

THE PRINCIPLES OF EXECUTING KARATE TECHNIQUES

In order to execute an effective karate technique, It is not enough to merely engage the arms or legs in a properly carried out movement, for the outcome of the technique will also depend on the state of contraction of the trunk's muscular-skeletal system. The trunk's musculo-skeletal system is responsible for the execution of techniques using the principles of submaximal contraction, maximal contraction, vibration, rotation and expansion while the upper extremities are engaged in arm techniques and the lower in leg techniques. In order for both arm and leg techniques to be effective, they must have the support of the trunk's musculature. The muscles that are located on the surface of the trunk, especially in front of the body, become an important factor in effectively executing techniques. Their contraction at the right moment provides optimal stability in both arm and leg techniques and as a simultaneous shield to the body's internal organs when under going the opponent's attack.

The front part of the neck and abdomen is covered with muscles and free of bones allowing movement that is particularly apparent in the neck and the lumbar part of the body. The thoracic cavity contains the heart and lungs organs that cannot function if their environmental conditions are drastically changed. They are inside an "armor" comprised of the ribs and the spinal column. The organs of the abdominal cavity can withstand constant changes in pressure. Thus, it is possible to drastically change the pressure in the abdominal cavity by contracting the abdominal and thoracic muscles. These changes are transmitted to a certain extent to the organs above the diaphragm, however the pressure there is considerably less than in the abdominal cavity. This is one of the most important roles of the diaphragm muscle as it separates the abdominal cavity from the thoracic cavity.

The trunk muscles are primarily composed of red, slow contracting fiber that are capable of prolonged, repetitive, low-intensity contractions, The white, fast contracting fibers are predominantly in the upper and lower extremities, and are capable of rapid, high-intensity contractions. This fact was understood by the old karate masters many years ago, who empirically established the order of contractions in executing techniques without knowledge of histological and biochemical composition of the muscle fiber. First the abdominal muscles contract and then those of the extremities. Thus only the sharp eye of the old master was enough to realize the imperative of correct biomechanics, without understanding the real reasons why the techniques should be approached in such a manner. This factor remains an important principle today, although it is gradually undergoing changes that are the result of a new training philosophy and karate's development as a competitive sport.

THE PRINCIPLE OF SUBMAXIMAL CONTRACTION.

While the order of muscular contractions included in the techniques remain the same in modern karate, the intensity of the muscle contractions and the number of muscle groups included in action has changed somewhat. In sports competition the goal of action is to score points. These points can be scored with submaximal contraction. Often the speed of the technique will be more important than its slaying power. This can be seen in the judging rules that denote most arm techniques as "half-point techniques", thereby inferring that the techniques are good, but if it is executed without stopping and the opponent is hit, he would not undergo serious injury. Thus the principle of submaximum contractions in executing techniques is characterized as a lower-submaximal level of muscle contraction (primarily of the abdominal muscles and the front side of the shoulder region), only sufficient to support a fast technique. The number of muscle fibers included in this action is less than the absolute maximum for that technique. In the principle of submaximal contraction, the tension is greatest in the muscles of the lower abdomen and it will decrease as we move away from this epicenter of action.

This type of technique will usually not be combined with maximal exhaling. The principle of submaximal contraction is most often used when executing a technique in the "oi" Position. It is increasingly found in competitive karate where the techniques (e.g. punch) are executed with a simultaneous guard-block with the

opposite hand. In all these conditions the technique is executed rapidly and ki-ai is "shorter", i.e. "faster" due to the speed of contraction of the abdominal muscles. *Thus* we can speak of the principle of executing a technique with "shorter ki-ai".

THE PRINCIPLE OF MAXIMAL CONTRACTION

Contrary to the previous example of submaximal involvement of the muscles in contraction, here a large number of muscle fibers will be contracted, thereby enabling the rest of the body to give optimum support to the technique. Somewhat more time is needed to execute a technique with maximum contraction than for submaximum contraction. It will be used in conditions where the technique must be destructive, karate as a martial art. Contraction of the powerful abdominal muscle will have far greater effect through the diaphragm on pressure changes in the thoracic-chest cavity and therefore Kikai will be much more powerful here than with the principle of submaximum contractions. There is a notable Peeling of a strong muscular involvement when executing techniques using the principle of maximal contraction. This is most often used when executing a technique in "gyaku" position.

THE PRINCIPLE OF VIBRATION

The principle of vibration in its performance engages large muscle groups, in strong muscle contraction providing support for the technique that follows. Due to maximal involvement of the large number of the muscles, principle of vibration will require a bit more time comparing with, for example principle of submaximal contraction. On the other hand, an advantage of the principle of vibration is strength of the technique executed. The vibration is very much used in practice of karate as a martial art and self-defense. The name vibration derives from the impression that one reels when vibration is executed, since pelvic region is moved back and forth causing low abdominal area to "vibrate". Strong contraction of the abdominal musculature will exert pressure on the diaphragm causing very strong "ki-ai". It is more often that this principle is utilized when technique is executed from either fudo or kiba-dachi, than when technique is executed in gyaku position although that combination is possible and very practical (Fig. 11-6).

