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Martial Arts and Cognitive Psychology: Toward Further Research
in the Cognitive Aspects of Martial Arts

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Abstract

Psychologists often overlook martial arts as a topic of research. This paper presents evidence that martial arts are sufficiently different from aerobic and anaerobic exercise to warrant a serious investigation by psychology for both theoretical research and clinical applications. Specific theoretical research in the field of cognitive psychology is proposed.

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While Asian martial arts have become very popular in the western world, many scientific circles do not take the study of the martial arts seriously as a topic of research. In some cases, they may suppose that current research efforts in aerobic and anaerobic exercise are sufficient. In other cases, they may believe that there is nothing to be gained by researching such an esoteric area, or that the research is difficult or impossible.

Still others may view the martial arts as a means to placate violence and object for reasons of conscience. Shaler remarks (as cited by Weiser and Kutz, 1995) that the martial arts are “... naught but [a] killing present, anger past, and misery to come in the course of one who studies these arts.” Even so, martial arts are beginning to be understood and appreciated in the last 25 years in the west, primarily for the health and exercise benefits. Weiser and Kutz (1995) note “The Martial Arts (MAs) deserve recognition as worthy of being added to this list of therapeutic practices ... and to the list of supplements to psychotherapy.” It is my intention to add “theoretical research” to this ever-expanding list of non-combat uses for the martial arts, specifically research into the cognitive aspects of martial arts.

Many studies point to the mental health benefits of martial arts, and the link between traditional (aerobic and anaerobic) exercise and martial arts has been noted. To assume that the sole utility in martial arts is the link with exercise would be errant since martial arts have “an additional and enhancing effect” (Weiser and Kutz, 1995). Further the martial arts are noteworthy because they not only do not produce immediate benefits, but they may actually increase anxiety before the benefits take effect (Weiser and Kutz, 1995). Weiser and Kutz (1995) also note that the literature “point[s] out the processes of MAs training ... are similar to those of

verbal psychotherapy” and that these similarities may be linked to the increase of anxiety during initial stages of training.

One of the problems surrounding study into the martial arts is the bewildering number of styles and the disparity of training methods. In my own case I have studied Judo, American Kenpo, Chen style Tai Chi, and I am currently studying Bujinkan Taijutsu. These arts are all distinctly different, both in methodologies and in philosophy - so how does one make a meaningful claim about “the martial arts”?

One way to do this is to study a particular portion of martial arts training, such as guided imagery, sparring, or weapons training. Cai (2000) did a study of Tai Chi that involved three groups. The first group studied self defense integrated with guided imagery, the second Tai Chi integrated with self-defense, and the control group studied only self-defense. In this study the first two groups “showed significantly lower anxiety and depression scores than the traditional single content program” (Cai, 2000). The study noted no significant difference between the guided imagery group and the Tai Chi group. This study shows an example of isolating specific portions of martial arts (in this case, guided imagery and Tai-Chi) and could be expanded on to study other specific portions of martial arts.

This is not the whole solution, however, as the whole can not be concluded to be solely the sum of it’s parts. In the end an exhaustive study of individual martial arts may be deemed necessary, however examining the pieces is a good place to start. If one finds significance in various pieces, then a good hypothesis would be that there is significance in the whole. If one finds no significance in the pieces, then a good hypothesis may be that the whole produces no scientific significance. While both hypotheses require testing, they are reasonable with sufficient evidence – of which the above study provides but one data point.

Most martial arts have a number of things in common. Kihon (“Basics”), Kata (“Forms”), and free response drills are all quite common among martial arts, but there are often philosophical similarities as well. Two of these philosophical similarities are Mushin and “Essence”. Mushin is often translated as “no mind”, or “empty mind” and refers to the state of mind one experiences where one’s concentration is focused externally to the exclusion of “chatter” – the verbal thoughts that often fill our consciousness. Essence is much trickier concept for the martial artist, but for the psychologist there are echoes of cognitive theories. Many martial arts have an overriding philosophy that guides its core, and the Kata (“forms”) are said to be reflections of this “essence”. Once one knows the “essence” of the art, the Kata (“forms”) are no longer needed. Another concept in many martial arts is the Henka, or variation. A Henka is similar to a base form and is supposed to teach the same principles as the original.

Nearly every martial art has a ranking system, or some method of setting the beginner apart from the more experienced practitioner. While this is necessary for training progression, it is also convenient for research purposes as this makes the mental differences between the skill levels easier to track.

Another thing that is common among many martial arts is the desire to generalize what is learned in the training hall to life experiences other than combat. Vockell and Kwak (1990) give an analogy between chess masters and martial artists. They point out that many very good chess players are poor at academic skills, such as reading, writing, and arithmetic. This is not to say that they are not intelligent, but rather that they have not learned to generalize to life, where as others can see the similarities between chess and real life. “One member of the famous Royal Knights chess team recently stated, ‘Chess is like life. If you have a plan, you will make fewer mistakes than you will without a plan’” (Vockell & Kwak, 1990).

