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Training of psychomotor adaptation – a key factor in teaching self-defence

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D Data interpretation
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Summary

The paper discusses the principal elements of training the psychomotor adaptation, as a part of a modern concept of self-defence. Such training contains methods and means of a general as well as of a composite but specific preparation for hand-to-hand fights. General training consists of improving mental disposition and motor skills (fitness and co-ordination), or maintaining them at a certain level, the specific one consisting of applying physical and mental (including the intellectual ones) stimuli as part of the psychomotor adaptation training. The exercises used in that latter training were classified into 15 categories arranged so that the highest category numbers correspond to greatest concordance of given motor task to real situation (a defensive action). Thus, number 15 corresponds to simulated defensive fights of one against a group of attackers.

Key words: **Training • Psychomotor adaptation • Self-defence • Combat sports • Martial arts**

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Introduction

The need for a defensive training is due to increase for at least two reasons. First, the feeling of safety, both in micro and macro scales, does not diminish despite a progressing globalisation. On the contrary, the pathology of violence and aggression increasingly touches families, schools, international and business relations, etc., and appears to be the result of clashes between diverse cultures, ideologies, religions, and the like. Second, the increasing flow of publications providing knowledge about a positive impact of competent self-defence training combined with martial arts and combat sports, motivates people to undertake such training. Namely, those who do not train combat sports or martial arts significantly more frequently indicate the shaping of self-defence as the motive for possible undertaking such training, compared with those who train, and who indicate improvement of their physical fitness, health, well-being, etc. [17].

The often incompetent presentation of combat sports and martial arts in mass media makes the right perception of self-defence training as a way to shape a subject physically, morally and socially very difficult. The attractiveness of a combat, especially a hand-to-hand fight, for spectators arouses tendencies to present such events in electronic media in a gladiatorial manner. In effect, competitions like judo, sambo or sumo are being displaced by combats based on applying blows, kicks, etc., without serious limitations by rules.

The aim of this study was thus to present the key elements of psychomotor adaptation as a basis of a modern preparation for shaping self-defence.

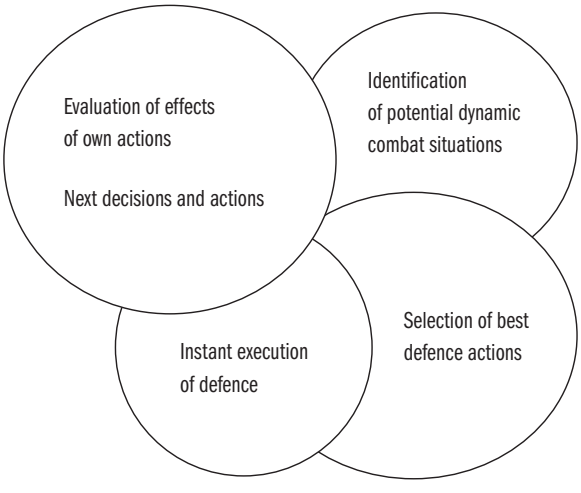

Figure 1. General model of four interacting dimensions of psychomotor abilities determining an effective self-defence.

General premises and foundations of psychomotor adaptation

We assume that high self-defence skills may be acquired only through a composite but specific preparation for hand-to-hand fights called, generally, psychomotor adaptation training. This represents mental and bodily training, its principal objective being integration of four dimensions of psychomotor abilities (Fig. 1):

- The ability to identify potential dynamic combat situations through a fast and accurate observation, as well as anticipation and intuition;
- The ability to select optimum defence actions;
- The ability to an instant execution of defence by motor or verbal means only, or both combined;
- The ability to evaluate the effects of own actions, which determine the next decisions and actions.

