*

Proportion of victories is the ratio (in percentage points) of the number of hand-to-hand fights won by a given competitor to the number of fights (in the described test the number is five). For example, five victorious fights meant that the tested competitor documented efficiency of 100 percentage points. In the case of winning two fights, the ratio is equal to 40 percentage points.

Proportion of effective actions of the fighting parties is the ratio of the number of points awarded for each pushing of an opponent out of the circle or causing them to touch the ground with any part of their body other than their foot, in all fights, to the sum of this amount and the number of points awarded for such actions to all opponents with whom the tested competitor fought (the structure index calculated in this way is multiplied by one hundred and calculated in percentage points). In the case of 15 points (victory in five fights) and in the absence of efficiency on the part of opponents with whom a competitor fought, this indicator (calculated in points) is equal to 100 percentage points. When the tested competitor won all five fights, and effectiveness of opponents is estimated by the sum of points equal to 10, the indicator for the winner is 60 percentage points.

CONCLUSIONS

The psychomotor competency test presented in this article called SMC is a set of three tasks that reflect potential armed fight situations on a micro scale. This test can be implemented in two dimensions. The first one is related to the sports factor, like many other utilitarian competitions, as a sports competition between teams. There were similar competitions in the Polish Army such as a patrol run [37], defensive biathlon [38], and competitions of the “fit as soldiers” series among civilians. The sports dimension can be implemented to promote pro-defence behaviour. In such a case, sports scoring should be introduced, as in the rules shown above. The proposed multidisciplinary competition may draw attention thanks to the fact that nowadays young people are considerably interested in ASG (Air Short Gun) or paintball guns, and politicians support development of shooting skills by young people. The multidisciplinary competition can

be conducted with great success in uniformed classes, pro-defence organizations, and military academies. The described formula for the competition allows changes to the rules of the competition in order to adapt them to a given environment. Changes can concern:

- choice of weapons used for shooting (e.g., military pistol, pneumatic weapon, paintball gun, laser gun, and even simunition weapons [39]),
- clothes of players (military uniforms, sportswear),
- hand-to-hand fight formulas (e.g., based on a simplified sumo formula, judo, kick boxing),
- the number of people in a team (including gender, for instance mixed teams),
- dimensions and locations of a paintball field (e.g., natural terrain, designated field on a sports field).

The second dimension concerns the assessment of psychomotor competences of soldiers (including task forces). Such assessment should be carried out for commanders (military decision-makers). In this approach, the level of psychomotor competence should be assessed based on eight performance indicators defined in this work to finally calculate the conventional survival probability ratio. Individual indicators provide important information about potential performance capabilities of soldiers (groups) in a real-life fight environment. Commanders receive information on individual soldier’s predisposition (e.g., shooting performance after a run; hand-to-hand fight performance), and group’s predisposition (e.g., during paintball fights). Based on obtained indicators, a profile of psychomotor competence of a group or an individual (soldier) can be developed.

The test can be conducted among soldiers and officers of other uniformed services who perform tasks on a micro scale or are exposed to actions in isolated situations. The test is part of the trend of modern defence education which uses physical culture measures [38]. This has been observed in recent years at universities, where specializations in “physical education in uniformed services,” “physical fitness in special forces,” or “sports and security” have emerged.

Furthermore, this attractive tool SMC (on the one hand, a modern test, on the other – the possibility of sports competition) is dedicated precisely from the perspective of wide application in defence education focused on survival. This research and educational proposal, in the face of a real threat of an escalation of Russian aggression, can be widely used in extracurricular physical activity of young people.

SMC is a tool that is used to diagnose and improve the psychomotor competency of small task groups (micro scale). However, combining this new, necessary didactic specialization is rather difficult to combine with professional competences, gaining popularity of personal trainers [40]. It is more reasonable to include SMC as methodological and educational support for many innovative recommendations related to both personal security [41, 42, 39, 43-50] and the development of innovative agonology.

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