These commonalities give us a good place to start our investigations into the potential rewards for research into the cognitive aspects of martial arts. For the rest of this paper I would like to focus on the cognitive aspects of pattern matching, problem solving, prototype creation, perception, consciousness, and creativity.

The martial arts offer us a unique perspective to the pattern-matching problem. Some Kata (“forms”) have been designed for two or more participants and free sparring provides a unique perspective as well. During both of these exercises, the martial artist is forced to quickly determine a number of attributes about their partner, including such things as foot position, attitude, hand position, distancing, and so on. While I have seen a number of studies published on static pattern recognition, there are much fewer on moving pattern recognition, and even fewer on moving pattern recognition under stress. What differences are there between the three states? What differences are there when movement of the subject is involved? What are the effects of stress on pattern matching? What are the effects of pattern matching under stress while simultaneously undergoing movement?

Unfortunately the nature of these exercises limits the types of experimental data that can be gathered. Some methods, such as the MRI require the subject to be immobile, while others require the subject to wear expensive equipment that can be easily dislodged by vigorous activity. However technological advances may assist in this area once a need is shown. Eye tracking, for instance, has made tremendous advances. A safe device can now be created to do eye tracking on a moving subject, and this can be used to determine the visual aspects of pattern matching of the martial artist. How does eye movement differ between expert martial artists and novices? What can this tell us about pattern matching under stress?

Henka (“variation”) are another potential area of pattern matching research - one which is much easier to deal with. The concept behind Henka is that it is similar in principle to a Kata (“form”), but with visual dissimilarities. Interesting questions can then be posed such as “what is the accuracy rate of various practitioners in determining the base Kata from a Henka? How long does it take? How does this compare between various skill levels? How does this compare to standard visual pattern matching tasks? Is there a link between visual pattern matching efficacy and motion pattern matching efficacy?” The last question is, perhaps, the most interesting one.

Problem solving is also another area of potential research. Solso (2001, p. 452) defines problem solving as “thinking that is directed toward the solving of a specific problem that involves both the formation of responses and the selection among possible responses.” In the case of martial arts both free response exercises and multi-person forms may provide an interesting window into the subject, though free response exercises would seem to be the most promising. In free response exercises, there are at least two problems present: “how do I keep my opponent from defeating me?” and “how do I defeat them?”

Martial artists typically have a number of responses to choose from as well, including striking, grappling, and exotic moves. The question of what goes into a successful problem response under these conditions is interesting, as is the nature of the solution and the conditions that it was derived under. Typically, there is a very small window of time, and the solution must be determined and executed within that window. Also it is generally expected that the solution is will be arrived at while in a Mushin (“chatterless”) state. In typical problem solving examples (c.f. Solso, 2001, ch. 15) the verbal thoughts are important to the solution. How is the problem solving process different when verbal thoughts are limited or disallowed completely? Given the parameters of the exercise, one may hypothesize that the process will be different, but what if it

isn't? What does that say about our problem solving process? What would it say if it was different?

Another interesting possibility for research is the concept of prototype formation. What does it mean when we claim that a particular technique looks like a “Koto Ryu” technique? Does practicing Kata (“forms”) in a certain manner create a prototype of a successful response? Is this the same as what the martial artists call “essence”? Is there a link between static visual prototype formation (such as learning faces) and prototyping the “essence” of an art?

Solso (2001, 132) holds that a “prototype is an abstraction of a set of stimuli that embodies many similar forms of the same pattern.” That martial arts training produces a wide variety of stimuli would generally not be disputed, so the question then is whether learning the Kata (“forms”) and then testing them with free response could be related to, or the same as, prototype formation.

Typically prototype matching is considered to be part of the “pattern matching” field, but what if one hypothesizes that the prototyping structures within the body-mind are available for other functions as well – such as problem solving? Would this give rise to being able to generalize more efficiently between the martial arts and real life?

One may also wonder about generalizing other portions of pattern matching, such as gestalt theory, canonic perspectives, and feature analysis. Indeed, an alternate translation of Kata is “pattern”, so one may wonder how much of a link there is between Kata and pattern matching. Are Kata related to “canonic perspectives”? Is feature analysis an important part of the learning process?

Solso (2001, p. 138 - 39) notes that a study done by Chase and Simon on chess players discovered that the master chess players were able to “see chunks, or meaningful clusters, of

chess pieces [that] made it possible for the better players to gather more information in the given time.” One could easily do a similar study with martial arts Kata (“patterns”) that would attempt to determine chunking of data among various martial artists’ experience levels.

Perception is another interesting topic that could be applied to the martial arts. One question dealing with perception is whether martial arts training improves the recognition of sensory signals in a meaningful way. That is, does training in martial arts allow one to more easily integrate the several sensory perception for more of a “total picture”? I had several experiences where someone told me that I “paid attention” better after a short period of martial arts training. While an interesting proposition, it nonetheless a single data point. If the training does provide training in perception as well, then why does it do so? Is this similar to dance and athletics, or different?