Self-defence, regarded as a simple or complex psychomotor act executed to fulfil the biological and psycho-emotional need for safety, is an intense response to hazardous stimuli. Since such stimuli mobilise the organism to a defensive response ("fight or flight"), which is an adaptive one, a competent teaching defensive behaviours ought to emphasise potential hazards and simulated forms of aggression (attack), which would require various motor and/or verbal responses. Every form of self-defence, best countering the aggressor's behaviour, is the product of an efficient mental performance, which includes perceiving or anticipating a threat, an instant assessing ways and chances of counteraction, and controlling own motor actions adjusting them to the opponent's behaviour and to other circumstances.

The technique of self-defence: The motor technique of self-defence should be viewed in relation to circumstances which call for self-defence, adjusted to the degree of the threat and own defensive potential [10]. Thus, the technique of self-defence may be defined as a specific sequence of movements constituting a partial or total resolving of various dynamic situations of a defence against an aggressor.

In contrast to that view, the praxeological meaning of the technique of self-defence may be reduced to the general set rules, directives, tricks, recommendations and methods applicable to fights, in this case to fights for survival, in a broad sense of this term [18,23]. Thus, the praxeological view includes certain categories of preventive measures, verbal counteractions, as well as the technique of self-defence in the narrow sense.

An inspiring role of sports and of playing music: The concept of motor technique (in the narrow sense) of self-defence coincides with the views of many researchers and sport training specialists who emphasise that the proficiency in individual movements, i.e. in sport technique, called also closed sensomotor habits, does not necessarily constitute a set of skills needed in individual (one-to-one, like in tennis) or team games, or in combat sports. In all those cases, habitually open behaviours and responses to varying outer factors and the ability to an efficient performance of movements in dynamically different situations of a struggle against a real opponent are of utmost importance [2,4,27]. Some authors rightly state that psychomotor skills cannot be acquired by multiple repetitions of given motor pattern without considering the importance of feedback between cognitive processes and motor actions [2,26,30]. Similar view was also presented by Tadeusz Wroński [33], an outstanding music virtuoso and teacher, who warned against a 'spiritual sleep' while teaching instrumental techniques devoid of perception and imagination, and advised that the feedback between mental decisions, body movements and their effects, and perception of those effects and subsequent decisions, be stimulated and enhanced.

Those observations pertaining to the development of skills in body movement control in sports and in the art of playing music ought to be considered when teaching a just self-defence and martial arts. We believe that the gist of such teaching is that the perceptual/motor actions be executed in relation to the circumstances of a fight (tactical teaching) instead of repeating isolated, pre-programmed movements. Miyamato Musashi [19], the greatest Japanese fencer in history, repeatedly emphasised in his considerations on martial arts that every technique had its advantages and drawbacks and that the key factor in achieving victory was the tactical wisdom of the fighter. That wisdom consists of the ability to create an advantageous combat situation, to take over the initiative, to strip the opponent of self-confidence and mental balance (*technique*, in a broad sense), and of selecting an appropriate *technique* (in a narrow sense, i.e. appropriate motor actions) and maintaining an advantageous rhythm of fight, adequate to opponent's behaviour (the necessary element of *psychomotor adaptation*, containing combat technique in the broad and narrow senses).

The importance of mind and of general physical fitness: The preparation for self-defence calls for becoming proficient in a much wider range of motor and perceptive defensive actions, compared with that needed in combat sports, as well as for improving the necessary skills under variable conditions (ground, dress, shoes, environment, etc.). The principal defensive asset in a combat, in which the attacker observes no rules whatever, is the mental performance: self-control, reflex, instant and accurate assessment of the situation, unhesitating actions anticipating the attacker's ones, combined with the ability to adjust own actions to the circumstances and principles of biomechanics.

Many a sport theorist and practitioner attach great importance to a high physical fitness. In our view, the important feature is a general motor fitness, adjusted to the *individual* level of motor abilities, especially those reflected by speed and explosive strength. As follows from our recent studies [16], a subject dominating over his/her opponents with respect to the level of the general physical fitness (reflected by the widely used motor tests) will not necessarily become the winner in a hand-to-hand fight. That view proved true in case of subjects inexperienced in hand-to-hand fights, as well as of those who trained intensely for over a year, and is in agreement with the report of Sterkowicz and Madejski [31], who studied isometric force of hands in grips used in *hapkido* and found that grip quality in a defensive fight was more important than its absolute strength.

