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Science of martial arts – Example of the dilemma in classifying new interdisciplinary sciences in the global systems of the science evaluation and the social consequences of courageous decisions

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Abstract

If the science has to serve much efficiently the global society, traditional divisions of sciences and detailed classifications are insufficient, mainly for the purpose of scientific management in individual countries. Sport science belongs to one of the newest, recognized by the most important bibliographical databases, of the homogeneous groups of detailed disciplines, within which are appearing specialties evolving more and more towards recognition as another detailed discipline. This example is the science of martial arts. However the most important factor merging specialists from the entire world of this unique knowledge turned out the appearance in 2005 in the global science space the journal Archives of Budo, which has been awarded a 5-Years Impact Factor dating from the starting year. Intuition and courage of Thomson Reuters experts we owe that to this integration happen. Specialists of the science of martial arts next to academic qualifications distinguish black belts of different martial arts. Today the epidemic on a global scale is the return of blood fights of neo-gladiators, which is a key element of continuous education for aggression through electronic media and television channels. Scholars of the science of martial arts are a real force that the effects of this pathology at least partially compensate. After ten years from the onset of the global science space the journal Archives of Budo, which integrates these experts, the effect is visible on the macro scale.

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1. Introduction

There is no single definition of science or scientific method accepted by the community of scholars. Furthermore, there is no uniform position on dating the beginning of science. It is definitely easier to determine the beginnings of the academic activity. Part of intellectual circles tends to consider the Academy of Plato (387 BC to 529) as the prototype of the university. It was seated in an olive grove dedicated to Academos, the Athenian hero, whereas at the entry there was an inscription: “*Let no one enter who is unfamiliar with geometry*”. It is worth to highlight the symbolism of the olive grove and geometry in such order. The priority of reason over material tools (ruler, callipers, etc.) can be observed. In the contemporary world, not only in academic circles, the scientific level is too frequently estimated by the number of laboratories and its equipment and not with the quality of scholars’ minds and ethics of academic communities. The University of Bologna (Italy, 1088) is considered to be the oldest university in Europe. Until today, it is known for teaching canon and civil law, and no laboratories and expensive research equipment is necessary to study law.

Tadeusz Kotarbiński, an eminent Polish philosopher, logician, methodologist of science, the founder of modern praxeology, very generally states that “the science is everything, which is worth to be the subject of intellectual teaching at universities and only at universities as a separate specialty” [1]. This definition was announced by Kotarbiński at the University of Łódź (Poland, 19 October 1957) at the ceremony during which he was granted the honorary doctorate degree.

It is significant that before he decided to formulate his own definition of science, he had performed a synthesis of classification of sciences throughout the centuries [2]: From division of sciences for the use of the Alexandrian library; Through Konrad von Gesner (*Bibliotheca Universalis*, 1545), Francis Bacon (*The two Books on the Proficiency and Advancement of Learning*, 1605, and *De dignitate et augmentis scientiarum*, 1623). He recalled later borrowings of the Bacon’s division to the introduction of *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers* (written by Jean Le Rond d’Alembert *Discours Préliminaire des Éditeurs*) edited by Denis Diderot (1751-1766); The classification of the famous physicist, André Marie Ampeère’a (*Essai sur la philosophie des sciences, ou, Exposition analytique d’une classification naturelle de toutes les connaissances humaines*, 1834). The most original and important classifications of nineteenth century; Original classification of sciences made by Bronisław Ferdynand Trentowski (1873) to three groups: theology – i.e. sciences of another world; cosmopoeia– i.e. sciences of this world; philosophy – i.e. sciences of both worlds. The concise schema of August Comte (*Cours de philosophie positive*, 1830), adopted from Henri de Saint-Simon, which leaves aside all practical and applied sciences. On the other hand, it distinguishes the descriptive science, i.e. specific (e.g. botany, zoology) from general sciences and sciences detached (searching for rights). The influence of Georg Wilhelm Friedrich Hegel on the evolutionary vision of the entire being. Classification of natural science by Friedrich Engels. General division of Wilhelm Wundt on detailed sciences and philosophy. Kotarbiński *inter alia* comments on the dispute between Edmund Husserl and Christopher von Sigwart on the place of formal logic in the family of sciences.