There are other interesting questions as well, though some will likely never be studied. Within the Bujinkan the test for Godan (“fifth degree black belt”, full instructor level) is well known. The person being tested kneels in front of Dr. Masaaki Hatsumi, the current lineage head, with his or her back to Dr. Hatsumi and their eyes closed. Dr. Hatsumi has a bamboo shinai (split training sword) that he raises over his head. At some random point he strikes at the head of the person in front of him with full force. The test is successful if the person being tested gets out of the sword’s way without getting hit.

That this phenomenon occurs cannot be seriously doubted - the test has been given more than a thousand times. And while there is much public debate (within the organization at any rate) as to the “how”, no definitive answer has been proffered. How this occurs is an interesting question that involves perception. Assuming that one discounts mystical explanations, one is left with only some sort of “subliminal perception”. How one would test this is beyond my current

knowledge, however, but it may be an interesting problem to find a testable hypothesis for this situation.

Consciousness is another potential, though troublesome, area of research within the martial arts. Consciousness research would overlap perception research somewhat as well. Solso (2001, p. 144) defines consciousness as “the awareness of environmental and cognitive events such as the sights and sounds of the world as well as one’s memories, thoughts, feelings, and bodily sensations.” The awareness portion would be tested in the same way as one would test perception, but what of the rest of Solso’s definition?

Within many martial arts is the concept of Mushin, a state involving “chatterless” concentration. How is this state different than our normal self-talk? Is this state different? Fortunately, movement is not necessary for this state to be entered, though that is an interesting question in itself. A study that compares Mushin with meditative and standard self-talk states could be revealing. Does Mushin change with movement? Is it identical to a standard meditative state? If so, much can be gleaned from the study of both meditative states. If this state is not different than a meditative state then what are the relevant differences? While thoughts would be missing, what feelings, memories, and bodily sensations would be present? What of “pictorial thoughts” (flashes of imagery that convey deep, symbolic meaning in an instantaneous manner)? Are these more common than linguistic thoughts when one enters Mushin?

Creativity can also be studied with martial arts, though creativity in general is somewhat problematic to study. Solso (2001, p. 462) defines creativity as “a cognitive activity that results in a new or novel way of viewing a problem or situation.” Solso (2001, p. 462) further describes the current model of creativity as a four stage process involving 1) Preparation, 2) Incubation, 3)

Illumination, and 4) Verification. He also notes “empirical evidence ... is almost nonexistent” (Solso, 2001, p. 462). Does creative response within martial arts follow these four steps?

It is possible, however the steps would be very compact. Are the martial arts creative? Intuitively we may say “yes”, but what model of creativity would we use? Incubation would be the problematic step – how does one incubate in such a short period of time? Further, we could ask if the martial arts enhance or hinder creativity? One can design an experiment of the latter problem fairly easily by comparing a control group of non-martial artists with a group of martial artists in a test of physical and mental creativity. One might expect more physical creativity and similar mental creativity, however these results cannot be guaranteed. Does physical creativity translate into mental creativity? How about the other way around?

The list that I have presented is not complete, and I expect that many more possibilities for theoretical research could be found. For instance Solso (2001, p. 479) mentions a test of general intelligence involving a subject group learning to play the game “Tetris”. In this case the Glucose Metabolic Rates (GMR) were compared both before and after a period of training. It was discovered that even though they had improved “sevenfold”, the GMR actually decreased significantly. One may ask after reading this study what would we would discover by testing the GMR of different skill levels of martial artists.

General research into human intelligence is also possible. Solso (2001, 469) notes that human intelligence includes at least the following abilities: to classify patterns, to reason deductively, to modify behavior adaptively, to reason deductively, to reason inductively - to generalize, to develop and use conceptual models, to understand. The martial artist utilizes each of these abilities in his or her training. From the ability to classify patterns (Kata) to the ability to

modify behavior adaptively (free response drills) each of them are used to some extent and, generally, in a unique fashion.

Research into the psychological aspects of martial arts is becoming more popular, though at this point the literature seems to be focusing on the application of martial arts to therapy and various social and historical aspects. Literature has noted the similarities of studying martial arts to psychotherapy and has suggested that both therapist and client can utilize martial arts for a more productive relationship.

For these reasons I have proposed that martial arts can be the subject of pure research as well, focusing on the topic of Cognitive Psychology. I have shown possible links between prototype formation and “essence” of a given martial art, and the relation of human intelligence to the martial arts. Pattern matching, problem solving, perception, and consciousness were also covered with the hope that the reader will understand some possibilities of research into cognitive aspects of martial arts, with the potential of discovering their own paths of research as well.

This paper did not, and cannot, present a comprehensive treatment of the psychological aspects of the martial arts. If the reader wishes to offer constructive criticism or exchange further information, the author can be reached at kengifirbrom@yahoo.com.

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