Despite numerous studies on the so-called general physical fitness, the terminology, motor tests, prediction norms for combat sports or combat arts (self-defence), remain equivocal. For example, in spite of a high similarity of the way of concluding a judo or wrestling contest, the tests meant to evaluate the general fitness of competitors or of those selected for those sports remain highly diversified [12].

Limitations of specialising in given combat sport: The requirements of a high degree of readiness for defence call for supplementing the combat sport training. For example, the training in wrestling sports is directed at improving strength and clinch-related skills, but not at dexterity in avoiding knife attacks or in delivering rapid blows and kicks. The need of overcoming limitations typical of individual combat sports and arts can be seen in the development of leading *budo* masters, whose outstanding self-defence capabilities are the result of long-lasting practising various systems of hand-to-hand fights [1].

As follows from movement ranges in various combat sports presented in Table 1, some sports enable achieving motor competence (or technical skills) in some defence-related actions, e.g. protection from blows (boxing) or blows and kicks (kick-boxing) in vertical position only, other situations like horizontal

Table 1. Elements of combat sports and martial arts formally acknowledged as forms and means of training specific psychomotor competences in the areas of sport fight and self-defence.

Activities	Conditioning skills	Sport fight		Self-defence					Throws and floors	Holds	Levers	Choking	Blows (hand-delivered)	Kicks	Actions using sport weapons	Actions using weapons, dummy weapons or other tools	Movement forms (kata)	Breaking/smashing objects	Meditation
		Position:		Forms		Against attackers, by using:													
	Safe falling	Vertical	Horizontal	Codified	Open	Grips/throws	Blows	Weapons/objects											
Combat sports																			
Boxing		✔											✔						
Judo	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔					✔		✔
Ju-jitsu	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔		✔
Karate		✔			✔	✔	✔	✔	✔		✔		✔	✔		✔	✔	✔	✔
Kendo		✔													✔	✔	✔		✔
Kick boxing		✔											✔	✔					
Fencing		✔													✔				
Taekwondo WTF		✔			✔	✔	✔	✔	✔		✔		✔	✔			✔	✔	✔
Unifight	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔			
Wrestling	✔	✔	✔			✔			✔	✔									
Combat arts																			
Aikido	✔				✔	✔	✔	✔	✔		✔		✔			✔	✔		✔
Hapkido	✔				✔	✔	✔	✔	✔		✔	✔	✔	✔		✔	✔		✔
Krav maga					✔	✔	✔	✔	✔		✔	✔	✔	✔		✔			

position, defence against grips, choking, throwing, etc., being ignored. On the other hand, in wrestling-type sports the training in defence against various kinds of blows is, practically, non-existent. Some combat sports and arts (e.g. judo or taekwon-do), based on a versatile technical training in hand-to-hand fights against an armed or unarmed opponent, tend now to orient athletes towards achieving sport results, as reflected by teaching only techniques useful in sport competition. The formally acknowledged in those sports forms and means of teaching psychomotor competences specific for self-defence are being disregarded, as about 50% of judo and taekwon-do instructors teach exclusively sport techniques. This should be viewed with due criticism, considering the needs of self-defence, since in contrast to real life, sport combats are relatively safe, as the participants ought to be of comparable weight, properly dressed, the contest being performed on special ground, according to regulations and referees' commands.