He finishes his review on papers published in the first half of 20th century. In the last footnote, he refers to the division made by John Desmond Bernal (*The Social Function of Science*, 1944) for the purposes of scientific institutions. Kotarbiński emphasises that this fundamental division according to the subjects provides for three main sectors (physical, biologic and social) and combines with the institution’s tasks. Universities (academies) have basic research assigned (analytical and descriptive). Research institutes deal with applied skills which aim either at serving in manufacturing of primary products (e.g. mining engineering, forestry) or production of consumer goods (e.g. pharmacy, tailoring).

It would be risky to use the word “contemporary”, when talking about divisions and classifications of sciences performed at the turn of 20th and 21th centuries, if we agree with Withead that the birth of modern sciences falls onto 16th century of our era [3]. These divisions are in some sense a continuation of Bernal’s assumptions. Currently, the division of science into three large groups: *life sciences; humanities and social sciences; exact sciences and engineering* is common.

Dynamic development of science, more and more linked with various branches of industry, implies *inter alia* the need for accurate administration of science, financial expenditure on research in its various sectors and on the system of education [4,5,6]. As a consequence, we can observe the progressive development of criteria and systems to evaluate scientific achievements, which are either comprehensive or involve a particular groups of science. In

numerous countries, *Impact Factor* was adopted as a universal criterion of evaluation (of publications and researchers) [7,8,9]. Other systems additionally offer evaluation of scientific institutions [10]. *Scientometrics*– the science of measuring and analysing science – was developed.

From the broad social perspective it is difficult to place the usefulness of science in the rigid frames of more or less accurate divisions and detailed classifications. The needs are usually ahead of the intuition of scholars and sometimes even their courage, and as pointed out by Kotarbiński while expressing criticism of Bacon's classification [2], overlooking or underestimating the importance of possible issues neglected.

The aim of this paper is to justify the sense of distinguishing *science of martial arts* as scientific sub-discipline at the boarder of *agonology* (science about struggle) and sport science due to social importance of the issue.

2. Interdisciplinary approach to important issues

The development of science, medicine and technique resulted in the fact that this branch (abbreviated as SMT) stimulated the most daily consumption and imagination of millions of people throughout the world which is difficult to be penetrated *en bloc*. The consumption only of millions but not of all people is stimulated, because there are still vast areas of poverty and backwardness. International space programmes constitute a glorious example of using the possibilities provided by SMT. However, using the products of technical civilisation in extremely shameful purposes is a disaster of educational systems and poor global dialogue – symbolic dimensions of such actions and at the same time a terrifying warning for all people in the world involve using passenger planes by terrorists in the attack on the World Trade Centre (11 September 2001) and by Andreas Lubitz, suicide pilot and murderer of 149 people (24 March 2015).

The centuries-long effort of eminent personalities, careful coordinator of social life and millions of people who trusted those leaders and did not waste their lives or lives of other people lies at the heart of glorious way of using human mind (*homo cogitans*) and creative skills (*homo faber*). Especially as, they did not take their lives in an unfounded manner. In contrast, they saved the life of others, often losing their own (these evidences the effects of positive, creative layer of *homo agonisticus*). Shameful effects of mind and body being used from thousands of years by considerable amount of people can be legitimately assigned to the toxic part of *homo agonisticus*'s nature [11].

Today, in theory, everyone can "conquer" Carthage, Moscow, Chinese wall, etc. for peaceful, cognitive and positively emotional purposes. Apart from the eagerness, all we need is appropriate remuneration for honest work, certainty that a pilot will not become a kamikaze, that passenger plane will not be shot down by the perpetrators, whose identify cannot be established, that a hotel will not blow up, that museums will not become places for mass executions, that food and water will not be poisoned and the air will not be fatally contaminated, etc. Paradoxically, the progress of SMT and possible scope of consumptions are followed by degradation of mental sphere. Paradox is even greater, because even the most enlightened part of the Knowledge Society cannot effectively counteract this in preventive and therapeutic sense [1].