THE PRINCIPLE OF ROTATION

Although an extremely effective way of executing a technique, this form is notably employed less than might be expected considering its effectiveness and possibilities both in defense and attack situations. In the rotation principle, the technique is executed together with rotating the trunk starting with the contraction of the lower abdominal muscles and spreading it up to the shoulder region in order to move the trunk around the central - vertical axis of the body. The rotation principle can be a very effective way of executing a block where the inertia of the rotating trunk is included in the power of the block. The same principle of including the inertia of rotation in the technique should be used both for arm and leg techniques.

THE PRINCIPLE OF EXPANSION

The expansion principle of executing karate techniques is far more popular in karate as a martial art than in karate as a competitive sport. Expansion will "extend" every technique and make it more penetrating, which is important for martial arts. The expansion principle in the punching technique is executed such that at the end of the punch there is a forward "extension" of the technique. The shoulder blade (scapula) moves considerably outward (abduction of the shoulder blade) and enables the arm skeletal system to advance by approximately 3-5 cm from the position in which the arm would stop without expansion.

The expansion principle in executing leg techniques will include a hip movement that "extends" the kick

and increases its aggressiveness. When executing techniques with the principle of expansion, care must be taken not to disturb the correct position of the body. Expansion does not mean that the biomechanics of the movement may be disturbed, rather this is a principle whose goal is to strengthen and not weaken the technique, which would happen if the body was partially thrown off balance when executing the technique.

The similarities and differences between karate as a martial art and karate as a sport are the four above-described principles of executing karate techniques. They are organized by order of importance of training for both types of karate. The order of the principle of execution of the technique changes when going from karate as a martial art to karate as a competitive sport. The principle of maximum contraction is dominant in the martial art since greater importance is put on the power of the techniques. At the same time, this principle plays a much smaller role in karate as a competitive sport and is pushed back to third place by order of importance and popularity. The principle of expansion is in a similar situation since it is rarely used in the sports competition. Generally speaking it is practiced far more than needed for an effective tournament match in sport karate.

Getting in shape for competition requires execution of series of fast technique biomechanically accurate and effective at the right moment when attacking the opponent. Such a technique can be executed with great speed and precision, using the action of a smaller number of muscles of the trunk and shoulder region, i.e. according to the submaximum contraction principle. The principle of submaximum contraction is a very frequent form of attack in sports sparring. The speed, accuracy of the technique, and the moment the technique is executed are sufficient for the technique to score points. Contrary to this is defense against an attacker who repeats his attacks in a series, one after the other, which is frequently seen in modern sports matches. The attack can be eluded by using the rotating action of the trunk as a powerful block, i.e. the technique will be executed here using the principle of rotation. Thus in sports matches, the principles of submaximum contraction and rotation are most often used which puts training and the philosophy of karate as a sport in a position opposite to one seen in the case of martial arts.

Changes in the judging rules and the main goal of the match require a change in the karate athlete's preparation. Training for modern competitive karate should abound with exercises of explosive power that include the large muscle group. The athlete should be able to maneuver in all directions, have good powers of concentration and the ability to adapt to the match conditions, both with an opponent of the same height and with those who are taller or shorter. One can only design the training program of competitors of different ages and sex if we have correctly grasped the goal of training and the need for the athlete's conditioning. New competition conditions must be met by changes in the athlete's preparations - competition dictates the type of training.

BODY SHIFTING

Body shifting can be defined as shifting the body's center of gravity in all directions. The body shiftings are divided into body movements and body positions. This form of karate technique, as others has undergone changes, i.e. taken on new significance and development possibilities in conditions of karate as a competitive sport.

BODY MOVEMENTS

Body movements can be defined as actions in which the body goes from one stance to another whereby the body and its center of equilibrium move from the initial position into a new position. Movement in kata is strictly related by the technical combination of kata, both in the direction in which action is focused and in the stance used to claim horizontal and vertical space. In sparring it is arbitrary and can take any form whatsoever. The dynamics of sparring in a competition require aggressive movements influenced by both the athletes' technical knowledge and fitness level. The outcome of effective maneuvering during sparring, and thereby the outcome of the match itself, depends less on the body's general fitness (cardiorespiratory conditions) and "more on specific fitness (facility of movement). Through movement, an optimal distance will be maintained between contestants. It will be in accordance with the tactics of the match and the realistic possibilities between the athlete and opponent. The need to quickly change position has increased

in importance requiring that the athlete develop explosive strength and speed in the muscles of the lower extremities which with more than one point in the match become a deciding factor in the successful outcome.