The benefits of combat sports and plays: The combat sport-specific limitations do not shatter the advantages of sport combat as the most intensive method of teaching hand-to-hand fights, indispensable for developing skills in psychomotor adaptation to variable situations and external conditions, even when applied in simplified or play forms. Diverse forms of sport combat create conditions which are vital for training skills in hand-to-hand fights, e.g. elements of surprise, rapid situational changes, the need to avoid opponent's attacks and to control his/her actions in cases when the control of own movements and actions is hampered by fatigue and opponent's actions [25,30]. However, intense self-defence training by practising sport combat, requires some indispensable background in motor abilities (especially co-ordination abilities) and skills (motor competence) which are a prerequisite to learn some self-defence techniques, e.g. falling skills for learning throws. It is thus advantageous to apply at the beginning exercises in psychomotor adjustment to partner's movements, to employ the instructor as a "live training device", to use tennis balls etc., and to spend more time on combat plays. The latter ones provide the element of necessary competition; the players create various conventional threats which, in turn, enable training

skills in dealing with those threats and in purposeful defensive habits. Combat plays are also excellent means to stimulate bravery, perceptiveness, reflex and physical fitness directed at self-defence [15].

The right use and amplification of own bodily power: Teaching the right use of own body in everyday life and in a hand-to-hand fight is an important element of the holistic training in psychomotor adaptation to the defensive fight. An improvement in appropriate skills enables enhancing the efficacy in the necessary defence, greatly prevents injuries and degenerative diseases, and improves the life quality and social functioning [8,9]. The prominent far-Eastern *budo* educators often stress the need of mastering the use of own mind and body and express the view that martial art training represents an original method of psychomotor meditation on own existence in the world and of improvement of its personal and social qualities. Further, it is a way of shaping psychomotor energy of a human being and his/her satisfaction of life, as well as of shaping the ability of exploiting the accessible energy sources of the nature, own power and body structure for the purpose of a just self-defence*.

The capacity to execute purposeful, powerful movements in decisive moments of a fight is one of the principal factors determining the motor efficacy of a defensive combat. That capacity ought thus to be steadily improved, making use of the vast experience of *budo* arts and sports, as well as of the contemporary knowledge of biomechanics. Unlike the classical strength training, a specific co-ordination training, directed at generating additional forces initiating the execution of specific movements and at a rapid and precise transfer of those forces, may increase the power of movements up to several-fold [6,7,27]. Those additional initiating forces may be knowingly generated in various segments of the locomotor apparatus as the result of a fast sequence of eccentric and concentric muscle work, of rotational movements of the trunk and hips, of translocation of the body mass centre, and of adequate leg work. The training in the generation and transfer of those forces is based on the presumption that all segments and muscles of human locomotor apparatus may be regarded as a complex of elastic, interlinked bands. The concept of elastic muscle bands, stretching during body movements, cumulating and transmitting kinetic energy, has been forwarded in many publications [6,22,27]. That energy may be made use of both in sports and in necessary defence and the effects may be amplified by adjusting own movements to the mode and direction of aggressor's actions or to natural powers.

The usefulness of an appropriate automation of some movements is in making mental processes free of controlling individual movements for the purpose of making them available for global control of the action – tactical assessment of given situation, adjustment of actions to given combat situation and evaluation of the results [3,30].

Psychomotor self-control: Preparations for a fair self-defence ought to include exercises directed at improving the ability of psycho-physical self-control, indispensable for an efficient performance under extremely hard and stressful conditions associated with threatening physical aggression. The skills in self-control enable preventing the stress-induced side effects, which restrict the mental and motor fitness.

The importance of the ability to control stress and of muscle relaxation in a hand-to-hand fight is emphasised by *budo* experts [5,7,11,14,32] and by military textbooks on hand-to-hand fights. Ron Shillingford [28] stated that every efficient technique of hand-to-hand fights consists of a harmonious interplay of muscle tension and relaxation combined with accurate decisions, and that no rapid and efficient movements can be executed without first relaxing the muscles involved. Similar opinions have been forwarded by experts in sport training [6,30].

General criteria of studying psychomotor adaptation and optimising training methodology

The premises and assumptions of a modern system of self-defence, based on psychomotor adaptation training, enable formulating general research guidelines in that area. Of prime importance is designing accurate and reliable methods that would enable the following:

1 – Identifying potential dynamic fight situations,
2 – Selecting the best defensive actions,
3 – An instant execution of defence,
4 – Assessment of effects of own actions which, in turn, determine the subsequent decisions and actions.