The development of economy, creative and consumption capabilities, experiencing spiritual and material benefits by societies getting rich are the basic premises for establishment at the boundary of medicine physical educations (a reference to the ideals of *kaloskagathos*) as a quasi-scientific discipline. The improvement of life hygiene guaranteed cultivating health and gave opportunity to fulfil own hedonistic needs for a longer period of time. With time, sport science was distinguished (as a clearly interdisciplinary science) [12]. It was preceded by revival of the idea of Olympism which is a sport sense stimulated the development of numerous new disciplines and competitiveness.

Technologic progress opened new possibilities of sport competition (hockey, skiing, cycling, pole vault, etc.), whereas the development of medicine allowed for moving the adaptive boundaries of human organism. However, in a short time, sport became an important instrument used in political struggle. Sport science and in fact certain scholars started to be exploited in an instrumental way. This practice deepens since various fields of sport were professionalised. Stratification of sport into professional one (dominated by the influence of business, media, criminal circles) and healthy ones (unfunded and discriminated in more or less camouflages way) resulted in activation of numerous pathologies (disallowed doping, corruption, brutalisation of sports fight, violence and aggression between entities identifying themselves with a given side – idol, club, national representation, etc., emotions intensified to provoke such behaviours).

3. Education to violence and aggression as chief threat for civilisation

The diagnosis of interpersonal relationships and relations between greater social groups, which are associated with sport, briefly discussed above has either positive or negative or neutral effect on the certain individual in the sense of transferring those experiences to other parts of life (health, sense of personal and family safety, quality and comfort of life, etc.) However, a person who does not care about sport may become an accidental victim of aggressive fights of hooligans. Due to this reason and due to rapidly growing thickening of social environment, sport may not be indifferent for greater number of people. As thick social environment, Jarosław Rudniański understands “people linked to each other with various technological information measures and in a high degree dependent on each other due to mutual connection of their interests; more precisely: impossibility to achieve satisfaction without participation of people from own family circle and even satisfaction of basic needs or their majority” [13, p.27].

Healthy sport requires careful permanent promotion. Imperfect promotion is unfortunately a common problem. In a daily media message (with use of more attractive and diverse technological means of information), the most clear involve information full of sensation, violence and aggression. This narrative is enhanced by a film library of thrillers, horrors and mega hits which in terms of weakly emission hours can be counted into calculation weeks. Competition, which is presented in sport TV programmes, includes neo-gladiator games and blood sports (unfortunately, boxing has a status of the Olympic sport). Those fights make it clear that blood, concussion or massacring of lying man are not products of virtual world. Such intensively and commonly accepted education to aggression has never been observed in the history of human hood. In the past, global population was never affected by this issue.

4. Interdisciplinary character of the science of martial arts

The insight of Tadeusz Kotarbiński continues to inspire. On one hand, while expressing criticism about the Bacon’s paper [2], he was aware that omission or underestimation of significant issues makes each classification of sciences defective (and there is nothing more worthy than well-being of all people). On the other hand, while creating modern praxeology, he did not underestimate the importance of fight in its broadest meaning. On the contrary, Kotarbiński was aware that people develop the greatest amount of energy and smartness when they find themselves in constrained situations. Just in course of a struggle, an adversary does all his efforts to obstruct an action of the other side. There are plenty of such situation in various kinds of struggles [14]. Kotarbiński dealt with fight only in theoretical sense. He established science about struggle, referring to the theory of struggle published in 1938 as “agonology” [11,15]. He also published the principles of independent ethics [16] and made clear reference to fight.

Praxeology – science about good work – formulates efficiency assessments (effective – ineffective), whereas ethics – moral evaluations (fairly – shamefully). The directive which Kotarbiński based on mixed assessments (praxeological and ethical) reflects the depth of the sense of defensive struggle at each level (including self-defence on a micro scale): “To fight, if one has to fight in defence of the closest of the fellow human beings (...). No one should be hated and saving the opponent all necessary misery related to victory and immediately showing active kindness when fight was no longer necessary” [16, p. 201]. This directive reflects the idea of educational and, if certain conditions are met, also healthy sense of education through struggle.