That, in turn, requires designing specific tests for every issue mentioned above.

The next step is to find out to what extent the results of the recommended motor tests and those used in educational research and psychology (especially those used to study personality features) are correlated with the abovementioned four tests, since it would be safer to conduct relatively simple laboratory measurements for predicting the outcome of teaching self-defence.

* Notes taken at courses and interviews with an *aikido* master, Y. Kurita, and a master in Chinese martial arts, J. Wing Woo

On the other hand, the results of useful specific tests should be correlated with the outcome of practical self-defence tasks, and this proves quite difficult. Namely, in contrast to combat sport competitions conducted under standardised conditions, the results being clearly defined and generally accessible, real defensive fights may be witnessed and recorded by police or safeguards. The evaluation of defensive fights, in order to meet scientific criteria, has to be based on standardised simulations, and simulated fights thus represent specific tests. Therefore, in order to predict the efficacy of defensive fights, the results of the previously mentioned specific tests ought to be correlated with the results of simulated defensive fights at various stages of training.

No such dilemmas exist in sports, where the training management and monitoring fitness of the athletes with respect to competition, are based on four identical elements:

– *Management:* General (versatile**) coaching, goal-directed coaching, specific coaching, correcting actions during a test or tournament fights;

– *Monitoring:* Assessment of the attained level (by applying tests) of the general (versatile) training, goal-directed training, specific training, and of the efficacy of actions during a test or tournament fights.

These two areas, methodological and research, cannot be directly applied to self-defence, the primary obstacle being the lack of competition formula like in combat sports. For that reason, e.g. *aikido* has been practiced exclusively as a self-defence art. Nevertheless, both *aikido* athletes and combat sport athletes are called sportsmen.

Self-defence is the capability to counteract one attacker as well as a group of them, who do not observe any rules. The rating of psychomotor competence in self-defence, closest to a real situation, and thus the best available consists of monitoring training fights of one against a group conducting a conventional attack or, in other words, the result of a simulation. In contrast, sport fight represents a specific method (or means) of psychomotor adaptation to non-standard, albeit defined and codified actions of two competitors.

Taking into account the above considerations, the *defensive training fights* (or simulated fights) and *sport fights* (in training or tournaments, e.g. judo, wrestling or taekwon-do), are classified as the most specific exercises in the training in psychomotor adaptation specifically to self-defence conditions. This emphasis is of importance since training in psychomotor adaptation may be also applied to other activities, e.g. in coaching football players, pilots, drivers, etc.

Probably the essential difference between self-defence and sports (including combat sports) with respect to training in psychomotor adaptation lies in the respective peak capacity. That peak capacity achieved in sports may be maintained for no more than about two weeks in a year, and in some sports (or, rather, in case of certain athletes) for several days only. This is conditioned by genetic factors and adaptive processes which cannot be overridden even by most refined coaching techniques.

In the field of self-defence, the ultimate objective of training is to achieve optimum psycho-physical readiness for defensive fights, i.e. to achieve a sense of comfort, irreplaceable by other feelings. That sense of comfort may be simplified by feeling assured of non-helplessness even in threatening extreme danger, of feeling convinced of being capable to counteract every aggression even when the attacker is superior, of feeling ready to sacrifice own life to save the dearest and to stay faithful to universal values, ideals and truth, to value highest own dignity, simultaneously respecting the dignity of others. Such consciousness grows with the degree of self-cognition and positive past experience, and reliably reflects a high status of the "command of own body" [13]. The simplest way to enhance that specific sense of comfort is proper upbringing, caring for bodily and mental health and competent training in self-defence continued life-long. Such training calls for orderliness, high degree of self-control and collaboration with others. Training effects may be also associated with the "efficacy of the spiritual strength", described and discussed by Rudniański [24], but hardly possible to quantify.