Jigoro Kano followed two parallel paths. Fascinated with ju-jitsu, samurai martial art, he practiced regularly and conducted theoretical studies. He developed coherent system of physical and moral education and called it *judo Kodokan*. In 1882, he officially established the institute of Kodokan, which still functions under the name of *Kodokan Judo Institute*. Forty years after founding the *Kodokan* Kano decided to make public the most general ethical principles of judo: “maximum efficient use of energy” (*seiyoku-zenyo*) and “mutual prosperity for self and others” (*jita-kyoei*) [17]. Nowadays, there are numerous *departments of judo therapy* at Japanese universities. Promotion of healthy aspects of judo dominates in sport. Nevertheless, in the view of global society, judo is known as one of the Olympic disciplines among other combat sports (the first of the Far East origin).

Regardless of the path difference in exploring the issues related to struggle as one of the most recognizable attributes of the human nature (*homo agonisticus* [11]), there is a similarity in methodological approach of both concepts. Kano did not define struggle (he could not have known *agonology* or *praxeology*) and despite this fact, he

classifies issues related to struggle (depending on the level of generalisation) similar to Kotarbiński (Table 1). Kotarbiński in the widest understanding defines “a struggle” as any activity, in which at least two subjects participate (assuming that a team can be a subject) whereas at least one of subjects hinders the other one [14].

Table 1. Classification issues related to struggle depending on the level of generalisation

Level of generalisation	Judo Kodokan (by J. Kano [17])	Agonology (by T. Kotarbiński [14])
“Highest”	people benefit society with their spirit <i>ofseiryokuzenyo</i>	the theory of struggle (in frame of praxeology)
“An intermediate”	one practices aspects of the martial art as physical education and mental education	sport, in political and lawyers’ debates, business competition, partly in education, etc.
“The basement”	one practices methods of attack and defence in <i>randori</i> and <i>kata</i>	a military struggle (an armed one)

The *randori* (combat training) and *kata* (formal exercises) are physical exercises adapted from traditional military training of Samurai (ju-jitsu). In Table 1, the names of the levels of generalisation are taken from the paper written by Kotarbiński [14]. Kano refers to “the basement” as the “lower level” [17]. In scientific terms, particular issues on lower level formulate the theory of combat sport [18] which is supported by specialist knowledge of detailed sciences (physiology, psychology, kinesiology, biomechanics etc.) and hypotheses and theories related to *sport science*. The results of such interdisciplinary studies are moreover applicable in the modern training of soldiers, antiterrorists officers, etc. [19]. Here, the theory of destruction [20] can be applied for military, police, anti-terrorist, etc. purposes.

“An intermediate” (mid-level according to Kano) level of generalisation creates a space for exploration for variety of detailed sciences from two large groups: *life sciences*; *humanities and social sciences*. The theory of combat sport [18] as well as the theory of non-armed struggle [13] and the theory of defensive struggle [21] can be applied here. Practical basis of judo developed by Kano are the key element of *budo* in Japanese system of education (since 1989, three martial arts – judo, kendo, sumo – have been taught in junior high schools, whereas judo and kendo have been taught in high schools) [22]. This level of application of knowledge about struggle has the strongest relationship with the impact through intellectual and practical exploration of various aspects of the fight (e.g. self-defence training) in all dimensions of human health. Therefore, this is the most important social aspect, which support the unit and large teams (to the global effect) through science which could be accepted due to this usefulness as well as fulfilling the formal criteria of treating it as a new scientific discipline (sub-discipline).

The scientific qualities of a *science of martial arts* is determined by the arguments from the “highest” level (upper level according to Kano). Life has verified the necessity to supplement the principle of *seiryokuzenyo*, which in the thirties of the last century was undoubtedly popular and visionary. Kano died in 1938 and did not experience the horrors of the Second World War. Most probably, he did not imagine how in such sophisticated way and on what scale people can comply with the principle of “maximally efficient use of energy” (according to thoughts and interpretations of Jigoro Kano: of body and mind [23]). The author theory of defensive struggle narrows this principle: “maximum effect in the use of the mind and body as well as of other people and (or) material tools solely in decent purposes, i.e. worthy of a man” [21, p. 285]. This principle was empirically verified as the effective method of cognitive-behavioural therapy [24], which is in broad range based on philosophy and practice for judo and *agonology*, and is expressed by Polish experts in the formula *honourable self-defence* [25,26].

4.1. Agonology as a scientific basis of science of martial arts – important sources of inspirations

Agonology, the science about struggle [11,15], is the original achievement of four Polish professors and includes itself in five complete theories [13,14,18,20,21]. Its development occurred in accordance with the principle “from general to specific” [11]. However, neither the main inspirer of *agonology*, Tadeusz Kotarbiński, nor two subsequent followers were inspired by studies of Jigoro Kano and practical side of judo.

Jigoro Kano (1860-1938) drew his main inspiration from practicing martial arts (from “the basement”/the “lower level”), which he started as seventeen-year-old young man (he commenced training in the TenjinShin’yo-ryu tradition of jujitsu in 1887 [17]). Kano gathered the effects of daily judo practice (*randori* and/or *kata*) together with insightful theoretical deductions (philosophical, historical, pedagogical and ethical). System of judo created, developed and promoted by him primarily as a way for moral, intellectual and physical education (combination of the “intermediate” and the “highest” levels, Table 1). The cumulative effect of the practice and theory combined with a well-established, unshakeable attitude of a righteous man – *judo in mind*, guaranteed that the principle of *jita-kyoei* (mutual prosperity for self and others) was fulfilled every day.

Tadeusz Kotarbiński (1886-1981) survived two World Wars but did not experience active armed fight or martial arts training. He constantly practised *agonology* in mind and therefore he practised solely on the “highest” level. Józef Konieczny (1936-1984), the author of the theory of destruction [20], cybernetics, praxeologist, philosopher, colonel, though he graduated from the military, he had no direct experience with the armed struggle. Just as Kotarbiński, he dealt with fight only on theoretical grounds (at the level of mathematic modelling and cybernetics). Jarosław Rudniański (1921-2008), the author of the theory of non-armed struggle [13], participated in the Battle of Monte Cassino (1944) on the side of the Allied forces. He was the student and co-worker of Tadeusz Kotarbiński. His inspirations came from papers of Mahatma Gandhi (1869-1948). Before, he published in 1989 his fundamental paper, *A Compromise and a Struggle*, he also published *The general theory of struggle* (1983) during the Martial law in Poland [27]. This book was for many leaders of the *Solidarity* movement a kind of instruction how to fight with communist regime in a non-violent way. It is difficult to find better recommendation for the theory of non-armed struggle. Lech Walesa, a leader of 10-million *Solidarity* movement overcame the communist regime without violence. The author of the theory of defensive struggle [21] and theory of combat sport [18] was born in 1949. As the last one from living co-creators of *agonology* and at the same time as the only one, he at first drew inspirations from theory and practice of judo (since he was twelve, he constantly trains judo and other martial arts). Directly after the Martial law in Poland ended (1988-1990), he explored *agonology* under the direction of prof. Rudniański.

The dilemma to establish certain expert qualifications in the *science of martial arts* is apparent [28]. The analyses of the effectiveness of police negotiators, experienced law enforcement officials participating in interventions, etc. allow for the conclusion that approx. 20% of such interventions state that, figuratively speaking, “aggression can be disarmed” in a verbal manner. To be precise, there are effective procedures theoretically justified and verified in their practical action, which indicate that limiting education of the law enforcement officials only to the physical dimension of training of martial arts would not be justified. Thus, in the *science of martial arts*, there must be knowledge which was inherited from *inter alia* Mahatma Gandhi.

This perspective clearly reveals how significant is the knowledge about struggle which was left by Jigoro Kano with the chief message to use it for the best possible intellectual, moral and physical development of a human being. The boundary between *judo* and *agonology* is fading already at its current development stage. Both the theory of defensive struggle [21] and theory of combat sport [18] (in particular, this one as the empirical theory) are applicable in practice. Expert in *agonology* does not have to create new system of physical exercises, although there are no formal limitations to create original training programmes and new martial art, e.g. *unifight* [30], a combat sport, which was created after publishing the theory of combat sports. This theory formulates methodological criteria of creating two empirical systems, adequate to study fights on a micro scale – *measuring the dynamics of the fight* (sports and non-sport confrontation) and *methods of bravery measurement* [18]. Therefore, the theory provides reliable tools to research the most significant phenomena in practicing combat sports and all hand-to-hand fights beyond sport. These include the methods of observation and measurements as well as analysis and generalisation of the observations’ results. At the basis of true conclusions, in accordance with the standards of scientific procedures, it is possible to recommend either necessary corrections in practical sphere or the accuracy of the solutions previously adopted. In return, the practice implies new problems. Due to the specificity of fights on a micro scale, problems defined almost always imply the need to solve them in an interdisciplinary manner. However, a clear group of issues relates to the educational fights (with emphasis placed on improving health). The theory of combat sport as the last in creating *agonology* and the closest to the science of martial arts