Such view on preparing for self-defence in the broad sense, i.e. to survival (beyond the bare defeat of a physical attack), leads to the conclusion that the sport training science terminology is inapplicable directly to describe and formulate the system of continuous training aimed at achieving and maintaining permanent readiness to counteract various threats. In particular, three kinds of coaching for a sport fight ought to be discerned: general (versatile), goal-directed and specific [20,21,29].

** In our opinion, the terms 'general' and 'versatile' should not be used interchangeably and irrespectively of the practiced activity. A subject may be regarded as 'versatile' in self-defence when capable of protecting him-/herself from blows used in boxing or karate, as well as from grips and holds used in wrestling, judo, ju-jitsu, etc. Thus, 'versatility' is not an absolute quality but a relative one and specific.

When coaching in self-defence (or in survival), two groups of methods and means should be discerned: specific (i.e. versatile) and general. The same terms apply to teaching self-defence in the narrow sense, i.e. to counteracting a physical attack. Specific coaching then refers to engaging own body and mind, as well as available tools, in an efficient, yet honest manner, under every circumstances of a physical attack on given person or other accompanying people.

General means include exercises applied for improving or maintaining motor skills (fitness and co-ordination) and mental disposition. Specific means, in turn, are regarded as the entire system of physical and mental (including intellectual) stimuli applied to psychomotor adaptation training. The degree of similarity of the respective exercises to actions or events taking place in a fight for survival against one or more attackers at close range is the principal criterion of classifying exercises of the specific category. The duration of such actions is not limited, therefore the duration and intensity of the exertion represent detailed classifying criteria for both general and specific means.

Classification of psychomotor adaptation exercises

The exercises designed for composite but specific preparation for self-defence are classified into 15 categories, arranged so that the highest category numbers correspond to greatest concordance of given motor task to real situation (a defensive action). Thus, number 15 corresponds to simulated defensive fights of one against a group of attackers.

Category 1: Adjustment of locomotor functions to external objects, e.g. avoiding collision, selecting the safest way, selecting the best way considering the aim of action and own potential, etc.;

Category 2: Adjustment of body movements to an object manipulated in vertical and horizontal positions;

Category 3: Adjustment of body movements to an object manipulated by the partner or to a set of motor actions performed with partner;

Category 4: Avoiding collision with an approaching object;

Category 5: Avoiding collision with an approaching object and taking control over that object;

Category 6: Safe falling down (whenever happens or when necessary to solve another task) and classification of exercises in teaching safe falls down;

Category 7: Standard exercises in moving, breathing, blowing by using parts of the body or various tools (a stick, *tonfa*, etc.), "struggle with shadows" exercises, considering the conditions of action and time;

Category 8: Delivering and avoiding standard blows;

Category 9: Standard exercises in defence against weapon threat;

Category 10: Avoiding an attempt at gaining control over own body in vertical and horizontal positions (task and play forms);

Category 11: Getting free from grips in vertical and horizontal positions; taking control over opponent's actions (strict and task forms);

Category 12: Motor competence tests in safe falling down – self-defence under conditions of known sequence of actions of subjects engaged;

Category 13: Sport fights under training and tournament conditions, e.g. judo, taekwon-do;

Category 14: Defensive training fights and control fights against the attacker in vertical and horizontal positions;

Category 15: Defensive training fights and control fights of a single subject against a group of attackers.

SUMMARY AND CONCLUSIONS

Every experienced teacher of combat sports and martial arts will have no difficulty in assigning the exercises he/she applies to the above classification. It is, however, important to emphasise that the concept of the psychomotor adaptation training is an open system as far as it concerns self-defence, in contrast to systems, that may be regarded as closed, e.g. *goshin jitsu no kata* in judo. Namely, that open system enables designing any number of exercises within every category, limited only by imagination and perception of self-defence based on psychomotor adaptation and, more importantly, by methodological competence of the instructor. Since that competence, when limited to the motor performance, would not discern a teacher in self-defence and one in a destructive fight, a good and proper mental/ethical competence is of utmost importance in teaching self-defence. That mental/ethical competence includes intellectual factors and interactions based on *budo* philosophy.

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