Theory of combat sports began to be taught at two Polish universities in 2000, i.e. right after it was published [18]. First reports from studies on dynamics of the fight and bravery were even ahead of the publishing date of

the theory of combat sport. It is obvious, because only the positive results of validation procedure allowed to implement both methods measuring these phenomena as reliable research tools of this theory.

A field of theory of combat sports is identified of three domain's set: *pragmatic (P)*, *utilitarian (U)*, *mental (M)*. A set called *pragmatic* includes entirety of these empirical and comprehensive systems that directly link the problems of preparing a sportsman to a struggle being in an immediate clash versus a competitor, his or her actions and behaviours at struggle and when it is over. *Utilitarian* – analogically, entirety of these empirical and comprehensive systems that directly link the problems of preparing a man to a struggle being in an immediate clash versus a competitor, etc. This domain of the combat sports theory is closely connected with the theory of the defensive struggle [21]. *Mental* – empirical and comprehensive systems connected mainly with ethical aspects of preparing a man to a struggle directly encountered by the parties, actions and behaviours in course of a struggle (combat sports and non-sport confrontations) and when it is finished. This domain contains also systems of comprehending to explain and clarify the relations being among these both kinds of struggles of common property – a direct encounter of the parties, during which the actions are directed onto the opponent's body.

An example of cognitive and application benefits of previous uses of theory of combat sport is positively verified by the empirical studies of the accuracy of classification of combat sports based on the criterion of direct fight (i.e. permitted interaction manner on the opponent's body during a fight) – using weapon (fencing, kendo, etc.), strikes (boxing, karate, taekwondo, etc.), throws and holds which restrain body (judo, wrestling, sumo, etc.). There are statistically significant differences of morpho-functional indices of athletes who belong to different groups of those sports [30,31]. Practice has proved that it is necessary to supplement this division of combat sports with a fourth category (which has nothing in common with neo-gladiator games, e.g. MMA): combination of combat sports, e.g. *unifight*[29].

Two courses, one semester each, turned out to become a universal supplement to the lecture of the theory of combat sport. *Combat sports propedeutics – basics of judo* [32]; *Honourable self-defence* [26]. Numerous empirical papers verified positive motor and mental effects of those courses [33]. Extraordinary health effects can be achieved through introducing the elements of martial arts (especially of safe falling exercises) do the educational programme of physiotherapy from the perspective of later application in clinical practice and prevention [34].

5. Conclusion

Nothing today ennoble sciences as the number of scientific journals evaluated by Thompson Reuters devoted to given science and the value of the *Impact Factor* of each journal. The most important factor linking specialists of martial arts from the entire world (of this unique knowledge) turned out to be the journal *Archives of Budo*, which emerged in the global science space in 2005 and has been awarded with a 5-year *Impact Factor* dating from the starting year [35]. It is the experts of Thompson Reuters and their intuition and courage that we one this integration to happen. In the homogeneous group of 96 (in 2013) journals of *sport sciences* and *sport medicine* evaluated by Thomson Reuters, only *Archives of Budo* is devoted to combat sports and martial arts [36].

Another important factor which facilitated the integration of scholars from the entire world, who deal with issues related to the science of martial arts were three editions of *World Scientific Congress of Combat Sports and Martial Arts*. All were held in Rzeszów, Poland (in 2006, 2010, 2014) The first one, devoted entirely to the issues related to enhancing all dimensions of health, increasing the sense of personal safety, improvement of the life quality, counteracting pathologies on the boundary with martial arts will also be held in Poland: *World Congress on Health and Martial Arts in Interdisciplinary Approach* (17-19 September 2015, Czestochowa). Congress took the honorary patronage of Lech Walesa, the Nobel Peace Prize laureate (www.archbudo.com).

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